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Country Environments and E-commerce Adoption: A Cross-Country Analysis

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ABSTRACT

This paper develops and empirically tests a comprehensive model of country level e-commerce adoption. In doing so, it bridges important gaps in the literature. Research on e-commerce adoption at the country level has been confined to small sample sizes which limit the generalization of their findings. This paper overcomes this limitation by using data from a larger sample of countries. Factors such as “social and cultural environment”, “legal environment”, “government policy and vision related to IT”, “social trust”, “uncertainty avoidance”, and “connectivity” are included in our model to examine their influence on country level ecommerce adoption. The hypotheses are confirmed using PLS analytical procedures and the findings are reported. We discuss the results and their implications for researchers and practitioners.

KEYWORDS: E-commerce adoption, Country environment, Social trust, Cross-country studies, Uncertainty avoidance, Legal environment

INTRODUCTION

The electronic commerce (e-commerce) phenomenon continues to generate great interest among researchers and practitioners. Despite receiving much attention, its adoption at the global level remains quite low (Wigder 2010). Many studies point to insignificant adoption of e-commerce (European Commission 2011; Stambor 2010). Many studies indicate macro level differences in e-commerce adoption rates among different countries. In the IS literature, most studies have examined electronic commerce from many different facets such as individual, organizational, business-to-consumer, and business-to-business relationships. Studies of macro level factors that influence adoption of electronic commerce are scarce in the IS literature. This paper bridges this gap in the literature by developing a model of country level e-commerce adoption and validating it using PLS analytic analysis.

Evidence exists about differential rates of e-commerce adoption among countries. One may expect disparity in adoption rates between the technology developed and the less technology-developed countries. In 2010, the U.S., South Korea, Canada and other developed countries in Europe ranked high in the “Extent of Business Internet Use” category, while countries in Africa and South America were at the bottom of the list (Dutta 2010). Even among the developed countries, considerable disparity in the rate of adoption of e-commerce existed in 2006 (UNCTAD 2006). For example, the shares of enterprises purchasing online in the European countries ranged from less than 10% in Italy to more than 50% in UK (UNCTAD 2006).
Until now, the investigation of the adoption and diffusion of e-commerce has been limited to either specific countries such as France (Brousseau 2003), Taiwan (Chen and Barnes 2007), USA and Canada (Hong and Zhu 2006), China (Stylianou et al. 2003; Yoon 2009), and Singapore (Wong 2003) or groups of small number of countries such as 17 European countries (Ho et al. 2007); USA and China (Tong 2010); South Africa and Sub-Saharan countries (Molla and Licker 2005). Almost all of these studies are limited by small sample of countries preventing generalization of their findings to overall country-level factors on e-commerce adoption. To overcome this limitation, data from greater number of countries are needed.

This study examines the effect of country-level factors on e-commerce adoption by consumers and firms. These factors are “social and cultural environment”, “legal environment”, “government policy and vision related to IT”, “social trust”, “uncertainty avoidance”, and “connectivity”. Country level e-commerce adoption is measured by consumer spending on ICT per capita; level of e-business development; level of online commerce; and availability of online public services for citizens and businesses. Thus, this study makes the following contributions:

- By studying these factors, this paper expands the existing literature by identifying a list of important dimensions that influence country level e-commerce adoption.
- Develop a conceptual model of country-level e-commerce adoption.
- The research model is empirically tested using a much larger country-level dataset from seventy countries ranging across all continents and developing/emerging spectrum. This enables validation of effects of country environments on e-commerce adoption in a relatively robust way.

To the best of our knowledge, no study has identified important dimensions of country environments and empirically tested their relationships with e-commerce adoption to find out how country specific factors influence e-commerce decisions. Specifically, this study postulates that connectivity, social trust, social and cultural environment directly positively affect e-commerce adoption. Different cultures have different level of trust that was found to be a main factor in e-commerce adoption at the consumer level (Gefen et al. 2003). We also argue that government policy and vision related to IT in a country is an antecedent to connectivity; without investment in IT infrastructure, Internet connection remains low. Thus it is expected that government policy positively affects connectivity. Also, legal environment in a country positively affects social trust, whereas, it negatively affects uncertainty avoidance which in its turn negatively affects the e-commerce adoption. E-commerce transactions may be risky especially when dealing with strangers. When someone feels that he/she is protected, this level of risk and uncertainty will diminish. Finally, greater social trust negatively affects uncertainty avoidance. That is, the more people trust others in a society, the lower the level of risk and uncertainty will be.

The remainder of this paper is organized as follows. The first section provides a brief review of the literature on e-commerce diffusion and adoption. Next, we present the research model, and a set of research hypotheses. Then, we discuss the methodology and quantitative data analysis that is used to test the hypotheses. Finally, conclusions and implications are presented.
means of telecommunications networks.” Treese and Stewart (1998) define e-commerce at a higher level by stating that it is the “use of the global Internet for purchase and sale of goods and services, including services and support after the sale.” While the first two perspectives have been abundantly explored by scholars, studies on the global aspect of e-commerce are scarce. Being an IS phenomenon, we believe that IS scholars should also examine the global perspective.

While the adoption of e-services by countries is increasing, the rates vary. Researchers (Pavlou 2003; Rose and Straub 2001, Mahmood et al. 2004) found that the adoption of e-commerce by consumers is hindered by:
- Consumer mistrust of local internet service and products,
- Lack of awareness of technology,
- Uneven diffusion of Internet across countries,
- Need of infrastructure that supports these systems,
- Low e-maturity levels,
- Low level of education, and
- Government policies.

A limited number of studies (Wong 2003; Molla and Licker 2005; Ho et al. 2007) have investigated the effects of country-specific factors on the adoption of e-commerce. These studies point to significant differences in e-commerce adoption between countries and that country-level factors may influence adoption rates. For instance, Wong (2003) found that demographic structure, financial and legal institutions, physical infrastructure, human resources, and e-commerce policy initiatives are important factors that impact the adoption of e-commerce in Singapore. Molla and Licker (2005) indicated that perceived organizational e-readiness and perceived environmental e-readiness are crucial factors in e-commerce adoption in South Africa. In another study, Ho et al. (2007) found that internet penetration, telecommunication investment intensity, educational level, and regional contagion are influencing factors in 17 European countries. Moreover, researchers (Ferguson and Yen 2006; Javalgi and Ramsey 2001; Zhu and Thatcher 2010) have shown that government policies, supportive legal environment, compatible socio-cultural infrastructure, ICT infrastructure, culture differences have impact on e-commerce adoption.

Based on these cross-country studies of e-commerce adoption, we argue that consumer adoption of e-commerce can be influenced by a country’s institutional environments, such as legal environment and government policies, as well as resource environments, such as technology infrastructure and human capital. A limitation of most existing studies is that they use a small sample of countries, which hinders generalization of their findings. This paper overcomes the limitation of smaller samples used by previous studies.

**RESEARCH MODEL AND HYPOTHESES**

The adoption and the use of e-commerce vary across countries because the institutional and resource environments in a country can influence the e-commerce adopt rates. In particular, it is proposed that a country’s institutional environment factors, namely legal environment, uncertainty avoidance, social trust, security, and government policies and resource environments, namely connectivity particularly infrastructure, and social environment especially the computer literacy influence e-commerce adoption.

In this study, e-commerce adoption at a country level is measured by four items: consumer spending on ICT per capita; level of e-business development; level of online commerce; and availability of online public services for citizens and businesses.
Government Policy and Vision Related to IT

The telecommunication infrastructure can be considered as the backbone through which a government/country can implement and develop its ICTs such as e-commerce (Mbarika et al. 2005). The lack of telecommunication infrastructure acts as a barrier in the growth of ICTs (Kaba et al. 2009) and e-commerce. The infrastructure development should be among the strategies of any country especially if high level of development is desired, whether at the technological or the economical domain. Governments are also concerned about digital divide which is a major barrier facing many countries, both developing and developed. Table 1 shows the items included in government policy and vision related to IT.

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Connectivity

As mentioned previously, ICTs infrastructure is a crucial and basic element of e-commerce (Okoli et al. 2010; Zwick and Dholakia 2008), which depends on Internet, mobile phone communications (Zwick and Dholakia 2008) and computers (Elen et al. 2010). Higher broadband penetration, low Internet prices, and good quality may lead to an increase in the level of e-commerce adoption in any country. Internet security is another element of connectivity. A lack of perceive security is a major reason why many consumers do not adopt and use e-commerce. Transactions in e-commerce require submitting sensitive information such as credit card numbers on the web. Thus, one can expect that lower the internet security, lower the adoption of e-commerce will be. Table 2 indicates the items included in connectivity.

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We argue that government policy and vision related to IT include all the policies that can facilitate the implementation of e-commerce or any e-service in a country. In general, countries with high level of spending on IT should possess main ingredients for e-services dispersion and implementation. Efficient government policy could also influence the internet security in a country. Consequently, in this study it is proposed that higher the level of government policy is, higher the level of connectivity would be.

**H.1:** Greater government policy and vision related to IT positively affects the connectivity in any country.
**H.3.b**: Connectivity positively affects e-commerce adoption.

**Legal Environment**

The legal institution in a country should provide predictable, credible, coherent and adaptable rules for economic transactions (Zhu and Thatcher 2010). These factors are crucial for e-commerce consumers because they may affect the intention to adopt e-commerce. Secure, stable and predictable legal environment can reduce uncertainties and build trust and confidence in the marketplace (Gibbs and Kraemer 2004). Table 3 presents the items included in legal environment.

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**Social Trust**

It is widely agreed that e-commerce adoption significantly depends on citizens’ trust in the cyber-environment. Thus trust is a crucial factor in e-commerce (Kolsaker et al. 2004). According to Gefen et al. (2003) trust is the key to retain customers in online business. Zhu and Thatcher (2010) suggest that the legal institution in a country should provide predictable, credible, coherent and adaptable rules for economic transactions. These factors are crucial for e-commerce consumers because they may affect the intention to adopt e-commerce. In a country where the legal system is well-developed and enforcement mechanisms are efficient, consumers as well as businesses have the confidence that they are protected. As a result, consumers and businesses in countries with developed legal system are more willing to enter into exchanges with each other.

**H.2.a**: Legal environment positively affects social trust.

**H.4.b**: Social trust positively affects e-commerce adoption.

**Uncertainty Avoidance**

Uncertainty avoidance is defined as “the extent of feeling threatened by uncertain or unknown situations” (Dorfman and Howell 1988). This dimension of culture has very significant impact on buying on internet (Lim et al. 2004). Previous scholars (Bagchi et al. 2003) have reported that the countries with higher uncertainty avoidance index were less likely to adopt technology products. People with high uncertainty avoidance usually fear the future and have high level of perceived risk. Yoon (2009) argues that the uncertainty avoidance is associated with trust. The higher the level of trust, the lower the uncertainty avoidance would be (Hwang 2009). When dealing with e-commerce, uncertainty avoidance is usually present because online transactions require submitting sensitive information. Having a developed legal system in a country should decrease uncertainty. Therefore; we propose that consumers and businesses in a country with a well-developed IT-related system will have lower uncertainty avoidance than their counterparts in other countries.
**H.2.b**: Legal environment negatively affects uncertainty avoidance.

**H.5**: Uncertainty avoidance negatively affects the e-commerce adoption.

We propose that higher broadband penetration, low Internet prices, and good quality may lead to an increase in the level of social trust as well as the level of e-commerce adoption in any country. Perceptions of inadequate security is a major reason why many consumers do not use e-commerce. Thus, one can expect that the higher the internet security, the higher the social trust.

**H.3.a**: Higher connectivity positively affects social trust.

Online transactions are influenced by a country’s informal institutions (North 1990). Generalized trust among people acts as a one such informal institution (Knack and Keefer 1997). Where the level of social trust is low, consumers are likely to avoid using online transactions. Individuals in low social trust societies tend to transact more with people whom they know and avoid transacting with unknown entities. Hence one can expect that the high social trust in a country will diminish the uncertainty avoidance accompanied with e-commerce.

**H.4.a**: Greater Social trust negatively affects uncertainty avoidance.

### Social and Cultural Environment

In addition to the basic education, e-commerce adoption requires a particular level of e-literacy or e-skills. In general the higher the level of education, the more likely consumers gain greater exposure to the computer technology and the Internet. Therefore computer and internet literacy can be considered to be an important factor in the adoption of e-commerce. A general level of education in a society may be an important indicator of people’s ability to make use of computer and internet but not solely sufficient.

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These factors are important in e-commerce adoption because without them, a person cannot use the online transactions and the technologies in general. Thus, it is expected that countries with high level of social and cultural environment will have higher level of e-commerce adoption.

**H.6**: Social and cultural environment positively affects e-commerce adoption.

The GDP per capita is one of the most important macroeconomic indicators to measure any economic activity at an aggregate level. This indicator is directly linked to consumers’ purchasing power. We treat GDP per capita as a control variable in our model.

**H.7**: GDP per capita positively affects the e-commerce adoption.

Figure 1 illustrates these factors and their relationships with e-commerce adoption.
METHODOLOGY

Data and Variables

The targeted sample of this study consisted of 70 countries. Secondary data was considered most suitable to answer the research questions. The data used in this study were obtained from four sources: (1) data related to e-commerce adoption, connectivity, government policy and vision related to IT, legal environment, and social and cultural environment are obtained from the UK-based Economist Intelligence Unit (EIU) (EIU.com), a well respected global research and advisory institute. The data sets used in the report of EIU were adapted from the “World Bank” and the “United Nations”. (2) Data related to uncertainty avoidance were collected from Hofstede’s website (geert-hofstede.com), (3) GDP per capita from the World Bank database (worldbank.org), and (4) trust from the world values survey (worldvaluessurvey.org).

The data used in this study fit the objective of the research since they cover greater number of countries compared to the earlier studies that explored high level e-commerce adoption. Consumer and business adoption is the dependent variable. Government policy and vision related to IT, Legal environment, Connectivity, Social and cultural environment, social trust, and uncertainty avoidance are the independent variables, and GDP per capita is a control variable. Details about composition of these indexes will be presented at the conference.

RESULTS AND DISCUSSION

The data were analyzed using descriptive statistical analytic procedures followed by testing the path model using SmartPLS software. The descriptive statistics are not included in this paper because of space limitation but will be presented at the conference. Results of the paths are presented in Figure 2.
The results of PLS analysis show that hypotheses H1, H3b, H6, and H7 are supported. We posited that government policies toward information technologies have a significant influence on the level of internet connectivity index that taps into adoption and diffusion measures of broadband internet and internet security. The data support this relationship (H1). Clearly, a higher index of connectivity is synonym with better IT infrastructure, which is expected to promote use of various IT applications including e-commerce. The data used in this study also support this relationship (H3b). Social and cultural environment taps into educational and technical efficacy level of people. A higher index of constructs such as computer efficacy, IT awareness etc have yielded significant positive relationships with IT use. This study also finds positive relationship between social and cultural environment and e-commerce adoption (H6). Higher capita GDP relates to the earning and spending powers and is likely to reinforce adoption of new technologies, especially e-commerce. This study confirms this relationship (H7).

We were surprised that the relationships between legal environment and social trust, legal environment and uncertainty avoidance, social trust and e-commerce adoption, and uncertainty avoidance and e-commerce adoption were not supported by the data. A mature legal environment assures people that in case of disputes or cheating, they can access appropriate forums for redressal and resolution of problems. Thus, higher level of maturity of legal environment should lead to higher trust among people. Therefore, we posited a positive relationship between legal environment and trust. However, the data did not support this hypothesis. A possible reason for this may be that the legal environment index is a composite index composing of various elements some of which may not be very relevant to building of trust and lowering uncertainty avoidance, for example, “Ease of registering a new business.” A plausible reason for the data not supporting the relationship between connectivity and trust may be that the connectivity index includes factors such as security which are relevant to building of trust but also other factors such as broadband penetration, affordability etc. which may not be relevant. We were very surprised to find insignificant relationship between uncertainty avoidance and e-commerce adoption. We assume that this may be because of the limitations in the Hofstede’s index for uncertainty avoidance. Many studies in the literature have also found problems with this index (Baskerville 2003). This may also be due to the dated nature of the uncertainty avoidance index, especially in the context of use of new technologies. Although these relationships are sound in theory and previous literature, the lack of support by the data...
raises important questions and calls for future research to examine the plausible causes for these findings.

CONCLUSIONS AND IMPLICATIONS

This research in progress is an attempt to construct a model that depicts the relationships between these factors and e-commerce adoption and empirically test it. This study contributes to the literature in two important ways. Although researchers have studied the effects of country-factor on e-commerce, no study has yet used all the factors that affect e-commerce adoption. This research addresses this issue by identifying seven important dimensions of country environments relevant to e-commerce adoption. Moreover, this research adds to the literature by introducing new factors, namely social trust, uncertainty avoidance, and connectivity that have not been tested before. Second, while previous research has studied the effects of country-level factors on organizations and consumers decisions regarding the adoption of e-commerce, these studies have been limited by small sample sizes. By using data from a relatively larger number of countries, this study overcomes this limitation.

This research offers some implications for policy makers. By identifying the factors that are related to the general environment, specifically the factors listed above, in a country and in coordinating with private firms, decision makers in governments can help improve the national economic development of their countries and get the best benefit out of e-commerce. E-commerce may provide organizations and consumers with numerous benefits such as cost savings and convenient way to deliver the products/services which increase the profit of the organizations. This increase in turn affects the national economy since these organizations compose a big part of the economy. According to our study, policy makers need to consider their country’s institutional and resource environments. For instance, when firms in a country do not have a high level of social trust, e-commerce may be restricted. In this situation, policy makers may take some specific actions to mitigate the negative effect of low social trust. For instance, they may improve the legal system related to IT, invest more in infrastructure and increase the internet security. Such positive changes may mitigate the negative effect of low social trust and increase consumers and organizations trust in e-commerce vendors, which can in turn facilitate the adoption of e-commerce. Similarly, policy makers may promote the development of e-commerce supply markets. For instance, they may encourage government agencies to use e-commerce while buying. This will increase the demand for e-commerce and support the growth of e-commerce supply market.

LIMITATIONS AND FUTURE RESEARCH

The outcomes reported are confined to the secondary data. The analytical results of this in progress paper point to some limitations in the data and the indexes. We assert that trust and uncertainty avoidance are critical factors in determination of ecommerce adoption. The results produced by the data surprised us and we are currently investigating them. This investigation is on two dimensions; a) relevance of different elements of composite indexes, b) developing better fit of the data to our research model. For example, Globe’s uncertainty avoidance index may be examined because it is a more recent index as compared to Hofstede. Using the raw variables that compose the indexes can also enrich the literature since it might yield fine grained results which will give practitioners as well as researchers more details about the factors that lead to e-commerce adoption. We are currently researching these issues and will present updated results at the conference.
REFERENCES


