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What drives global B2B e-commerce usage: an analysis of the effect of the complexity of trading system and competition pressure

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ABSTRACT

The purpose of this paper is to examine the conditions in which B2B e-commerce is most likely to diffuse widely at the country level. This paper examines the role of trading system complexity and pressure of competition on B2B EC diffusion by controlling Gross domestic product (GDP) per capita and Information and Communication Technology (ICT) infrastructure. Our sample comprises a pool of country-year dataset from 143 countries over a three-year period (2014–2016). The data were collected from Network Readiness Index Report and Global Competitiveness Report. The findings provide evidence that greater the complexity of trading relationships with the global economy and high level of pressure from the competition are the main forces for B2B use across countries. Consequently, the authors suggest that having a strong trade relationship with developed countries with matured B2B e-commerce practice is helpful in sustaining B2B e-commerce use across countries.

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B2B e-commerce; cross-countries; digital divide; complexity of trading system

Introduction

Business to Business E-commerce (B2B EC) is defined as Internet-enabled B2B technologies used by firms to conduct buying, selling, and exchange of information with their supply chain partners (Sila 2015, 2013). B2B EC is viewed as one of the important measures for achieving social and economic prosperity of both developed and developing countries. It is also widely regarded as one of the key ingredients of business success and a mechanism to increase corporate and public organisation efficiency (Alsaad, Mohamad, and Ismail 2014). Due to its potential, firms in developed economies have benefit extensively from the deployment of B2B EC across various industries (Bouchbout and Alimazighi 2009). In fact, more than three-quarter of total online B2B transactions are dominated by the developed economies, particularly United States, United Kingdom, Japan, and China (United Nations 2015). In contrast, many developing countries are still lagging far behind the developed nations in reaping the potential benefits of B2B EC. While many public and global agencies such as World Trading Organization (WTO) strive to bridge the uneven diffusion gap of B2B EC worldwide and to promote active involvement of less developing countries into a multilateral trading system via e-commerce trading, the diffusion gap across countries was broadened rather than narrowed in the past decade (Alsaad, Mohamad, and Ismail 2015; Gibbs, Kraemer, and Dedrick 2003; Kshetri and Dholakia 2002; Zhu, Thatcher, and Thatcher 2015; Zhu and Thatcher 2010). In this respect, diffusion of B2B EC refers to the extent that organisations in a country assimilate, exploit, and use of B2B EC

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technologies into their business operations. The diffusion of B2B EC is usually measured as an intensity of the technology used by the organisations in a particular country (Jeyaraj, Rottman, and Lacity 2006; Mohamad and Ismail 2009).

Considering the fact that the use of B2B EC technologies in a country takes place once firms start to incorporate those technologies in their business transactions, most of the previous research has diverted special attention to understand firm-level determinants of B2B EC usage (Alsaad, Mohamad, and Ismail 2017, 2014; Gibbs, Kraemer, and Dedrick 2003; Kshetri and Dholakia 2002; Robey, Im, and Wareham 2008). While studying the use of B2B EC at the firm level in a country-specific context is of value in understanding the use of B2B EC in general, there is a need to complement these initiatives with a more systematic analysis on global usage of B2B EC. This is in line with King, Gurbaxani, Kraemer, McFarlan, Raman and Yap (1994) and Currie (2009) suggestions that understanding the macro environment would offer an insight into dynamics that shape the design and the use of information systems, i.e. B2B EC, of a particular country. Therefore, the main objective in this study is to examine the conditions in which B2B EC is most likely to diffuse widely at the country level. Doing so would offer more insightful evidence to facilitate policy-making and to explore potential methodologies to enable more effective B2B EC diffusion worldwide (Gibbs, Kraemer, and Dedrick 2003; Kshetri and Dholakia 2002; Weber and Kauffman 2011).

Grounding on the basic premise of the theory of Transaction Cost economy which emphasises the selection of efficient governance structure to manage economic transactions (Williamson 1985), we suggest that the increasing development of complex economic and complexity of structures and of social relations within a country drive the spread of B2B EC across countries. This is based on the proposition that increased the complexity of the trade system (locally and globally) within the country demands for appropriate governance mechanism to ensure efficiency and to enhance the capacity of the trading system (Drori, Jang, and Meyer 2006). As B2B EC is proclaimed to be an effective market mechanism to manage inter-firm's trading transactions (Alsaad, Mohamad, and Ismail 2014; Kurnia, Karnali, and Rahim 2015; Shi and Liao 2015), we anticipate that the diffusion of this technology across countries depends on the complexity of the country's trading system. The empirical analysis in this paper employed domestic and foreign market size, which is obtained from Global Competitiveness Report (GCR), as proxies for the complexity of the country's trading system. We further argue that pressure resulted from competition could be another powerful force in explaining the diffusion of B2B EC at the country level. Competition pressure refers to a market situation in which traders strive for customers in a way that induces them to become more efficient in providing products and services at lower prices (Dong, Xu, and Zhu 2009; Gomaa 2014). Such situation induces greater allocation of resources to sustain competitiveness and ultimately spurs greater firm's efficiency. In response to greater competitive pressure, firms tend to be more innovative in finding possible ways to operate the business in more effective manner. Therefore, we expect that B2B EC will spread greatly in highly competitive economics. In our empirical analysis, we measured country's level of competitive pressure based on local market competition index as obtained from GCR.

Literature view

Business to Business E-commerce (B2B EC) is defined as Internet-enabled B2B technologies used by firms to perform buying, selling, and exchange of information with their supply chain partners. B2B EC encompasses a wide range of technologies such as the Internet, traditional Electronic Data Interchange (EDI) systems, online auctions, electronic marketplaces, electronic hubs and electronic supply chain systems (Sila 2015, 2013). The use of Internet technologies to facilitate B2B transactions has attracted considerable attention from both practitioners and academics. This is because of its perils and promises to transform the way in which supply chain operations are conducted (Alsaad, Mohamad, and Ismail 2015; Sila 2015). The importance of global B2B EC has increased tremendously in the past decade. It is reported that the volumes of global B2B EC transactions have surpassed $15 trillion (Baller, Dutta, and Lanvin 2015). More than three-quarters of the total transactions are

dominated by United States, United Kingdom, Japan, and China respectively (United Nations 2015). According to Forrester Research, B2B EC sales in the United States reached $780 billion in 2015. It constituted 9.3% of the total $9.39 trillion US B2B market in 2015; meanwhile, it is expected to reach 12.1% within five years. In Canada, almost 63% of sales by firms in 2013 were attributable to B2B transactions. B2B EC accounts for 91% and 53% of all EC revenue in the Republic of Korea and the Russian Federation respectively in 2013 (Forrester Research 2015).

While B2B EC has diffused substantially in some economies, its usage in some other countries is not sufficiently or satisfactorily widespread. For instance, less than one-fifth of the enterprises in Bulgaria, Slovakia, Former Yugoslav Republic of Macedonia, Greece, and Cyprus made EC purchases (Eurostat 2015). Similarly, the volume of B2B EC's sales in both Middle East and North Africa was comparatively low with about $9 billion in 2012 (GetElastic 2015). In a similar vein, EC transactions were almost negligible in Africa and most of the Latin America countries (Zhu and Thatcher 2010). These pieces of evidence suggest substantial variation in B2B EC usage across various regions and economies worldwide. More importantly, the problem of uneven distribution of B2B EC amongst countries is getting wider in the last five years (Doong and Ho 2012; Kyriakidou, Michalakelis, and Sphicopoulos 2011).

To some extent, research that has been carried out in the area of the digital divide has shed light on the unequal distribution of Information and Communication Technologies (ICT) use at the national level (Doong and Ho 2012; Haight, Quan-Haase, and Corbett 2014; Weber and Kauffman 2011). The Organisation for Economic Cooperation and Development (OECD) defines digital divide as the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard to their opportunities to access ICT and the use of the Internet for a wide variety of activities (OECD 2001). Investigation of digital divide related issues have been focusing on various kinds of ICTs that include (among others) computer penetration, IT Penetration, Internet penetration, e-commerce diffusion, general ICT development, website adoption, and e-business technologies (Billon, Lera-Lopez, and Marco 2010, 2009; Edward M Crenshaw and Robison, 2006a; Dewan, Ganley, and Kraemer 2010, 2005; Teo and Srivastava 2010).

Most of the factors affecting digital divide can be associated with the characteristics of receiving societies that can be classified into three main categories. The first category comprises of economic-related factors. Empirical studies have found factors such as Gross Domestic Product (GDP) as well as trade and competition play a significant role in shaping the pattern of ICT usage across countries (Billon, Lera-Lopez, and Marco 2010; Edward M Crenshaw and Robison 2006a; Dewan, Ganley, and Kraemer 2005). As for the second category, social factors such as socio-demographic features, levels of access to technology and education have been examined to explain the digital divide across countries (Billon, Lera-Lopez, and Marco 2010; Chinn and Fairlie 2010; Edward M Crenshaw and Robison 2006b; Dewan, Ganley, and Kraemer 2005). Meanwhile, for the third category, researchers have highlighted the role of environmental factors. In this regard, institutional factors such as legal, policy, liberalisation, political stability, political rights, investment climate, commercial openness, and cultural elements potentially explain the presence of digital gap across countries (Chinn and Fairlie 2010, 2006; Oxley and Yeung 2001; Zhu and Thatcher 2010).

A review of the literature shows that the adoption of B2B EC has been examined at different levels. At the firm level, much of research has employed multiple theoretical perspectives to explain why, how and when adoption of B2B EC takes place. Researchers have examined how contingencies related to the organisation; technology, environment, and partnership shape the use of B2B EC, for more details see (Robey, Im, and Wareham 2008). Another stream of research has compared the suggested determinants among a limited number of countries, such as European countries (Gibbs, Kraemer, and Dedrick 2003; Gibbs and Kraemer 2004; Oliveira and Dhillon 2015; Oliveira and Martins 2010; Zhu, Kraemer, and Xu 2006). Meanwhile, a systematic analysis of the conditions necessary for the development of viable B2B EC at the national level is still scant (Gibbs, Kraemer, and Dedrick 2003; Kshetri and Dholakia 2002). A clear knowledge of the mechanisms that describe the use of B2B EC is critical for policy-makers and other stakeholders to facilitate country entry

decisions and selection of the appropriate business models. In this research paper, we propose that understanding the diffusion of B2B EC at national level deserves detailed investigation considering the complexity and magnitude of trading relationships in a country. Next section elaborates further on authors' proposition on how country's complexity of trading relationships could affect diffusion of B2B EC at the national level.

Hypotheses development

Transaction cost economy by Williamson presumes that operating complex transaction and complex business relationships entail substantial efforts and costs in coordinating, supervising and monitoring them (Williamson 1985). Such costs would drive to modernise and become more predictable, regulated, and efficient to conduct trading transactions through effective market mechanism and new technology. These incur the lowest possible production and transaction costs. Information system researchers suggest that B2B EC is an inter-organization mechanism to manage the business relationships and interconnectedness (Alsaad, Mohamad, and Ismail 2014; Kurnia, Karnali, and Rahim 2015; Reimers, Johnston, and Klein 2014; Shi and Liao 2015). B2B EC technologies facilitate the procurement of the needed resources by creating an electronic linkage with the trading partners. These technologies also automate the procurement process and facilitate the process of capturing and transmitting of transactions data (Alsaad, Mohamad, and Ismail 2014; Chatterjee and Ravichandran 2013; Iskandar, Kurokawa, and Leblanc 2001). Recognising these characteristics, we suggest that B2B EC adoption, in itself, cannot be promoted as an end in a country. Instead, the magnitude and the complexity of the trade relationships in a country will determine the level of B2B EC's diffusion in that country. In a country, the size of its markets reflects the magnitude and the complexity of trade relationships and interconnectedness among firms within a country or across countries (Coviello and Munro 1995; Massara and Errico 2011; Pfeffer and Salancik 2003). Markets are depicted as a system of local or global commercial relationships among a number of players including customers, suppliers, competitors and private and public support agencies (Coviello and Munro 1995; Pfeffer and Salancik 2003). From the transaction cost economy perspective, operating complex markets and complex business relationships entail substantial efforts and costs in coordinating, supervising and monitoring trading transaction (Dewan, Ganley, and Kraemer 2005; Drees and Heugens 2013). This would drive to the modernisation of the mechanisms used to manage these complex relationships and in a way where it becomes more predictable, regulated, and efficient in conducting trading transactions through using an effective market mechanism and new technology. As B2B EC effectively manage complex trading relationships, we predict that its diffusion would be relatively higher in a market with the large market size of trading relationships. This lead to the following hypothesis:

H1: The greater the size of the market of a country, the greater the B2B EC usage in that country.

Given the fact that market can be either domestic or foreign market, authors divide the above hypothesis into two sub-hypotheses as follows:

H1a: The greater the size of a domestic market, the greater the B2B EC usage of the country.

H1b: The greater the size of a foreign market, the greater the B2B EC usage of the country.

By simply looking at the complexity of trade relationship does not completely portray a global B2B EC practice. In Williamson's opinion, fierce competition also induces entities in an economy to choose the most efficient governance structure in order to survive now and in the future(Williamson 1985). Hence, the diffusion of B2B EC would largely be affected by the level of competition experienced by firms in a country. This study conceptualises competitive pressure as the extent to which organisations in a country is affected by the competition in the market as to embrace an innovation (Huo, Zhao, and Zhou 2014; Zhu and Kraemer 2005). Competition encourages firms to innovate as part of the response to compete with their business rivals (Picoto, Bélanger, and Palma-dos-Reis

2014; Wu, Mahajan, and Balasubramanian 2003; Wu and Lee 2005). In a highly competitive business environment, firms need to reconfigure their internal and external processes to match the requirements of the rapidly changing environment so as to avoid being left behind. As such, adopting new technology like B2B EC enables the firms to establish a closer connection as well as to integrate their processes with downstream and upstream partners more efficiently. The B2B EC, therefore, has the potential to foster firms' response to customer demands by enabling a greater degree of customisation and by reducing lead times (Huo, Zhao, and Zhou 2014; Lin 2014; Sila 2013, 2010; Teo, Wei, and Benbasat 2003; Zhu and Kraemer 2005). In response to that, firm facing higher level of competitive pressure is more likely to embrace B2B EC as part of its effort to sustain the competitive advantage over their rivals. Concerted action across firms to embrace B2B EC in response to the competitive pressure ultimately increases the level of B2B EC's usage of the country. Thereby, authors formulate the second hypothesis as follows:

H2: The greater the level of competition a country experience, the greater is the B2B EC usage of the country.

Research method

Sample of the study comprised of 143 countries as listed in the Network Readiness Index (NRI) Report and Global Competitiveness Index (GCI) Report; the annual publications of World Economic Forum. Both reports are considered as reliable and have been extensively adopted in academic research (Krishnan, Teo, and Lim 2013; Teo and Srivastava 2010). The NRI report that accompanies Global Information Technology Report specifically assesses the factors, institutions, and policies assisting the leverage of ICTs in 143 countries worldwide. The network readiness aspects include political and regulatory environment, business and innovation environment, infrastructure, affordability, skills, individual usage, business usage, government usage, economic impact, and social impact. Meanwhile, GCI, as presented in Global Competitiveness Report, provides comprehensive analysis and ranking on competitiveness landscape of 143 economies worldwide with respect to the factors influencing their productivity and prosperity. The index measures a country's competitiveness based on 12 primary pillars; institutions, infrastructure, macroeconomic environment, health and primary education, higher education and training, goods market efficiency, labour market efficiency, financial market development, technological readiness, market size, business sophistication and innovation. Overall, the country's competitiveness is assessed based on 113 indicators obtained via Executive Survey Opinion and various international statistical resources.

The dependent variable of this study is B2B EC diffusion that refers to the extent to which organisations in a particular country assimilate, exploit, and use B2B EC technologies into their operations. The B2B diffusion is measured as an intensity of the technology usage by organisations in that country (Jeyaraj, Rottman, and Lacity 2006; Mohamad and Ismail 2009). Therefore, for the purpose of this study, authors employed B2B Internet-use index as reported by NRI to represent the rate of B2B EC diffusion of a country. The B2B EC internet-use index measures the extent to which businesses in a particular country use ICTs for conducting their B2B transactions. The NRI measures B2B EC Internet-use index for each country based on a 7-point scale; of which 1 represents not used at all and 7 indicates used to a great extent. Extracted data for 24 countries as shown in Table 1 depicts the diversity of B2B EC diffusion across countries.

Three independent variables considered were Foreign Market Size, Domestic Market Size, and Competitive Pressure. Data representing these variables were obtained from GCI report. Domestic Market Size is measured as the sum of gross domestic product plus value of imports of goods and services, minus value of exports of goods and services. These are then converted into a 7-point scale. Meanwhile, Foreign Market Size is measured based on the value of goods and services export that is also converted into a 7-point scale. Finally, Competitive Pressure is measured based on the level of intensity of the competition in the local markets [1 = not intense at all; 7 = extremely intense].

Table 1. B2B Internet use index of selected countries: 2014–2016.

	B2B EC Internet Use Index		
Country name	2014	2015	2016
United Kingdom	6.260	6.296	6.368
Korea, Rep.	6.173	5.970	5.777
United States	6.169	6.257	6.321
Netherlands	6.010	6.030	6.040
Sweden	5.975	6.027	6.005
Japan	5.963	6.069	5.953
Taiwan, China	5.927	5.727	5.289
Norway	5.847	5.924	5.798
Czech Republic	5.824	5.791	5.772
Lithuania	5.813	5.913	5.827
Estonia	5.795	5.797	5.787
Australia	5.781	5.672	5.477
Switzerland	5.773	5.799	5.721
Myanmar	3.242	3.216	3.313
Guinea	3.095	2.989	2.989
Gabon	3.089	3.038	3.205
Mauritania	3.085	3.086	2.775
Lesotho	3.069	3.073	3.299
Lebanon	2.985	3.150	3.545
Bhutan	2.982	3.124	3.463
Algeria	2.725	2.895	3.310
Ethiopia	2.677	2.759	3.441
Burundi	2.613	2.622	2.622
Chad	2.472	2.203	2.202

We also incorporated several control variables into the proposed research model; GDP per capita – to control the possible influence of a country's level of economic development; ICT infrastructure – to control the effect of ICT infrastructure development of the country (including mobile network coverage, international Internet bandwidth, secure Internet servers, and electricity production) that account for significant variance in ICT diffusion (Teo and Srivastava 2010). GDP per capita is the indicator commonly used to capture the level of nation's microeconomic capabilities. The values for which are taken from world economic outlook database by International Monetary Fund's (IMF) (IMF 2017). The ICT infrastructure index values were obtained from NRI (NRI 2016).

For the purpose of data analysis, the present study has considered the most recent data reported for 143 countries in the last three years (2014–2016). Therefore, the final samples comprised of 400 country-year observations (three years data for 143 countries), after excluding observations with incomplete data on one or more of the explanatory or control variables.

Data analysis and results

The descriptive statistics of the independent variables and dependent variable from 2013 to 2015 are presented in Table 2.

Table 2. The descriptive statistics of the independent variables and dependent variable.

	2014		2015		2015	
Variables	Mean	SD	Mean	SD	Mean	SD
Competition Pressure	4.52	0.55	4.51	0.54	4.52	0.53
Domestic market size	3.57	1.20	3.67	1.24	3.64	1.25
Foreign market size	4.44	1.10	4.53	1.06	4.52	1.06
B2B EC	4.43	0.90	4.45	0.92	4.48	0.87
ICT Infrastructure	4.08	1.51	4.05	1.60	4.19	1.62
GDP (*billion USD*)	736.10	2255.09	767.28	2383.93	800.85	2518.00

This study employed Partial Least Squares-SEM (PLS) for hypotheses testing purpose. PLS has several advantages over other types of data analysis. It imposes minimal demands in terms of measurement scales and sample sizes to validate the proposed model (Elrehail et al. 2018). PLS does not assume true independence of the variables, data normality, and is not affected by omission of regressors (Chin 2010; Hair et al. 2014; Teo and Srivastava 2010). Moreover, PLS is a suitable choice for the purpose of exploration and development of theory (Hair, Ringle, and Sarstedt 2011). More importantly, PLS has been used in similar studies investigating cross-country phenomena that utilise secondary data in their analysis (Krishnan, Teo, and Lim 2013; Teo and Srivastava 2010).

Following Teo, Wei, and Benbasat (2003), we estimated three models; the full model which included the predictors, the criterion variable and the block of the control variables, the theoretical model which included the hypnotised model without the inclusion of the control variables, and finally the control model which included only the control variables. These three models were designed to offer a basis for assessing the true impact of the hypnotised variables and rule out an alternate explanation for the findings. The results of the PLS bootstrapping analysis are depicted in Figure 1 and presented in Table 3. As shown in Table 3, a comparison between the full model and the control model shows that the full model explains a moderate incremental variance of (0.75–0.66) 9 percent (Cohen 1988). Similarly, the incremental variance resulted from comparing the full model and the theoretical model amounts to a 12 percent. The magnitude and significance of the hypothesised relationships did not change when the control variables are included or removed. These results suggest that our theoretical model is qualitatively equivalent to a model which includes all of the control variables. Nevertheless, GDP as a control variable in the full model and in the control model behaved differently. The effect of GDP decreased in magnitude and significance after inclusion all independent variables, which means that the increase of B2B EC use is more likely to be explained by dependence and competition than economic factors. Not surprisingly, ICT infrastructure (path coefficient = 0.497; $p < 0.00$) exerts a significant effect on the usage of B2B EC. The results also show that Foreign market size (path coefficient = 0.20; $p < 0.05$) and competition pressure (path coefficient = 0.24; $p < 0.01$) are positively and significantly influencing B2B e-commerce usage, as earlier hypothesised. Contrary to the expectation, the Domestic market size does not affect the usage of B2B e-commerce (path coefficient = 0.09; $p > 0.05$). Finally, our model substantially explains 74 percent of the use of B2B EC in a country.

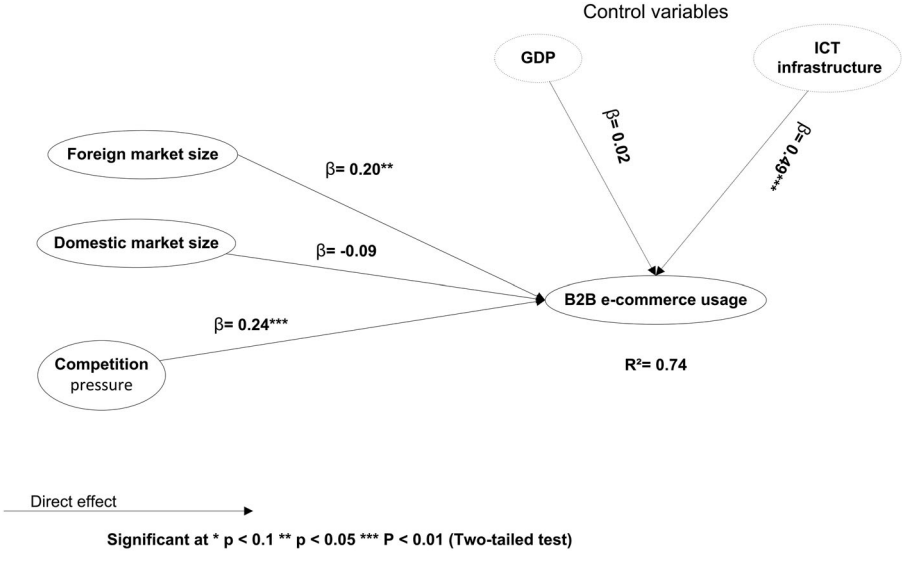

Figure 1. PLS bootstrapping results.

Table 3. PLS bootstrapping results.

	Variables	Path Coefficient	Standard Deviation	Standard Error	*T*-Statistics	*P*-value
Full model						
$R^2 = 0.74$						
	Competition	0.24	0.03	0.03	7.88	0.00
	Domestic Market Size	0.09	0.08	0.08	1.14	0.12
	Foreign Market Size	0.20	0.08	0.08	2.58	0.01
	GDP	0.02	0.02	0.02	1.57	0.25
	ICT	0.49	0.04	0.04	13.78	0.00
Theoretical model						
$R^2 = 0.63$						
	Competition	0.45	0.03	0.03	13.65	0.00
	Domestic Market Size	−0.16	0.09	0.09	1.72	0.08
	Foreign Market Size	0.65	0.09	0.09	6.99	0.00
Control model						
$R^2 = 0.66$						
	GDP	0.16	0.02	0.02	7.65	0.00
	ICT	0.77	0.02	0.02	42.94	0.00

Discussions

This paper aims to analyze the regional distribution of B2B EC adoption across countries. Our samples consisted of 400 country-year observations from 143 countries over a three-year period from 2014 to 2016. This paper distinguishes itself from the previous literature on ICT adoption by investigating for the first time, factors affecting the use of B2B EC at the national level. Specifically, this study pays particular attention to the role of national and international market size and pressure of competition towards B2B EC usage of a country. The empirical results obtained indicate that intensity of B2B EC usage is positively affected by the level of ICT infrastructure, the size of foreign market and intensity of pressure of competition.

We start from the premise that availability of a profound ICT infrastructure is a key determinant of B2B EC diffusion rates across countries. It is generally the case that a platform or a framework wherein electronic transactions can be done. Our result shows that the size of the foreign market which includes multiple relationships between suppliers and customer worldwide is an important driver of a country's B2B EC diffusion, as these relationships need ICT tools as a mechanism to manage and to coordinate trading transactions and relationships. The integration of countries into the global trading system often involves the adoption of B2B EC by firms in these countries as a condition for managing and participating in such system. This result corresponds to earlier findings that the diffusion of B2B EC is driven by global forces where foreign and multi-national firms push B2B EC technology to their global business partners i.e. customers, suppliers and subsidiaries (Gibbs, Kraemer, and Dedrick 2003; Gibbs and Kraemer 2004). Our finding also agrees to some extent with the notion that a greater business relationship with other (foreign) economies creates opportunities to influence, interact and learn from the foreign countries(Guler, Guillén, and Macpherson 2002; Neumayer and Perkins 2005; Prakash and Potoski 2007; Zhou and Park 2012). Foreign trade relationships are therefore seen as providing an important mechanism for the shaping, production, and transfer of new technology including B2B EC across countries. From another perspective, our results further suggest that competitive pressure promotes greater B2B EC deployment in a country as it has great potential to reduce business operating costs and increase market share. It also offers a great opportunity for firms to remain competitive with their rivals. The fierce competition in the volatile economic environment today has stimulated firms to search for new external partnerships and through, which they can compete to gain and sustain a competitive advantage. Therefore, there is an urgent need for an effective system to manage these external relations and we claim that B2B EC has the potential to do so. To conclude, the use of B2B EC is relatively higher in a country with a more competitive environment. This corresponds in a great deal with findings of prior research that

highlights the importance of competitive pressure for e-commerce adoption (Huo, Zhao, and Zhou 2014; Lin 2014; Sila 2013, 2010; Teo, Wei, and Benbasat 2003; Zhu and Kraemer 2005).

However, contradict to earlier expectation, the result shows reliance on the domestic market to be negatively affecting B2B EC diffusion. A plausible explanation for this result is that firms in a country have to conform to the prevailing norms and practices of the domestic market (Angst et al. 2010; Ansari, Fiss, and Zajac 2010). In some societies, firms may sense that adoption of B2B EC will likely cause disruption in current successful routines that are deeply embedded in their value system which is considered a source of success (Kshetri 2010). That is, potential adopter will be affected by social processes, norms, and expectations to justify his adoptionist behaviour. In many societies where B2B EC is not socially acceptable, potential adopters will conform to the social expectations.

Research implications

From theoretical perspectives, our understanding of the diffusion of B2B EC is enriched when we expand the analysis beyond the individual firm's actions and address the impact of the complexity of the trading system. Understanding the macro environment deliver an insight into dynamics that shape the design and the use of information systems in a particular country. Therefore, examining the determinants of cross-country B2B EC usage offers other insightful evidence to facilitate policy-making and to explore methodologies by which B2B EC diffusion can be made to work even better worldwide (Gibbs, Kraemer, and Dedrick 2003; Kshetri and Dholakia 2002; Weber and Kauffman 2011). Unlike prior research on the global diffusion of ICT emphasising the role of national base institutional framework such as ICT infrastructure, economic and financial resources, and human capital for e-commerce to flourish; the main theoretical implication from this study is that B2B EC, by itself, cannot be promoted as an end at country level by merely improving the institutional environment in a country. The demand for greater B2B EC usage increases when the businesses start to experience global trading relationships. This implies that the high productivity gain in B2B EC is likely to be due to the increased inter-firm transaction across countries, resulted from new interconnectedness and interdependence.

Our findings also suggest that looking at the complexity of trading relationships alone does not provide a complete picture of global B2B EC practice. The pressure of competition is a key determinant of global B2B EC usage. This implies that as global competition is heated, companies are striving to build stronger ties with pioneered partners to stay competitive and healthy. The authors suggest that stronger ties with trading partners residing in developed countries and following matured B2B EC practices are extremely helpful to promote B2B EC usage in a country. Moreover, aid from developed countries can help to foster the diffusion of B2B EC and might be better spent on training the trading partners and carrying out infrastructure-related development. Apart from that, the government should encourage open-door policies for cross-country trading activities that provide a platform for learning, interaction, and adoption of best practices from developed countries. To ensure that firms in a country are adopting up-to-date technologies including B2B EC, the government should promote and preserve competition environment among businesses.

Limitations

Finally, no research comes without limitations. One of the main limitations of this study is related to the use of secondary data. We utilised indices and data as formulated by the issuing agencies, thus giving us minor control over the definition of variables. This study also limits the underlying variables to the complexity of the trading system and pressure of competition as we are not able to obtain some other interesting variables related to institutional, social, demographic, and environment, as well as policy. Future research may consider including those variables in order to obtain richer insights from the data. Another possible avenue for future research is to investigate the mechanisms in which innovation is being transferred from advanced economies to developing economies.

Institutional theory by DiMaggio and Powell (1983) suggests three mechanisms namely; pressure by coercion, normative pressure, and mimetic pressure which could be used to describe this phenomenon.

Conclusion

In this study, we propose a research framework that explains the diffusion of B2B EC from country-level perspective. The research model examines the effect of the complexity of the trading system (as represented by foreign market size and domestic market size) and the effect of competitive pressure on the country's diffusion of B2B EC by controlling the effect of GDP and ICT infrastructure. We utilised data from secondary sources (NRI and GCI) with a set of data from 143 countries over three years to empirically test the proposed research model. The results of the study offer strong support for the effect of foreign market size and competitive pressure. The demand for greater B2B EC usage in a country increases in line with the increases of global trade relationships as experienced by the businesses. Understanding these macro environments deliver an insight into dynamics that shape the design and the use of B2B EC in a particular country.

Disclosure statement

No potential conflict of interest was reported by the authors.

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