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THE IMPACT OF SCHWARTZ'S CULTURAL VALUE TYPES ON ICT USE: A MULTI-NATIONAL INDIVIDUAL-LEVEL ANALYSIS

Completed Research Paper

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Abstract

We introduce and examine the roles of Schwartz's cultural value types in Information and communication technologies (ICT) use (PC and the Internet) at an individual level. Our study used the World Value Survey (WVS) data of 2009 from 49 nations with around 75,000 data points. For all nations, we find that 7 out of eight considered Schwartz's value types matter. We also find that the use of ICT is predominant among highly educated, high-income, employed and young people. Males use PC and Internet significantly more. Overall, we also find remarkable similarities and differences in results across developed and developing nations. Broadly, for ICT use, impacts of some cultural values differ and some are same between the two groups, while impacts of demographics are somewhat similar across developing and developed nations.

Keywords: Culture, Schwartz's value inventory, ICT use, cross-cultural study, multi-national, individual-level, developing nations

Introduction

Information and Communication Technology (ICT) use has been remarkably different in various nations of the world. For example, the disparity in Internet users between different nations per 100 residents in 2007 is glaring; 0.48 in Cambodia to 39.5 in Lithuania to 91.6 in the Netherlands.

Economic factors alone do not explain the variations (Rogers, 1995). A number of non-economic factors at an individual level have been conjectured to impact ICT adoption and use. These include the level of education (Rogers, 1995), age, sex, income (Venkatesh et al., 2003), enjoyment, etc. (Moon and Kim, 2001), which exerts influence on intention and use through perceived system usefulness and perceived ease of use (Davis, 1989). The importance of various cultural values, however, has not been studied in detail in ICT use and needs to be investigated. The present work is an effort in that direction.

Schwartz et al. (2002), define values as desirable, trans-situational goals, varying in importance, which serve as guiding principles in people's lives (Schwartz, 1992; Rokeach, 1973; Kluckhohn, 1951). Individuals both within and across societies have quite different value priorities that reflect their different genetic heritage, personal experiences, social locations, and enculturation (Schwartz and Bardi, 2001). Schwartz's value inventory has been used in many situations: choice of medical specialty, choice of university major, consumer purchases, cooperation and competition, delinquent behavior, environmental behavior, intergroup social contact, occupational choice, religiosity and religious observance, and voting (See Schwartz and Bardi, 2001, for details).

In this article we propose that individual values (such as those described in Schwartz's research) are significant indicators of ICT use at an individual level and we provide empirical support for our proposal across a number of

nations. Our study is a supranational individual-level one involving 49 developed and developing countries, based on more than 75,000 observations. The strength of the study is in identifying possible individual value types in a supranational technology usage model using Schwartz's value inventory as the key constructs and testing the model with a large number of recent data points, hitherto not applied in the IS literature. The use of Schwartz's value dimensions is justified since they have been designed for use at an individual level and have been claimed to be near exhaustive.

Culture and IS Use

Cultural-IS studies can be conducted at an individual, organizational or a national level (Leidner and Keyworth, 2006; Srite and Karahanna, 2006). National level studies deal with aggregate data and thus the use of national-level cultural dimensions at this level are appropriate, and the results can be quite useful and insightful (Bagchi et al., 2004). Hofstede (1980, 2001), Schwartz (1994, 1999) and other scholars (Smith et al., 2002; House et al., 2004) have developed national cultural frameworks that could be used to study various business situations at a national level.

When attempting Culture-IS studies at an individual level only, it is important to remember that national-level dimensions may not be used without proper modifications (Srite and Karahanna, 2006). In order to avoid such a misapplication, researchers have proposed identifying users' individual-level cultural characteristics (Ford et al., 2005; McCoy et al., 2005; Straub et al., 2002). Straub et al. (2002) proposed a virtual-onion model in which an individual's cultural profile is the product of the interaction of several layers of culture (supranational, national, professional, organizational, and group) and thus it may not be adequate to operationalize an individual's culture based on, for example, national culture only.

ICT adoption and use studies at an individual level generally involve a single nation, although a few studies exist which explore adoption and use in multiple nations (Straub, 1994; Straub et al., 1997). Technology adoption and usage frameworks generally rely on TAM, TPB, UTAUT etc., or Rogers' diffusion model (Bhattacharya, 2001; Venkatesh et al., 2003). In this study such an approach is not possible since the secondary-level database used does not contain such constructs as ease of use, usability. Further, it may be inappropriate since it has been suggested that models such as TAM may be inadequate for a supranational level analysis (Straub et al., 1997). Nonetheless, our model loosely resembles TAM in the sense that individual values affect adoption and use through cognitive responses. One can visualize that these values are in form of external stimuli which act through cognitive response (such as usability) which then lead to affective response (attitude) and subsequently to behavioral adoption and use.

Schwartz Cultural Framework and Value Types

At an individual level, culture can be interpreted as the set of values that individual holds. Unlike other cultural frameworks, Schwartz's work is separated into two distinct analysis types: an individual-level analysis and a culture-level analysis.

Schwartz's framework (SF) is considered important in social psychology for a number of reasons (Desender et al., 2008). First, it is theory-driven, its central elements rooted in earlier work in social sciences. Schwartz derives values based on three universal requirements of the human condition: the needs of individuals as biological organisms, requisites of coordinated social interaction, and survival and welfare needs of groups. For example, Schwartz shows that the conformity value evolved from the prerequisites of interaction and of group survival. For interaction to proceed smoothly and for groups to maintain themselves, individuals must restrain impulses and inhibit actions that might hurt others. Similarly, the self-direction value evolved from organismic needs for mastery and from the interaction requirements of autonomy and independence (Schwartz, 1992; Schwartz, 1999). Second, the model uses value measures which have been shown to have cross-culturally equivalent meanings at an individual level to operationalize the cultural dimensions. Third, Schwartz's model is different from, and more exhaustive than, other cultural models which are often not congruent (Ng et al., 2007). A comparison between SF, Hofstede, GLOBE and other cultural frameworks, yields stark contrasts. First, SF can be applied clearly at both individual and group/national-level, while the other frameworks are designed for group/national level only. Second, the value types in SF are not all mutually exclusive but linked in a circular fashion, depicting relations of conflict and congruity among the ten values. Third, it is possible to compare similarities as well as differences in the SF values.

The SF includes 10 motivationally distinct types of first-order individual values based on over 60,000 teacher and student samples from 63 nations (Schwartz, 1992, 1994, 1999). These values motivate people to action, serving as guiding principles in people's lives. According to Schwartz, values are beliefs, closely linked to affect and referring to desirable goals. Values transcend specific actions and situations, serve as standards or criteria and are ordered by importance relative to one another. The ordered set of value forms a system of value priorities. The *relative* importance of the set of relevant values guides action. This set of value priorities is believed to reveal the trade-offs an individual makes in pursuing a particular goal. These value types are (Schwartz and Bardi, 2001):

- **Power:** Social status and prestige, control or dominance over people and resources (social power, authority, wealth, preserving a public image).
- **Achievement:** Personal success through demonstrating competence according to social standards (successful, capable, ambitious, influential)
- **Hedonism:** Pleasure and sensuous gratification for oneself (pleasure, enjoying life)
- **Stimulation:** Excitement, novelty, and challenge in life (daring, a varied life, an exciting life)
- **Self-direction:** Independent thought and action choosing, creating, exploring (creativity, freedom, independent, curious, choosing own goals)
- **Universalism:** Understanding, appreciation, tolerance, and protection for the welfare of all people and for nature (broad-minded, wisdom, social justice, equality, a world at peace, a world of beauty, unity with nature, protecting the environment)
- **Benevolence:** Preservation and enhancement of the welfare of people with whom one is in frequent personal contact (helpful, honest, forgiving, loyal, responsible)
- **Tradition:** Respect, commitment, and acceptance of the customs and ideas that traditional culture or religion provide the self (humble, accepting my portion in life, devout, respect for tradition, moderate)
- **Conformity:** Restraint of actions, inclinations, and impulses likely to upset or harm others and violate social expectations or norms (politeness, obedient, self-discipline, honoring parents and elders)
- **Security:** Safety, harmony, and stability of society, of relationships, and of self (family security, national security, social order, clean, reciprocation of favors).

Figure 1.
Schwartz's Value Inventory



(From Schwartz, 1992)

The dynamic relations between values can be seen when arranged in circular order (Figure 1) involving both conflict and congruence nature of relationship. Value types situated close to each other on the circle are similar whereas those situated on the opposite side of the circle represent contrary positions. Thus the achievement value type may be compatible with the power value type but conflicts with the benevolence value type. All the SF value items can be further reduced to four second-order value factors (Schwartz, 1994; Grojean et al., 2004). These are Self enhancement, Self transcendence, Conservation, and Openness to Change. Self enhancement consists of three first-order values: hedonism, achievement and power. Self transcendence consists of two first order values: universalism and benevolence. These two second order values can be viewed as polar opposites on a self enhancement versus self transcendence continuum. This continuum focuses on the extent to which an individual values self- interest and growth as opposed to the interests of those around that individual. In practical terms, this implies that a person who assigns high scores to values located (for example) in the "security" value type is also likely to regard values located in the "conformity" value type as "guiding principles of his life" - and s/he will be unlikely to assign high scores to values located in the "stimulation" or "self-direction" value types (<http://www.chairt.com/index.html>). Similarly, the second-order factor Conservation is composed of three first order values: tradition, security, and conformity. The opposite of this factor is Openness to Change which contains three first order values; hedonism (shared with self-enhancement), stimulation and selfdirection. These two second order factors are also situated in opposite poles on a continuum (Conservation vs. Openness to Change) which contrasts a person's willingness to change and grow, with valuing stability and retention of established ways.

In this study, we do not include the value types of universalism and benevolence. These value types are both concerned with the enhancement of others and transcendence of selfish interests, although they are not identical: benevolence deals with the concern for the welfare of associates in everyday interactions while universalism deals with the welfare of all people and nature. It is not clear how self-transcendence values can help in the use of ICT as ICTs can be used for both beneficial and harmful purposes (Friedman, 1998).

Schwartz and his associates also designed seven cultural level values that reflect the basic issues that societies confront in order to regulate human activity in the society (Kirca et al., 2009). These are:

- **Conservatism:** Societies where social order, national and family security, reciprocation of favors, obedience, respect, preserving public image, wisdom, forgiving, and tradition are priorities,
- **Hierarchy:** Societies which emphasize the legitimacy of the hierarchical ascription of roles and fixed resources (social power, authority, humility, wealth),
- **Intellectual Autonomy:** Societies which encourage the values that situate the person as an autonomous entity to pursue his or her goals and intellectual interests (e.g., being curious, open minded, and creative);
- **Affective Autonomy:** Societies which promote and protect the attainment of positive affective experiences (e.g., enjoying life, pleasure, exciting life, varied life),
- **Mastery/Competency:** Societies give priority to the dominance of the surroundings through self-affirmation (e.g., ambition, success, independence, risk).
- **Harmony:** Societies in which harmonious fit with nature and the environment are priorities (e.g., unity with nature, protection of the environment, world of beauty).
- **Egalitarianism:** Societies that share a concern for the well-being of others (e.g., equality, social justice, responsibility, freedom, loyalty, help).

These dimensions can be related or contrary. For example, Intellectual and Affective autonomy are similar in that they are the opposite pole of collectivism (Schwartz, 1994). Similarly, Mastery and Harmony are in direct contrast. Schwartz's cultural types have some relationship to Hofstede's and GLOBE's cultural dimensions. Schwartz also ensured that cultural dimensions are designed based on equivalent meanings of terms all around the world. The use

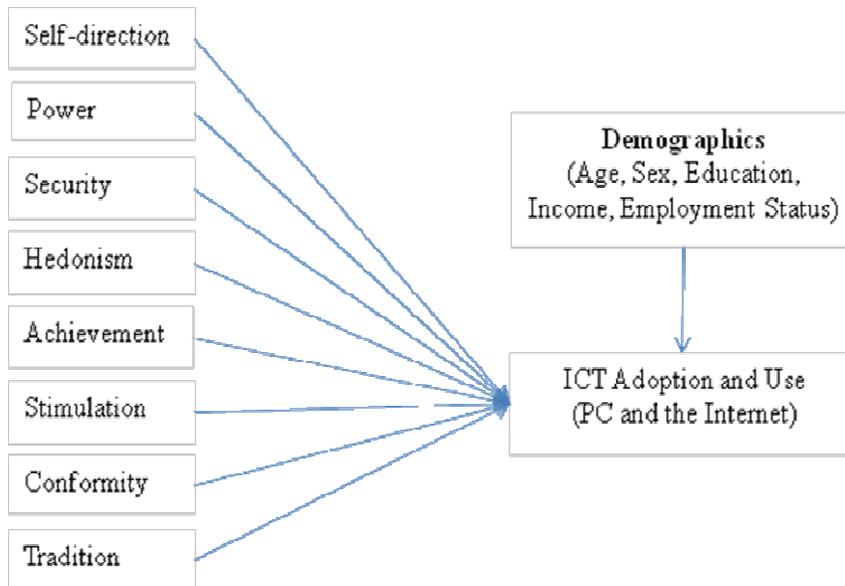
of values at an individual level and cultural dimensions at a group/national level is one of the features that makes the SF a unique model.

The Model and Hypotheses

Based upon the literature cited above, our proposed research model is presented in Figure 2. The model considers two groups of variables which affect ICT (PC and Internet) adoption and use: Individual motivations (Schwartz's Value types) and demographics. The hypotheses developed from the research model are detailed below for each group of variables.

Because our analysis considers the differences between developed and developing countries, we also provide a brief discussion of the expected difference between the two groups.

Figure 2.
The Proposed Model



Individual motivation variables

Power motivation is a concern about having control, impact or influence over others (McClelland, 1987; Winter, 1973). Individuals with high power motivations have a great concern in their image and how others view them. In this sense it is related to social influence in ICT use (Venkatesh et al., 2003). Some individuals also value obtaining prestigious possessions and ICT gadgets can be seen as ideal tools for such purposes (Frieze et al., 2006; McAdams, 1988; Winter, 1973). Power motivation is also related to career success, and since ICTs are essential tools for any type of business, computer literacy and thus more ICT use has become a necessity for those hoping for advancement (McGowan and Cornwell, 1999). The common motivation to use ICT is that the individual knowledge worker may get empowered by using the tools to support and boost his or her knowledge-sharing skills (Tampoe, 1996).

H1a. The more power-oriented values an individual exhibits, the higher the use of ICT.

Achievement motivation is the long-term need for success or the concern for the attainment of excellence (McClelland, 1961). The need for achievement is the desire to succeed, preference for situations of moderate risk and to attain excellence. People with a high achievement need relate their success as a result of skill and /or effort, preferring competitive strategies over cooperative ones (House et al., 2004; Ward, 1995). PC and the Internet access and use require skill and effort and can help to successfully finish projects; sometimes use of these ICTs result in

excellent completion of projects, yielding a sense of achievement. Achievement motivation could be related to performance expectancy in ICT use (Venkatesh et al., 2003).

H1b. The more achievement-oriented value an individual exhibits, the higher the use of the ICT.

Hedonic values emphasize deriving pleasure and enjoying life. Perceived enjoyment is the extent to which using a system is 'fun' for the user. Davis et al. (1992) and later Moon and Kim (2003) emphasized that perceived enjoyment is also an important indicator of intention and actual use in TAM. It has also been found that perceived enjoyment is an important motivational factor for mobile Internet usage (Lee et al., 2005). The Internet and PC offer hedonic services (e.g., games, sports and entertainment information, etc.) as well as utilitarian services (e.g., search engines, news, weather services). Heilman and Brusa (2008) found a significant positive relationship between college students' perceptions of the enjoyment of using computers on their level of computer. High hedonic values are thus assumed to be positively related to ICT usage.

H1c. The more hedonism-oriented values an individual exhibits, the higher the use of ICT

Adventure, excitement and risk-taking constitute the core of stimulus-oriented values. High risk-taking is associated with ICT adoption and use at an individual- and at national level (Hofstede, 2001; Straub, 1994; Bagchi et al., 2004; Srite and Karahanna, 2006). Adventure, excitement and risk-taking constitute the core of stimulus-oriented values. For example, Internet-based transactions such as online shopping are generally considered inherently more risky than traditional face-to-face shopping due to the virtual nature of the transaction, reliance on electronic payment systems, and the threat of unsecure handling of financial or personal information (Lee et al., 2007). Consumers comfortable with accepting risk in an online transaction tend to have more positive perceptions of the relative advantages provided by the Internet. Fogela and Nehmad (2009) found that individuals with profiles on social networking websites have greater risk taking attitudes than those who do not. High stimulus-oriented values are thus assumed to be directly contribute to ICT usage.

H1d. The more stimulus-oriented values an individual exhibits, the higher the use of ICT

Self-directional behavior is characterized by such traits as independence, curiosity, and choosing one's goals. It is reasonable to suppose that those who value the group over the individual may less prefer Internet public shopping venues (Lee et al., 2007). Individualism contributes to ICT adoption and use both at an individual level as well as at a national level (Rogers, 1995; Hofstede, 2001; Bagchi et al., 2004; Srite and Karahanna, 2006; Lee et al., 2007). A report by Telecomworldwire (1998) found that Internet users' primary motivation for gaining access is curiosity. It is expected that individuals with low self-directional values are likely to report lower levels of perceived trustworthiness than individuals with high self-directional values. In accordance with previous research, we assume that an individual's self-directional values will be positively related to their perceptions of IT and its subsequent usage.

H1e. The more self-direction-oriented values an individual exhibits, the higher the use of ICT.

The next three values called, Social-Order values such as *tradition, security and conformity* (which conceptually overlap with the traditional pole of the secular/traditional WVS dimension) are expected to demonstrate negative relationships with ICT adoption and use. These values depict a traditional and predictable world (Hitlin and Kramer, 2007; Inglehart, 2006; Inglehart and Wetzel, 2005; Inglehart and Baker, 2001) and thus any changes brought about by ICT are expected to be looked upon negatively.

Traditional cultural values may impede ICT usage (Albirini, 2006). Hill et al. (1998) found that participants in non-Western nations with "traditional religious values and conservatism" showed greater resistance to ICT transfer in its current "Westernized" form. Loch, et. al. (2003) found that the "moral and religious cultural issues", social life and communication, and fear of the influence of other cultures influence Internet acceptance in the Arab world.

H1f. Tradition-oriented values will be negatively related to ICT usage

The concept of a secured environment is important to all users, more so to individuals in developed nations where attack incidents are more frequent, where PC and Internet usage is often considered less secure and security comes with a cost (CSI, 2008; Whitman, 2003). Secured ICT implementation is more in developed nations where the ICT usage is more. A World Bank report (2007), for example, notes that “while developed nations have more than 300 secure internet servers per one million people, developing nations have fewer than two. Canada has more secure servers than all the developing countries combined.” However, privacy issues often clash with security (Fisher-Hubner, 2001). More secured systems often result in less privacy, which in turn may reduce ICT usage. Security concerns over web/internet are more important. The security of digitized data, for example, is of key importance as far as public confidence is concerned. Breaches in security may seriously undermine public confidence in e-government and e-health issues for example, and thus result in less confidence in ICT use (EPTA, 2006). Overall, we assume the following hypothesis will hold.

H1g. Security-oriented values will be negatively related to ICT usage

Conformity is defined by Schwartz (1994) as “Restraint of actions, inclinations, and impulses likely to upset or harm others and violate social expectations or norms.” Conforming people seeks obedience to clear rules and structures. They gain a sense of control through doing what they are told and conforming to agreed laws and statutes. Conformity can have a negative impact on people who use ICT more; the Internet allows one to visit all types of web sites and use application mostly for free (such as e-mail, ICQ, chat rooms, newsgroups, and online games). The Internet has been known to spread rebellion in some nations. It has been observed that computer users more frequently engage in antisocial behavior (Loch and Conger, 1996). Frequent PC and especially Internet use allows some to be socially isolated and may be less conforming to existing social values (Chak and Leung, 2004). Conformity-orientation can be associated with less uncertainty avoidance which has been shown to be negatively associated with ICT adoption at a national and individual levels (Straub, 1994; Hofstede, 2001; Bagchi et al., 2004; Srite and Karahanna.,2006; Lee et al., 2007).

H1h. Conformity-oriented values will be negatively related to ICT usage

Demographic variables

Since values may not exist in isolation, potential confounding variables need to be found. Research has shown that there are other factors that may influence individual technology adoption and use. Levels of education, age, income, and unemployment have all been found to be impact ICT usage (Rogers, 1995, Venkatesh et al., 2003;GVU center, 1999; UCLA Center for Communication Policy, 2001;Schleife, 2004). Therefore the effects of these variables need to be weighed in. Our hypotheses for these demographic variables follow the findings of the prevailing research:

H2a. Education is positively related to ICT usage.

H2b. Age is negatively related to ICT usage

H2c. Income is positively related to ICT usage

H2d. Employment is positively related to ICT usage.

Gender has also been found to be a factor in ICT usage. In general, studies have found that females tend to lag their male counterparts in Internet adoption (GVU center, 1999; Gefen and Straub, 1997; Venkatesh and Morris, 2000; Pew Internet, 2001). However, the pattern of usage, especially in the use of the internet, has been found to vary (Jackson et al., 2001). Wahid (2007) found that the proportion of women who use the internet for such social activities as chatting is significantly larger than that of males, whereas males are more likely to use the Internet for task-oriented activities. Because we do not consider patterns of use, we therefore do not hypothesize any differences in usage.

H2e. Gender is not related to ICT

Developed and Developing Nations

Using a cultural point of view, scholars have argued whether ICT (primarily designed for Western developed nations) can be adapted equally well in developing nations. According to Schwartz and his colleagues, a high level of pan-cultural agreement regarding the hierarchy of importance of the ten values exist. For example, among individuals across the world, certain values are especially important (e.g., honesty), others are less important (e.g., wealth and other power values) or even very low in value hierarchy (e.g., pleasure) (Schwartz and Bardi, 2001). Others believe that developing and developed nations not only differ in economic conditions but in a lot of other issues and cultural values could be one of these. Hofstede believes that certain cultural values such as individualism is associated with economic well-being of a nation. For wealthy nations, its citizens get access to resources to “do their own thing”, whereas in developing nations people depend on the support of their ingroups (Hofstede, 2001, p. 253). Some scholars have argued that several East Asian nations (called Asian Tigers) adopted western technologies. They did not, however, had western values, such as individualism, materialism, self-sufficiency, independence for family, etc., but rather depicted collectivistic characteristics, such as self-sacrifice, family ties, loyalty, endurance, and respect for authority (Marsella and Choi, 1993; Kagitcibasi, 2005). We expect the impact of some values on ICT use will differ between developing and developed nations.

H3. Developing and developed nations will differ in certain values and will be similar in others as far as use of ICT is concerned

Data and Methodology

The World Values Survey (WVS) of 2005-2008 was conducted among a representative random sample of the adult population within each nation-state by a large international network of social scientists under the leadership of principal investigator of the project, Prof. Ronald Inglehart of University of Michigan (WVS, 2009). Each nation had at least 1000 data points. Data for 49 nations were available. A total of more than 75,000 (actually 76303) responses from all nations were available; but due to missing data, only about 50,000 samples could be used. The obtained nation set is based on data availability and is a mix of representative developed and developing nations, with 16 developed nations and the rest as developing nations. Developing and developed nations are defined per World Bank (World Bank, 2008). The list of nations is given below.

Argentina, Australia, Brazil, Bulgaria, Burkina Faso, Chile, China, Colombia, Cyprus, Egypt, Ethiopia, Finland, France, Germany, Ghana, Hong Kong, India, Indonesia, Italy, Japan, Jordan, Malaysia, Mali, Mexico, Moldova, Morocco, the Netherlands, New Zealand, Peru, Poland, Romania, Russia, Rwanda, S. Africa, S. Korea, Serbia, Slovenia, Spain, Sweden, Switzerland, Thailand, Trinidad, Turkey, UK, Ukraine, the USA, Vietnam and Zambia.

The WVS questions and corresponding Schwartz type are given in Table 1. Because Schwartz’s questions are given in reverse order (e.g., 1 = very much like me; 6 = not at all like me), we reversed the values prior to any analysis.

With a multi-nation data set, the Ordinary Least Squares (OLS) regression can yield inaccurate results for contextual and cross-level variables by overestimating the degrees of freedom, and therefore tests of significance can be erroneous. A Pooled OLS regression model can control for national variations by including dummy variables for each country, in effect reducing the regression to a fixed-effect one (Greene, 2008). For the Internet, a pooled logit regression was used instead of a pooled OLS, as the Internet use was binary (used last week/not used last week).

Three different analytical models were applied for each ICT type: PCs and Internet usage. Model 1 used all of the Schwartz values as independent variables after first controlling the demographic variables (age, sex, employment status, income, and education levels). Model 2 used the same approach, but only for developed countries, and Model 3 considered only developing countries.

Cultural/Value Variables

Ten distinct types of individual values of the value orientation scales developed by Schwartz (2001) were included in the WVS 2005-2008 survey, as listed in Table 1. These are designed to monitor the desirable goals that motivate people to action, serving as guiding principles in people’s lives. The questions briefly describe the characteristics of

certain people and ask respondents to identify the extent to which they resemble each person, using 6-point scales ranging from 'Not at all like me' (a value of 1) to 'Very much like me' (a value of 6). Hitlin and Kramer (2007) suggest that indirect questions such as these are more useful in capturing the essence of personal values than direct questions. To remove any bias and adhere to the scale use correction as suggested by Schwartz, we formulated hypotheses for eight of the value types and Schwartz's value types ideally require maximum of 8 value types to be used in a regression at any given instance (Schwartz, 2003).

Table 1
Schwartz's Individual Values as measured by the 2005-2007 WVS survey

The WVS Question No. and the Question Content	Representative Schwartz Value
V80 Importance of thinking up new ideas and being creative	Self-direction
V81 importance of being rich	Power
V82 Importance of living in secure surroundings	Security
V83 Importance of having a good time	Hedonism
V85 Importance of being very successful	Achievement
V86 Importance of adventure and taking risks	Stimulation
V87 Importance of behaving properly	Conformity
V89 Importance of tradition	Tradition

Results

We first ran the bare bone regression model with eight Schwartz's value types as independent variables. For each model (Models 1-3), all the value types were significant in the expected direction (results not shown here). This indicates that Schwartz's value types do influence ICT use for both PCs and the Internet. We next ran regressions with the potentially confounding demographic variables. The regression results are presented in Table 2. For the Internet, logit regressions were run and the unstandardized coefficients (B) are shown. In all models, the R² contributions of the Schwartz values are significant. Multicollinearity was not in evidence, as witnessed by the Variance Inflation Factor (VIF) values (VIF values <10) (Greene, 2008).

All Nations (Model 1)

Regardless of model, demographically, ICT use was predominantly associated with educated, high-income, young and employed, individuals, supporting hypotheses H2a – H2d. Also regardless of model, PC and Internet use is significantly greater among males, indicating a lack of support for null hypothesis H2e.

With respect to Schwartz's set of values (H1), most of eight first-order values are significant in the predicted direction for PC use. The Power value type (*Important to be rich*) (H1a), although significant in PC regression, was in the opposite direction than predicted (H1a). For Internet use, all the power values were insignificant. It should be noted that Power and Achievement are among the lowest in rank in the world value hierarchy (Bardi & Schwartz, 2003). Overall these sets of variables can explain 46-48% of the variance in ICT use in a sample of over 50,000 of people. Although not reported here, we did initially consider adding a technology-related experience component to the model, where, for example, PC familiarity was assumed to increase the comfort level of Internet users and subsequently increase Internet use. When this component was added, the R² value increases to 0.61-0.63.

We next focus on results concerning developing and developed nations to examine possible similarities and differences.

Developed Nations (Model 2)

For self-direction, stimulation, tradition and security are significant in the predicted direction for both technologies. The R² values for both Internet and PC use range between 0.39-0.43. When the technology-related experience component was included, the R² value increases significantly to nearly 0.60 (not shown). Power was not significant for either ICT.

Table 2.
The Regression Results

	PCs			Internet		
	Model 1	Developed	Developing	Model 1	Developed	Developing
		Model 2	Model 3		Model 2	Model 3
Demographic Variables (Control):						
(Constant)				-2.386***	-0.527***	-2.655***
Income Scale	0.131***	0.148***	0.136***	0.165***	0.146***	0.178***
Employment Status (1=Full time; 7= unemployed)	-0.062***	-0.064***	-0.058***	-0.065***	-0.053***	-0.067***
Highest educational Level attained	0.345***	0.295***	0.381***	0.389***	0.287***	0.426***
Age	-0.216***	-0.333***	-0.188***	-0.039***	-0.041***	-0.038***
Gender	-0.029***	-0.027***	-0.033***	-0.231***	-0.169***	-0.258***
Schwartz Values:						
Important to think up new ideas	0.050***	0.057***	0.053***	0.160***	0.161***	0.161***
Important to be rich	-0.022***	0.000 ^{NS}	-0.029***	0.010 ^{NS}	-0.024 ^{NS}	-0.017 ^{NS}
Important to live in secure surroundings	-0.007*	-0.018**	-0.005 ^{NS}	-0.020*	-0.033*	-0.023*
Important to have a good time	0.028***	0.007 ^{NS}	0.035***	0.052***	0.016 ^{NS}	0.064***
Important to be very successful	0.016***	0.013 ^{NS}	0.015**	0.029**	0.021 ^{NS}	0.032**
Adventure/Risk taking is important	0.038***	0.023**	0.044***	0.071***	0.052**	0.076***
Important to always behave properly	-0.016***	-0.008 ^{NS}	-0.018***	-0.019*	-0.028 ^{NS}	-0.014 ^{NS}
Tradition is important	-0.051***	-0.035***	-0.056***	-0.083***	-0.042**	-0.102***
Other Statistics:						
VIF	1.07-1.59	1.09-1.48	1.07-.55	--	--	--
R ²	0.48	0.43	0.41	0.46	0.39	0.41
N	53,690	11,460	42,230	69,230	11,257	40,243

Legend: ***: p<.000, **: p<.05, *:p<.10 (The meanings of the signs of the coefficients are given in Appendix A1).

Developing Nations (Model 3)

Security is insignificant in PC use, as are conformity and power for Internet use. Power was not a significant indicator of Internet usage, though, as noted above, it was significant for PC use, but in opposite direction hypothesized (further discussed below). The rest of the value dimensions are significant in the predicted direction. The R² values for both Internet and PC use are approximately 0.41. When the technology-related experience component was included, the R² value increases significantly to nearly 0.60 (not shown).

A summary of the results is presented in Table 3. As can be observed, there is considerable support for the set of hypotheses developed in this paper. It can also be observed that there is a wide range of similarities and differences among the impact of various values on ICT use for the set of developing nations, while people in developed nations do not differentiate between PC or Internet use (the same values are significant or non-significant).

Table 3.
Summary of Results

Variables	All	Developed	Developing
	Validated Hyp. /Total	Validated Hyp. /Total	Validated Hyp. /Total
Schwartz Cultural Values			
Hypotheses 1(a)-1(j)			
PC	7/8	4/8	7/8
Internet	7/8	4/8	6/8
Demographics			
Hypotheses 2(a)-2(e)			
PC	5/5	5/5	5/5
Internet	5/5	5/5	5/5
Developing/Developed Nations			
Hypothesis 3	1/1	1/1	1/1

Discussion

The finding that seven of Schwartz's value inventory items are significant for all nations for PC use with proper sign is remarkable. For Internet use, seven of these hold, with power becoming irrelevant. The results show that even after controlling for potential confounding demographic variables such as age, gender, income, education and employment status, Schwartz value types exert influence on ICT use.

Our primary set of hypotheses, that Schwartz's individual motivation variables affect ICT use, were mostly supported, with the exception of H1a (*The more power-oriented values an individual exhibits, the higher the use of ICT*) which was not supported (for PC usage the sign was in opposite direction in two out of three, for Internet usage, it was not significant). When the effects of the variables are considered across the three models, 34 of the 48 hypotheses (71%) were supported. This offers strong support for Schwartz's conceptualization of values and for our introductory proposal that Schwartz's individual values can be significant indicators of ICT use at an individual level across multiple nations. That the sign of the coefficient of power was not in the predicted direction for the PC use regression could be due to a number of reasons. Values adjacently placed on the circle of values (Schwartz, 1992) are of similar sign and values on the opposite sides of the circle are of opposite signs as they are conflicting in nature (refer to Figure 1); in the present case, power and security are adjacently placed on the circle and were predicted to impact ICT use in reverse ways as these are border values (representing secondary values self-enhancement and conservation respectively). Although the impact of these on PC use was predicted to be of opposite signs, impact of neighboring values may occasionally change signs or positions over time and/or space (Bardi et al., 2009). That power was not significant in the Internet regression could be due to the fact that all people in the world rate power as one of the low values.

For developed nations, only half of the Schwartz's values considered were significant in both the PC and Internet regressions. Thus, self-direction, stimulation, tradition and security were significant, while hedonism, achievement, power and conformity were not. It is possible that self-direction and stimulation encourage ICT use whereas tradition and security oppose ICT use more intensely when the nations are developed. Hedonism, achievement and conformity have less impact on ICT use in richer nations. Thus "important to be rich" (Power) is not relevant in a developed nation as PCs are relatively cheap. In a developed nations "Having a good time" (hedonism) can be achieved in so many ways other than using ICTs. It can be mentioned that Satisfaction is a precondition for continued ICT use (Bhattacharya, 2001), but the role of enjoyment may not be. Similarly, in developed nations being "very successful" in jobs and other areas is a necessary but not sufficient condition for ICT use, as ICT use has become almost routine in day-to-day life for most people in such nations. In the same vein, improper behavior (conformity) is not related to ICT. These issues, however, need further investigation.

High usage of ICT by well educated, high income, younger users is well-known (Rogers, 1995; GVU Center, 1999; Nielsen Media Research 1999; UCLA Center for Communication Policy, 2001). Our hypotheses H2(a)-H2(d) are thus supported. Hypothesis H2e, *Gender is not related to ICT usage*, is not supported. For each of the models

considered, PC and Internet use is significantly greater among males, in contrast to recent research which has shown that the gender gap is closing with respect to computer access, use and self-efficacy (Imhof et al., 2007), but in accordance with findings that male students spent more time at computers per week than females (Middendorf, 2002). The role of gender in Internet use is controversial (Mitra et al., 2005). It has been shown that the role of gender influences the nature of Internet use, but not the frequency of use (Jackson et al., 2001; Morahan-Martin, 1998). It has also been reported that Internet use is either not different between males and females, or the differences are disappearing, but also that the perceptions of the Internet differ (Gefen and Straub, 1997; Morris et al., 2005). Due to the data available, our results can neither support nor contradict some other findings: some types of Internet/Web use are more frequent among females; females use e-mail more than males (Boneva et al., 2001, Jackson et al., 2001); females use academic web sites more frequently (Mitra et al., 2005); among the US internet users, in recent years, females outnumber males (51.7% to 48.3% in 2007) (eMarketer, 2007).

Adequate support is also given for H3 (*Developing and developed nations will differ in certain values and will be similar in others as far as use of ICT is concerned*). Developing and developed nations show remarkable similarities and differences in relation to ICT use. Similarities in value types include the significant contributions of self-direction, stimulation, tradition to ICT usage. Differences in value types include non-significant impact of hedonism and achievement on ICT usage. These differences could be due to variations in the environment (e.g., socioeconomic status, institutional differences). One can also argue from cultural point-of-view. Schwartz (1994) defines cultural values as desirable goals that are stable across situations, vary in importance, and serve a guiding role in a person's life. Thus a person's values are motivational (they provide valence and can vary in intensity) and also serve as standards for judgment and justification of action (Grojean et al., 2004). Feather (1995) observed that the selection of alternate courses of action (such as different ICT usage behavior) is related to an individual's values and choice between alternatives. One can argue that in developed nations, hedonism and achievement values are not so important to ICT usage, as ICTs are common and routinely used.

It can also be noted that when experience with other type of ICT use (Reed et al., 1995) is additionally included as an explanatory factor in the regressions, R^2 values of different models increase significantly to around 0.60.

Conclusions, Contributions and Limitations

The Schwartz's value inventory that was used in this article could be argued as obsolete, given that the original data were collected more than 15 years ago. During this period, substantial modernization has taken place in most of the surveyed countries. It has been argued that there have been significant shifts in cultural values (House et al., 2004). However, the data of present study on Schwartz's values is the most recent one (WVS, 2009) and was collected during the last three to four year period. Also Schwartz's original values inventory contained a total of 56 items, of which were included in the WVS survey. For example, wealth and social power were values which were associated with value type "power". Schwartz and his colleagues believe that these fifty-six values formed consistent and internally reliable subsets that serve to index these ten value types (Schwartz and Bardi, 2001, p. 270). As Hitlin and Kramer (2007) note, these ten value types are useful in adding statistical depth to a robust set of findings about value-dimensions in societies around the world. The WVS data, however, is limited in other ways. PC use and Internet use are limited in scales ('used last week'/'not used last week' for the Internet and for PC it is 'never used', 'occasionally used' and 'frequently used'). The WVS Schwartz value types are also 1-item questions (one Schwartz item for each of 10 values). A question can be raised whether Schwartz's ten universal values are reliably or validly measured in this manner. So results need to be interpreted with caution.

In spite of some limitations, the study contributes in several areas. We introduced Schwartz's dimensions in ICT use at an individual level and controlled for demographic variables. Our study contained data from 49 nations with more than 75,000 responses. As for the total set of nations, we find that 7 out of ten of Schwartz's value dimensions matter for both ICTs. We also find that the use of ICT is higher among educated, male, high-income, young and employed. The role of gender in ICT use is different for PC and Internet. Overall, we find remarkable similarities and differences in results across developed and developing nations. Broadly, for ICT use, impacts of some cultural values differ and some are similar, while impacts of demographics are somewhat similar across developing and developed nations. Finally, the results proved robust when we tested the same model with another similar database that has 21-item Schwartz value inventory and multiple-item Internet use construct.

The present study has preliminarily explored the role of individual cultural values in ICT use. Results show that individual differences and similarities in ICT use across the world are striking. More research is being conducted to explore these issues. The basic model has been based on Schwartz' value inventory and demographics only, to focus on the impact of Schwartz's value inventory on ICT use. For example, interaction terms are not considered in this model, which can make the model stronger. Additional explanatory variables such as interpersonal trust, social capital, institutional trust, moral values, nature of task, town size and information channel type etc., can all contribute to the overall model fit and these are being studied at present. We are also presently extending our research with nation-by-nation analysis. Interaction effects are also investigated, which we did not report in this paper. Schwartz thinks that characteristics of each nation sample (e.g., distributions of age, occupation, as well as unique economic, social, technological and historical experiences) may cause variation in the pan-cultural value hierarchy of importance of the ten values in various societies. Age appears to correlate most positively with conservation values (tradition, conformity, and security) and most negatively with openness to change values (self-direction, stimulation) and hedonism (Schwartz, 2003). Similarly, the interaction effects of gender, income and education on Internet use are being investigated. Preliminary results show that many of these interaction effects are significant. We hope to have final results in the near future.

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Appendix A1.
Variables and Their Hypothesized Signs (WVS 2005-2007 survey)

Variables and Hypothesized Signs	How measured	Expected Signs in Relationships
Scale of incomes (+)	1-10; 1=lowest, 10=highest	Positive (H2e)
Sex	1=male, 2=female	Not significant (H2c)
Age (-)	18-97	Negative (H2b)
Highest educational level attained (+)	1-9; 1=lowest, 9=highest	Positive (H2a)
Employment status (+)	1-7; 1=full time, 7=unemployed	Negative (H2f)
Schwartz: Important to this person to think up new ideas (+)	1-6; 1=not at all like me; 6=very much like me	Positive (H1e)
Schwartz: Important to this person to be rich (+)	1-6; 1=not at all like me; 6=very much like me	Positive (H1a)
Schwartz: Important to this person living in secure surroundings (-)	1-6; 1=not at all like me; 6=very much like me	Negative (H1g)
Schwartz: Important to this person to have a good time (+)	1-6; 1=not at all like me; 6=very much like me	Positive (H1c)
Schwartz: Important to this person to help the people	1-6; 1=not at all like me; 6=very much like me	Not Used
Schwartz: Important to this person being very successful (+)	1-6; 1=not at all like me; 6=very much like me	Positive (H1b)
Schwartz: Important to this person adventure and taking risks (+)	1-6; 1=not at all like me; 6=very much like me	Positive (H1d)
Schwartz: Important to this person to always behave properly (-)	1-6; 1=not at all like me; 6=very much like me	Negative (H1h)
Schwartz: Important to this person looking after environment	1-6; 1=not at all like me; 6=very much like me	Not Used
Schwartz: Important to this person tradition (-)	1-6; 1=not at all like me; 6=very much like me	Negative (H1f)
Internet Use	0=not used last week, 1=used last week	
PC Use	0=do not know what a computer is; 1=Never used; 2=occasionally used; 3=frequently used	