Moderating Effects of Uncertainty Avoidance on ICT Infrastructure, Human Capital, and Virtual Social Networks Diffusion

Research-in-Progress

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Abstract

Drawing from Rogers’ diffusion of innovation theory and Hofstede’s typology of national culture, this study proposes that the diffusion of VSNs in a country is influenced by the levels of its information and communication technology (ICT) infrastructure and human capital, which in turn are contingent on the national cultural dimension of uncertainty avoidance. Utilizing the publicly available archival data from 53 countries, results substantiate a significant relationship among them. Findings suggest that (1) ICT infrastructure and human capital in a country are positively associated with its VSN diffusion; and (2) uncertainty avoidance negatively moderated the relationships of ICT infrastructure and human capital in a country with its VSN diffusion. Findings contribute to the knowledge base of VSNs by highlighting the contingent role of uncertainty avoidance, and provide indications to practice on managing VSN diffusion in a country by leveraging the effects of its ICT infrastructure and human capital.

Keywords: ICT infrastructure, human capital, uncertainty avoidance, VSN diffusion

Introduction

Virtual social networks (VSNs) represent a socio-technical innovation, which is based on the Internet technologies (Sangwan et al. 2009). They are increasingly becoming a ubiquitous and intrinsic part of people’s lives (Jenkins 2006). On the grounds of information and communication technologies for development (ICT4D), Krishnan et al. (2013) indicate that VSNs has the ability to play a significant role as an ‘enabler’ of human development by creating an environment in which people can develop their full potential and lead productive and creative lives in accord with their needs and interests. In general, VSNs can be defined as the networks used for creating and maintaining social interactions among geographically dispersed individuals around the globe (Panteli 2009); and common examples include Facebook, MySpace, OpenSocial, Second Life, etc.

In recent times, VSNs has generated a lot of interest among researchers (Sun and Wang 2012). Research on VSNs can be broadly classified into three streams (Krishnan et al. 2013). While the first set of research focus on the design, development and evolution of VSNs (e.g., Burmeister 2009), the second set of research is concerned with the adoption and diffusion of VSNs (e.g., Jones et al. 2009; Sun and Wang 2012). And, the third set of research pertains to the impact of VSNs (e.g., Grassman and Case 2009; Kreps and Pearson 2009). Although research in all the three streams is important, researchers, practitioners, and policymakers knows relatively little on the factors causing disparity of VSN diffusion across countries. Further, the review of extant literature also indicates that there is a dearth of cross-country level empirical studies examining the factors leading to uneven diffusion of VSNs among different countries. Such studies are important because they not only provide policy implications but also render new and insightful ideas in the fields of practice. Further, they are helpful in identifying and understanding the aggregate patterns.
of VSN diffusion. Krishnan et al. (2013) acknowledges a recent global survey of 10 countries (Australia, Brazil, France, Germany, Italy, Japan, Spain, Switzerland, US and UK), which found that the percentage of online population who actively use VSNs ranged between 59% to 86%, and their usage time ranged between 157 minutes to 387 minutes per month (Heras 2010; Van Grove 2010); and indicates that it is imperative to understand the factors causing variations in the global diffusion of VSNs. Motivated by this, the main purpose of this study is to give heed to the consistent calls from researchers (e.g., Krishnan et al. 2013; Sun and Wang 2012) by identifying the factors affecting VSN diffusion in a country. In this study, consistent with Sun and Wang (2012), VSN diffusion is defined as the extent to which VSNs such as Facebook, Twitter, LinkedIn, etc. are used by individuals in a country for the purpose of communication.

Studies indicate that Rogers’ diffusion of innovation theory is well suited for studying the adoption and usage of any information communication technology (ICT) or the Internet-based innovation (Baskerville and Pries-Heje 2003). This theory seeks to explain how, why and at what rate a new technology spreads through different cultures (Rogers 1962). Further, Rogers (2003) specifies that the process of innovation diffusion of a technology in a country heavily relies on its ICT infrastructure and human capital. Sun and Wang (2012) found that these two factors are critical and has the potential to cause uneven diffusion of VSNs across countries as they reflect the developmental aspect of a country. While ICT infrastructure, which reflects the degree of technological development in a country, refers to the gradual convergence of broadcasting content, telecommunications, and computing (Tapscott 1996), human capital, indicating the level of human development in a country, refers to the knowledge, skills, and abilities embodied in people (Coff 2002). Rogers (2003) also specifies that the process of technological innovation diffusion in a country is contingent on its national cultural values. According to Hofstede (1986), national culture is defined as the collective programming of the mind which distinguishes the members of one group or category of people from another. Studies linking ‘national culture and IT’ indicates that the cultural dimension of uncertainty avoidance, defined as the extent to which the members of a society feel threatened by uncertain and unknown situations (Hofstede 1991; Hofstede et al. 2010), has a long-lasting influence on diffusion of ICT-led innovations in a country (Leidner and Kayworth 2006). Further, Sun and Wang (2012) empirically found uncertainty avoidance (within the Hofstede’s (1983) typology of national culture) to be the strongest predictor of VSN diffusion when developmental factors (i.e., ICT infrastructure and human capital) were controlled. Taken together, as countries at different development stages have different degrees of openness and receptiveness to innovations (Gomulka 1971), this study proposes that the diffusion of VSN in a country is likely to be dependent on its ICT infrastructure, human capital, and the national culture dimension of uncertainty avoidance (Krishnan et al. 2013; Sun and Wang 2012). That is, utilizing the diffusion of innovation theory (Rogers 1962; 2003) and considering the national culture dimension of uncertainty avoidance as a contingency (Hofstede 1991; Hofstede et al. 2010), this study argue that (1) a country’s ICT infrastructure and human capital affects its VSN diffusion; and (2) the direction and strength of their relationships are contingent on the national cultural dimension of uncertainty avoidance. In sum, the key research questions (RQs) that this study strives to address are: (RQ1) how does ICT infrastructure and human capital in a country affect its VSN diffusion? And, (RQ2) how does the national cultural dimension of uncertainty avoidance interact with ICT infrastructure and human capital in a country in predicting its VSN diffusion?

The rest of the paper is organized as follows. First, a theoretical model is constructed by establishing the relationships among ICT infrastructure, human capital, uncertainty avoidance, and VSN diffusion in a country; and the research hypotheses are derived. Thereafter, using archival data from 53 countries, the hypothesized model is tested. Lastly, the implications are discussed and future plans are highlighted.

**Literature Review and Hypotheses**

**Relating ICT Infrastructure to VSN Diffusion**

Growth theory is an economic theory investigating the reasons for growth and development in a country. Specifically, according to the neoclassical and new growth theories, technological progress is a critical determinant of a country’s growth and development (Lucas 1988; Romer 1990). These theories have been applied in the context of ICT-led developments to explain their growth and maturity in a country. For instance, Siau and Long (2009), grounding the discussion in the new growth theory established that ICT infrastructure plays an essential role in growth, development and maturity of e-government in a country.
Taking a similar approach, I argue that the diffusion of VSNs in a country is dependent on its ICT infrastructure as VSNs needs to utilize them for serving the purpose of establishing the networks of interaction and communication among individuals. Sun and Wang (2012) stressed that the diffusion of VSNs in a country is characterized by its ICT expenditure. Therefore, it is clear that a country's ICT infrastructure affects its VSN diffusion. Accordingly, I posit: **ICT infrastructure in a country is positively associated with its VSN diffusion (H1).**

### Relating Human Capital to VSN Diffusion

Schultz (1961) and Lewis (1955) in their human capital theory (an economic theory) stress the critical role of human capital in growth and development of individuals and nations. Specifically, Schultz argues that human capital is one of the critical reasons that explain the differences in growth (e.g., income and productivity) between human beings as well as nations. Alike human capital theory, the new growth theory also supports the notion of knowledge-based economy by recognizing the importance of human capital and indicates that the investment in human capital generates returns in the future (Lucas 1988; Romer 1986). Studies in the context of ICT-based innovations (e.g., e-government) has shown that human capital in form of education is an essential factor that explains the growth and maturity of such innovations (Siau and Long 2009; Srivastava and Teo 2010). A study by Bruce (1997) indicates that education (a key component of human capital) is critical for people to develop necessary knowledge and skills to use ICT-led applications. Benhabib and Spiegel (2005) mentioned that human capital is an engine for ICT-led innovations, and established that it is essential for technology diffusion at the national-level. An earlier study by them found that the technology spillovers from one country to another (i.e., from leaders to followers) depends on human capital in terms of education (Benhabib and Spiegel 1994). In the context of developing countries, Sun and Wang (2012) highlighted that the investments in human capital lead to the diffusion of VSNs at a greater extent. Taken together, it makes logical sense to presume that human capital in a country affects its VSN diffusion. Accordingly, I propose: **Human capital in a country is positively associated with its VSN diffusion (H2).**

### Existing Perspectives on National Culture

Culture is an elusive concept that “consists of several elements of which some are implicit and others are explicit...most often these elements are explained by terms such as behaviour, values, norms, and basic assumptions” (Groeschl and Doherty 2000, p. 14). The theories of national culture centers upon the cultural values, and can be broadly classified into three categories (Morden 1999) namely, (1) single dimension models (e.g., Fukuyama (1995)); (2) multiple dimension models (e.g., Hofstede (1980; 1983)); and (3) historical-social models (e.g., Bloom et al. (1994)). While there are different definitions of national culture, most researchers, regardless of their differences in disciplines, are inclined to rely on the aforementioned Hofstede's definition (Myers and Tan 2002). Hofstede indicates that people share a collective national character that constitutes their cultural mental programming, which shapes their values, beliefs, assumptions, perceptions and behaviour. Hofstede (1980; 1983) identified four largely independent dimensions of differences between national value systems namely, (1) power distance (large vs. small); (2) individualism vs. collectivism; (3) masculinity vs. femininity; and (4) uncertainty avoidance (strong vs. weak). As noted by Hofstede (1980; 1983), power distance (PDI) is the extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally. Individualism (IDV) describes cultures in which task prevails over relationship, whereas collectivism describes cultures in which relationship prevails over task. While masculinity (MAS) describes cultures in which social gender roles are distinct, femininity describes cultures in which social gender roles overlap. And, uncertainty avoidance (UAI) is the extent to which members of a culture feel threatened by uncertain or unknown situations. In a later work, Hofstede introduced a fifth dimension namely, long-term vs. short-term orientation (Hofstede and Bond 1988). Recently, Hofstede and colleagues added a sixth dimension called indulgence vs. restraint to the typology of national culture. As noted by Hofstede et al. (2010), long-term orientation (LTO) stands for the fostering of virtues oriented toward future rewards, whereas short-term orientation stands for the fostering of virtues related to the past and present. And, while indulgence (IND) stands for a tendency to allow relatively free gratification of basic and natural human desires related to enjoying life and having fun, restraint reflects a conviction that such gratification needs to be curbed and regulated by strict social norms.
Leidner and Kayworth (2006) found six different themes of research linking culture and information system (IS): (1) culture and IS development; (2) culture, IT adoption and diffusion; (3) culture, IT use and outcomes; (4) culture, IT management and strategy; (5) IT’s influence on culture; and (6) IT culture. Acknowledging the importance of research in all the six themes, Srite and Karahanna (2006) indicate that there are only a handful of studies investigating the influence of culture on technology adoption and usage. Specific to the context of VSNs, studies confirm that national cultural differences are critical in explaining its adoption and usage (e.g., Dotan and Zaphiris 2010; Marcus and Krishnamurthi 2009; Marshall et al. 2008). However, these studies are micro in orientation with reference to a particular region or a country, and they do not attempt to assess the global diffusion of VSNs. To my knowledge, there are no studies – except a recent study by Sun and Wang (2012) – looking at the influence of national culture on VSN diffusion from a cross-country level perspective spanning several countries.

**Moderating Influence of Uncertainty Avoidance**

Sun and Wang (2012) proposed a pyramid model comprising of national culture, developmental factors, and regulations to study the global diffusion of VSNs. In their study, within the four dimensions of the Hofstede’s typology of national culture (1980; 1983), only uncertainty avoidance was found to be the strongest predictor of VSN diffusion when developmental factors (i.e., ICT infrastructure and human capital) were controlled. Societies with high uncertainty avoidance tend to minimize the possibility of uncertain, ambiguous or unknown situations by strict laws and rules, safety and security measures, and philosophical and religious beliefs in absolute truth (Hofstede 1983). Hofstede et al. (2010) indicate that such countries will be hesitant towards new technologies such as VSNs. This is because members of these societies will always experience some level of risk during communication or exchange of information via VSNs (Debatin et al. 2009; Ibrahim 2008; Posey et al. 2010). Further, they believe “what is different is dangerous” (Hofstede et al. 2010, p. 203). As VSNs represents a new and a different form of Internet-based innovation for communication (which often involves exchanging of personal sensitive information) and maintaining relationships among individuals, they tend to perceive them as risky and dangerous. Hence, in such countries, the effects of ICT infrastructure and human capital on VSN diffusion would be lower (or negative). That is, the direction and strength of the aforementioned relationships of ICT infrastructure and human capital with VSN diffusion is contingent on uncertainty avoidance. More formally, I therefore offer the following: Uncertainty avoidance negatively moderates the relationships of ICT infrastructure (H3) and human capital (H4) with VSN diffusion.

**Research Design**

To test the hypotheses, I gathered archival data for two reasons. First, collecting large scale primary data spanning several countries is constrained by the amount of resources and time available for conducting such research (Krishnan and Teo 2012). Second, archival data, as suggested by some researchers (e.g., Jarvenpaa 1991) offers several advantages namely, (1) easy reproducibility; (2) ability to generalize the results arising from larger datasets (Kiecolt and Nathan 1985); and (3) robust to the threat of common method bias (Woszczynski and Whitman 2004). Hypotheses were tested via a cross-sectional analysis of 53 countries (after omitting the missing values). According to Hair et al. (2006), 50 is the minimum number required to avoid degrees of freedom and efficiency issues. Hence, such issues appear to be minimal in the current study. Further, as this study is associational in nature, in line with the extant studies (e.g., Mithas et al. 2010), I relate the data for the dependent variable captured in year 2013 with that for the independent and moderating variables captured in previous years (i.e., 2012 and 2010 respectively). The primary sources of data are the World Economic Forum’s (WEF) Global Information Technology (IT) Report (WEFGITR 2013), the UN E-Government Survey Report (UN-Report 2012), and Hofstede et al. (2010). In the following paragraphs, I describe the operationalization of study variables.

The dependent variable in this study is VSN diffusion, which indicates the extent to which VSNs are used by individuals in a country for communication, the scores for which were obtained from the WEF’s Global IT Report (WEFGITR 2013). The WEF’s research team measured this variable by asking the respondents, “How widely used are VSNs (e.g., Facebook, Twitter, LinkedIn, etc.) for communication in your country?” and anchored it on a 1-to-7 scale with “1” representing “not at all” and “7” representing “widely.” This measure has been used in past studies like Krishnan et al. (2013), and Sun and Wang (2012).
The independent variables in this study are ICT infrastructure and human capital. **ICT infrastructure** was measured using the Telecommunications Infrastructure Index, the values for which were taken from the UN E-government Survey Report (UN-Report 2012). This index is a composite of five primary indicators namely, (1) number of personal computers per 100 persons; (2) number of Internet users per 100 persons; (3) number of telephone lines per 100 persons; (4) number of mobile cellular subscription per 100 persons; and (5) number of fixed broadband subscribers per 100 persons. For computing this index, the UN’s research team followed three steps. First, based on the scores of the indicators (for countries), a maximum and minimum value was selected for each of the five indicators. Second, the country’s relative performance (for each indicator) was measured by a value between 0 and 1 based on the formula: Indicator value = (Actual value - Minimum value) / (Maximum value - Minimum value). Third, the telecommunications infrastructure index was constructed as a composite measure based on the formula: Telecommunications Infrastructure Index = Average (personal computer index + Internet user index + telephone line index + mobile subscription index + fixed broadband index). The values for this index ranged between 0 and 1, with the higher values corresponding to the higher levels of ICT infrastructure. This index has been used in past studies like Krishnan and Teo (2012), and Srivastava and Teo (2010).

Another independent variable, **human capital** was measured using the Human Capital Index with the values running between 0 and 1 (the higher values corresponding to the higher levels of human capital). This index, taken from the UN E-government Survey Report (UN-Report 2012) is a composite of the adult literacy rate and the gross enrolment ratio. While adult literacy rate is the percentage of people aged 15 years and above who can, with understanding, both read and write a short simple statement on their everyday life; gross enrolment ratio is the total number of students enrolled at the primary, secondary and tertiary level, irrespective of age, as a percentage of the population of school age for that level. This index has been used in past studies like Siau and Long (2009), and Srivastava and Teo (2010).

The moderating variable in this study is **uncertainty avoidance**, which expresses the degree to which the members of a society feel uncomfortable with uncertainty and ambiguity. The data for this measure was obtained from Hofstede’s multinational study of cultural values (Hofstede et al. 2010). While Hofstede’s measures have been criticized as being less useful over time (Sivakumar and Nakata 2001), several studies (e.g., Brouthers and Brouthers 2001) had upheld its theoretical and empirical value. Further, Sondergaard (1994) in his replication study highlighted that “Hofstede’s findings were confirmed in the reviewed replication studies” (p. 452). This measure has been used in past studies like Sun and Wang (2012).

Additional control variables consisted of income (GNI per capita), urban population (as a % of total population), and the remaining five national cultural dimensions (i.e., PDI, IDV, MAS, LTO, and IND). I selected these particular control variables, since they are both consistent with prior macro-level studies on VSN diffusion (e.g., Krishnan et al. (2013), and Sun and Wang (2012)). While the values for income and urban population (for period 2012) were taken from the World Bank’s World Development Indicators database 2013 (WDI-Database 2013), the values for cultural dimensions were obtained from Hofstede et al. (2010). Although the measures I used in this study were utilized by prior studies, it is desirable to note that the reporting agencies (i.e., WEF and UN) and the research team led by Hofstede (and his colleagues) are not only trustworthy but also followed rigorous procedures and stringent guidelines for ensuring the reliability and validity of the data. Hence, I used the data directly from these reports (please refer to the aforementioned reports for more details on the data collection procedures and guidelines).

**Analysis, Results and Discussion**

**Descriptive Statistics and Correlations**

Table 1 shows the descriptive statistics and correlations for all variables. As shown, most correlations among variables were significant at p<0.05. Results also indicated that ICT infrastructure and human capital were positively correlated with VSN diffusion. Also, uncertainty avoidance was negatively correlated with ICT infrastructure, human capital, and VSN diffusion. Further, as correlations among the variables were below the threshold value of 0.6, the concern for multicollinearity would be minimal (Gujarati 2003). Confirming this, the results of the variance inflation factor (VIF) tests revealed that the VIFs ranged from 1.56 to 3.22 (<4) with all tolerance levels above 0.31 (>0.25).
Variables M SD 1 2 3 4 5 6 7 8 9 10
1. Income 9.84 0.83 - - - - - - - - -
2. Urb Pop 68.23 18.97 44 - - - - - - - -
3. PDI 59.96 21.16 -35 -29 - - - - - - -
4. IDV 45.11 23.70 42 41 -63 - - - - - - -
5. MAS 48.71 21.43 -09 -07 22 -02 - - - - -
6. LTO 49.93 22.04 21 09 01 12 -01 - - - - -
7. IND 46.09 22.86 30 38 -24 09 06 -57 - - -
8. ICT Infra 0.52 0.21 50 48 -38 45 -22 35 17 - - -
9. Hum Cap 0.83 0.13 39 46 -34 34 -10 29 41 - - -
10. UAI 66.84 23.43 -04 11 17 -18 08 -04 -11 38 -26 -
11. VSN Diff 5.65 0.54 42 47 -41 45 -17 01 41 50 46 -30

Note: N=53; *Log transformed variable; Urb Pop: Urban Population (as a % of total population); ICT Infra: ICT Infrastructure; Hum Cap: Human Capital; VSN Diff: VSN Diffusion; Decimal points are omitted for correlations; All correlations (except those underlined) are significant at p<0.05 (2-tailed).

Table 1. Descriptive Statistics and Correlations

Hypotheses Testing

I used moderated multiple regression technique for testing the research hypotheses as it is an established method for testing the interaction effects (Kankanhalli et al. 2005). I adopted the method recommended by Aiken and West (1991) for examining interactions in regression methods where I first centered each of the two variables by subtracting the mean from each country’s score for each variable to reduce the effect of multicollinearity between the interacting term and the main effect. Both the interaction terms were assessed simultaneously so that their effects could be seen in the context of the overall model (Kankanhalli et al. 2005). The regression equation is as follows: VSN Diffusion = \( A_0 + A_1 \) (ICT Infra) + \( A_2 \) (Hum Cap) + \( A_3 \) (UAI) + \( A_4 \) (ICT Infra × UAI) + \( A_5 \) (Hum Cap × UAI) + E, where \( A_0 \) to \( A_5 \) represents the coefficients and E represents the error term. Specifically, as a first step, the control variables were entered into the regression equation. In step 2, I entered ICT infrastructure, human capital, and uncertainty avoidance. And in step 3, I entered the interaction terms. A summary of regression results are presented in Table 2. The \( R^2 \) value of 0.62 and adjusted \( R^2 \) value of 0.56 (\( F=10.32, p<0.001 \)) indicated that the overall model was effective in explaining the variance in VSN diffusion. The change in \( R^2 \) value between steps 2 and 3 of regression was 0.08 (change in \( F=1.33, p<0.01 \)), indicating that the outcome of the third step (i.e., testing of interaction effects) could be interpreted. As shown in Table 2 (step 2), both ICT infrastructure (\( \beta=0.31, p<0.01 \)) and human capital (\( \beta=0.28, p<0.01 \)) was positively associated with VSN diffusion. ICT infrastructure’s effect on VSN diffusion was found to be stronger compared to human capital’s effect. Hence, H1 and H2 were supported. This finding indicates that the variations in the level of ICT infrastructure and human capital lead to uneven diffusion of VSNs in a country.

Turning now to the moderating effects, the results indicated that both the interaction terms were significant. As shown in Table 2 (step 3), uncertainty avoidance negatively moderated the relationships of ICT infrastructure (\( \beta=-0.44, p<0.001 \)) and human capital (\( \beta=-0.27, p<0.01 \)) with VSN diffusion. Hence, hypotheses H3 and H4 were supported. To determine if the patterns characterizing the significant interactions conform to the directions as proposed in the research hypotheses (i.e., H3 and H4), I graphed the interaction effects (see Figures 1a and 1b). This procedure was recommended by Cohen and Cohen (1983) for all significant interaction cases. In addition, to examine the consistency of the proposed direction throughout the range of independent variable, I performed simple slope analysis as recommended by Aiken and West (1991), which reflects whether the slopes relating the independent and dependent variables differ from zero.
Table 2. Regression Results

Figures 1a (and 1b) show the interaction of uncertainty avoidance on the relationship between ICT infrastructure (human capital) and VSN diffusion. As shown, while there was an insignificant negative relationship between ICT infrastructure (human capital) and VSN diffusion at strong levels of uncertainty avoidance, there was a significant positive relationship at its weak levels. Further, it is evident from the figure that there was only a negligible difference in VSN diffusion values between weak and strong levels of uncertainty avoidance when ICT infrastructure (human capital) was low but there was a substantial difference in VSN diffusion values between weak and strong levels of uncertainty avoidance in favour of weak uncertainty avoidance when ICT infrastructure (human capital) was high.
Confirming the above, a simple slope analysis revealed that when uncertainty avoidance was strong, the relationships of ICT infrastructure (slope=1.19, t=1.64, n.s.) and human capital (slope=2.02, t=1.84, n.s.) with VSN diffusion was negative and insignificant. And, when uncertainty avoidance was weak, the relationships of ICT infrastructure (slope=1.16, t=65.73, p<0.001) and human capital (slope=1.19, t=33.21, p<0.001) with VSN diffusion was positive and significant. Taken together, these findings suggest that the assumptions about the impact of ICT infrastructure and human capital in a country on its VSN diffusion are justifiably dependent on the national cultural dimension of uncertainty avoidance. Finally, among the seven control variables, only income (β=0.34, p<0.001) and urban population (β=0.39, p<0.001) significantly affected VSN diffusion (see Table 2 (step 3)).

Implications, Limitations and Future Research

This study contributes to the knowledge base of VSNs in three ways. First, this study by making innovative use of publicly available archival data give heed to the consistent calls from researchers to key out the factors that would cause uneven diffusion of VSNs among different countries. Second, in contrast to the past studies that has examined the antecedents of VSN diffusion in a country, this study by grounding the discussion in Rogers’ diffusion of innovation theory and Hofstede’s typology of national culture posits that the relationships of ICT infrastructure and human capital with VSN diffusion is contingent on the cultural dimension of uncertainty avoidance. While the linkages among these variables were rarely investigated in the literature, emerging research remains at best anecdotal, conjectural and descriptive. This research sought to identify if indeed there is a quantitative merit in the aforementioned relationships. Third, among the limited research that has been undertaken on VSNs diffusion, most studies tend to be micro in orientation focusing on a particular region or a country. Motivated by the needs for conducting cross-country level studies spanning several countries, this research is one among the few studies to offer a macro (or global) perspective. Specifically, the results from this study render new and insightful ideas in the fields of practice. Further, they are also helpful in identifying and understanding the aggregate patterns of VSN diffusion across countries.

From a practical standpoint, the implications from the interaction plots are insightful to the practitioners and policymakers as they indicate that the national cultural variable of uncertainty avoidance plays a critical role in explaining the differences in “ICT infrastructure, human capital, and VSN diffusion” relationships across countries. The results suggest that as the national cultural foundation of uncertainty avoidance is hard to change, practitioners should invest in increasing the levels of ICT infrastructure and human capital in a country to effectively manage the diffusion of VSNs.

This study has two limitations. First, I used secondary data obtained from different sources, and hence I have to depend on the indices as formulated by the reporting agencies. While primary data might have given me a better control over the definition of variables, it is less feasible to undertake a large scale cross-country data collection given the limited amount of resources and time. However, taking into consideration that these indices have been formulated by reputed agencies that has employed stringent procedures and guidelines for their data collection, relying upon these secondary sources provides a cost-effective way for conducting this study. Second, I analyzed data only from the countries commonly available in all the primary sources. For instance, I could not include countries like Afghanistan, Cuba, North Korea, Taiwan, etc. as these countries were not commonly available in all the data sources. However, given that I have sample size as 53, where 50 is the minimum number to avoid degrees of freedom and efficiency problems, the significance of the results could be believed.

Future research may focus on several directions. First, researchers may consider extending the cross-sectional study to a longitudinal (panel) study when more data becomes available. Specifically, Dewan et al. (2010) indicate that at least nine years of data is required to support a robust estimation of empirical specifications while performing panel data analysis (especially in the context of country-level analysis). This would help to examine the issues of temporal precedence (leads/lags between independent, moderating, and dependent variables), as well as the evolution of VSN diffusion as the functions of the levels and trends in ICT infrastructure and human capital in the cultural context of uncertainty avoidance. Second, researchers may also consider improving the empirical analysis of the current study by splitting the sample into developed and developing countries (i.e., based on the economic development status of a country) and examining the quantitative merit in the relationships among different variables. Third,
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Researchers may also consider examining the interaction effects of other cultural variables on the relationships of ICT infrastructure and human capital with VSN diffusion.

Concluding Remarks

In conclusion, despite the pervasive usage of VSNs by individuals across countries, both research and practitioner communities know relatively little on the reasons behind the disparity of VSN diffusion across countries. As an initial step to be taken towards understanding this disparity, by grounding the discussion in Rogers’ diffusion of innovation theory and Hofstede’s typology of national culture, I have constructed a theoretical model that examined the moderating effect of uncertainty avoidance on the relationships of ICT infrastructure and human capital on VSN diffusion; and empirically validated it by making innovative use of publicly available archival data. Findings suggest that the assumptions about the impact of ICT infrastructure and human capital in a country on its VSN diffusion are justifiably dependent on the national cultural dimension of uncertainty avoidance.

References


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