The Combined Influence of National and Organizational Cultures on ICT Adoption and Use

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Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), no material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

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Abstract

Information has become a new form of capital (Atkeson & Kehoe, 1993) and created a new type of economy (Castells, 1996). Using information effectively and efficiently is important for an organization's success and information and communication technology (ICT) has become more important than ever before to achieve this goal. While ICT has shown its promise, problems have also emerged when organizations try to improve their operations by adopting and using ICT. A frequently-overlooked cause of these difficulties is culture (Walton, 1975). Some information systems may be appropriate technically, but not culturally, and this kind of misfit between culture and the type of ICT being implemented can result in systems not being accepted by users (Gallivan & Srite, 2005), and thus abandoned.

With organizations globalizing, they are likely to face differences between their organizational culture and the national culture of the locations they operate in. Prior research has found that cultural differences affect ICT, especially in terms of the level of resistance and acceptance encountered during ICT adoption and use. However, while the separate effects of national culture and organizational culture have been investigated, little work has been done in the information systems field on their combined effect. It is important to study this for a number of reasons. For example, some aspects of an organization's culture may help mitigate the risk-aversion of certain national cultures and encourage the use of innovative technologies.

This dissertation reviews the literature on culture, ICT adoption and utilization to explore the individual and interactive impacts of organizational and national culture on ICT. A number of propositions are then developed and validated through the analysis of secondary data. Although the results are inconclusive, this project is a first attempt at investigating the combined effects of national and organizational cultures on both organizational ICT adoption and individual ICT utilization. Furthermore, it systematically uncovers the similarities between national and organizational cultures, and makes distinctions between their impact on organizational ICT adoption and individual ICT use, thus providing insight and guidance for future research in this area.

Chapter 1: Introduction

As we have entered the information age, information has become a new form of capital (Atkeson & Kehoe, 1993) and created a new type of economy (Castells, 1996). These changes are represented by massive innovations in information and communication technology (ICT), and subsequently, the deployment of various types of ICT in all sizes and types of organizations (Castells, 1996; Stehr, 2000). Indeed, ICT has been very promising. For example, it has automated manufacturing, optimized supply chains, and stores a large amount of crucial information for organizations and provides easy and secure access to such information from almost anywhere. The widespread adoption and utilization of ICT in factories and offices has even retriggered the centuries-old fear extensively portrayed in science fiction that humans will be replaced by intelligent machines (Castells, 1996).

However, while ICT is showing its promise, problems have emerged when organizations try to improve their operations by adopting and using ICT. A frequently-overlooked (Walton, 1975) cause of these issues is culture (Gallivan & Srite, 2005). Some information systems may be appropriate technically, but not culturally, and this kind of misfit between culture and the type of ICT being implemented can result in systems not being accepted by users (Gallivan & Srite, 2005). For example, Zhang, Guo, Chen and Chau (2008) found that e-government systems in China were gradually abandoned not long after they were implemented, because of their perceived low cultural fit for government departments. As a result, expensive ICT implementations could lead to little improvement in performance.

The significant impact of culture on ICT adoption and use has led to much research, and two comprehensive reviews of this field were conducted in 2005 (by Gallivan and Strite) and 2006 (by Leidner and Kayworth). This study will critically review developments in the field since then and following that, it will examine the joint and separate aspects of national and organizational culture, a topic that has not been well addressed in the literature.

Hofstede (1980) asserts that mankind's survival largely depends on the ability of individuals who think differently to act together. How people think, and then act, is influenced, to a great extent, by their cultures (Hofstede, 1980; Karahanna, Evaristo, & Srite, 2005; Kroeber & Kluckhohn, 1952). Prior research has found that cultural differences affect ICT adoption and use, especially in terms of the level of resistance and acceptance encountered (Hwang, 2011; Leimeister, Leimeister, Knebela, & Krcmar, 2009; Lippert & Volkmar, 2007; N. Zhang, Guo, Chen, & Chau, 2008). Acceptance and resistance are human behaviors and are thus shaped by both national and organizational cultures (Karahanna, et al., 2005; D. S. Zhang & Lowry, 2008). Ultimately, national and organizational cultures influence organizational ICT adoption and use through the behavior of the individual members of the organizations implementing the ICT.

It is widely held that organizational culture is a subset of national culture, since most organizations operate in their home countries and employ members from the same national culture (Gallivan & Srite, 2005). However, this is not always the case (Karahanna, et al., 2005). For instance, while Americans are characterized as being individualistic (Hofstede, 1983), a key part of the organizational culture of American software companies is the requirement that their employees work in teams (Karahanna, et al., 2005). Similarly, as organizations globalize, overseas subsidiaries may retain the same organizational culture as their headquarters', even though local employees introduce different national cultures. For example, Hofstede (2001) found that employees in overseas subsidiaries of IBM followed the practices established by their US headquarters.

Given the importance of ICT for organizations today, it is possible that differences between organizational culture and national culture could affect ICT adoption and use. For instance, some aspects of an organization's culture may help mitigate the risk-aversion of certain national cultures and encourage the use of innovative technologies. Another possibility is that when firms with a conservative culture set up subsidiaries in countries that are more open to new experiences, these subsidiaries may adopt innovations more quickly than their headquarters'. While the separate effects of

national and organizational culture on ICT adoption and use have been investigated, little work has been done to explore their combined effects on ICT adoption and utilization or their influences on each other during the process (Leidner & Kayworth, 2006). This study aims to study these joint and mutual influences, and by doing so, provide additional insights into organizations' decisions to adopt and use ICT.

This study begins with an overview of the literature on the impact of organizational and national culture on ICT adoption and use. This summary is used to develop propositions, which are then tested in a more recent sample of studies in this domain. The study concludes with a discussion of its findings and future avenues of research in this area.

Chapter 2: Literature Review

This chapter begins with a broad review of the literature on national and organizational culture, and on the impact of these cultures on ICT adoption and use.

Overview of Culture

Scholars have defined culture in many different ways: Kroeber and Kluckhohn (1952) identified 164 culture definitions. Leidner and Kayworth (2006) characterized culture, based on Sachmann's (1992) theory, as a compound of "ideologies, coherent sets of beliefs, basic assumptions, shared sets of core values, important understandings, and the collective will" (p. 359).

Table 1. *Level of Cultures*

Level	Definition
Supranational • Regional • Ethnic • Religious • Linguistic	Any cultural differences that cross national boundaries or can be seen to exist in more than one nation. Can consist of: • Regional – Pertaining to a group of people living in the same geographic area • Ethnic – Pertaining to a group of people sharing common and distinctive characteristics • Religious - Pertaining to a group of people sharing a common religion • Linguistic – Pertaining to a group of people speaking the same tongue
National	Collective properties that are ascribed to citizens of countries (Hofstede, 1984)
Professional	Focus on the distinction between loyalty to the employing organization versus loyalty to the industry (Gouldner, 1957)
Organizational	The social and normative glue that holds organizations together (Siehl & Martin, 1990)
Group	Cultural differences that are contained within a single group, workgroup, or other collection of individuals at a level less than that of the organization

Note. From Karahanna, et al. (2005)

Culture consists of symbols, languages, myths, rituals, attitudes, values, beliefs, ideologies, fundamental assumptions, expectations, norms, and practices (Burchell, Clubb, Hopwood, Hughes, & Nahapiet, 1980; DeLong & Fahey, 2000; Erumban & De Jong, 2006; Hofstede, 1998; Khalil, 2011; Leidner & Kayworth, 2006; Pettigrew, 1979). It "serves as shared source of socialization and social control" (Erumban & De Jong,

2006, p. 304), shapes individuals' behaviors, activities, interactions, relationships, perceptions and views of matters, reality and truth (Khalil, 2011; Schein, 1985), and represents "the collective programming of the mind which distinguishes the members of one group from another" (Hofstede, 1981, p. 21).

Base on the context in which it is formed and applied, culture can be divided into five general types or levels (see Table 1): supranational, national, professional, organizational and group (Hofstede, 2001; Karahanna, et al., 2005). The present study focuses on national and organizational cultures.

National Culture

Based on the general definition of culture, national culture can be framed as shared values, basic assumptions, beliefs, and practices within a country, which guide its members' thinking, behavior, interaction, and worldview.

Hofstede's (1980) framework of national culture is highly influential and widely employed in social science research (Sanchez-Franco, Martinez-Lopez, & Martin-Velicia, 2009). In fact, his theories and models have topped the Social Science Citation Index (SSCI) for many years (Zhao, 2011). (Taksa, Flomenbaum, & Society, 2009; Veiga, Floyd, & Dechant, 2001; D. S. Zhang & Lowry, 2008). Hofstede's (1980) dimensions of national culture provide information systems (IS) researchers with a systematic model for exploring culture, and analyzing differences among groups both quantitatively and qualitatively (Ford, Connelly, & Meister, 2003).

The Original Culture Dimensions

Hofstede's (1980) framework targets the fundamental problems faced by human society, but which have been answered in different ways by different societies. It is designed to be employed in cross-cultural organizational research to explain the different ways organizations are structured, the motivations individuals and organizations, and the diverse issues individuals and organizations face in societies.

Originally, Hofstede established four dimensions of national culture: power distance, uncertainty avoidance, individualism versus collectivism, and masculinity versus femininity. They were developed based on data collected from worldwide comparative attitude surveys that IBM Corporation had been carrying out since 1967/1968. It was made available for academic research in the early 1970s. By 1973, more than 11,600 questionnaires had been issued and collected in 20 languages from the corporation's subsidiaries across 72 countries and three regions (Hofstede, 1983; Hofstede & Bond, 1988).

Apart from the large scale and the international standardization, other attributes also contributed in separating IBM's surveys from other employee attitude questionnaires. The cultural focus was one of them. For instance, 60 of around 150 questions in the questionnaire asked about each the employee's basic values and beliefs. As a result, they were eminently fit for measuring culture (Hofstede & Bond, 1988).

The data accurately represents work-related value patterns and cultural differences, because the questionnaires were conducted in a controlled environment that eliminates, to a great extent, other variables other than culture. For example, IBM employees were considered being extremely well matched subsets of each country's population. Generally speaking, across different countries, they all worked for the same organization, did the same jobs, had the same level of education; the only difference was their nationality (Hofstede & Bond, 1988).

Power Distance

Power distance describes "the extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally" (Hofstede, 1991, p. 28). Institutions are considered as essential elements of societies including families, schools, and communities, while organizations refer to places individuals work. Within organizations, power distance indicates the relationship between supervisors and subordinates. Supervisors and subordinates from high power distance cultures consider each other existentially unequal. The supervisors have much power as possible, and subordinates are expected to respect

and follow their bosses' authorities. As a result, organizations whose management comes from high power distance cultures are likely to centralize power and control, making the power hierarchy easy to set up and considerably stable. On the other hand, supervisors and subordinates from low power distance nations consider each other existentially equal. Thus, organizations whose management comes from low power distance cultures are likely to have a decentralized power structure. The power hierarchy is established only for convenience and represents the inequality of roles. It can be changed over time and changes fairly easy (Hofstede, 1991).

Uncertainty Avoidance

Uncertainty avoidance indicates "the extent to which the members of a culture feel threatened by uncertain or unknown situations" (Hofstede, 1991, p. 113). Uncertainty avoiding societies try to prevent uncertainties in individuals' behaviors by following the laws and rules. Within organizations, formal and informal rules also maintain and control employers' and employees' rights and duties as well as work processes. People from uncertainty avoiding cultures orientate their behaviors around rules and regulations, whereas those from uncertainty accepting societies tend to follow the rules in the case of absolute necessity (Hofstede, 1991).

Individualism versus Collectivism

Individualism versus collectivism defines the level of tightness of the ties between societies and their individuals. In individualistic cultures, "everyone is expected to look after himself or herself and his or her immediate family", while in collectivistic cultures, "people are integrated into strong, cohesive in-groups, which … continue to protect them in exchange for unquestioning loyalty" (Hofstede, 1991, p. 51). Within workplaces, employees from individualistic cultures act based on their own interests, and work is organized such that personal interests and the organization's interests coincide. On the other hand, workers from collectivistic cultures act according to their in-group's interests, even when they does not coincide with their personal interests (Hofstede, 1991).

Masculinity versus Femininity

Masculinity versus femininity represents whether gender roles are distinct within societies. In masculine cultures, social gender roles are clearly distinct. Men are expected to be assertive, tough, and tough on material success, whereas women are supposed to be tender, modest and concerned with the quality of life. Within feminine cultures, social gender rules overlap. Both men and women are expected to be tender, modest and concerned with the quality of life. In workplaces, individuals from masculine cultures tend to be decisive, assertive and aggressive, so that decisions are likely to be made without group discussions and conflicts are likely to occur. In contrast, individuals from feminine cultures tend to make decisions as a group and prefer to resolve conflicts by compromise and negotiation (Hofstede, 1991).

The Fifth Culture Dimension

The success of East Asian- made electronic products and cars in Western markets in the 1980s reflected the rise of Asia's economy. This was confirmed by the World Bank's 1987 World Development Report and other analyses. As a whole, they indicated that Japan, South Korea, Taiwan, Hong Kong and Singapore, or the Five Dragons, as these countries (or regions) were sometimes referred to, outperformed the United States and Western Europe in terms of the average annual growth rate of their per capita gross national product from 1965 to 1985 (Hofstede & Bond, 1988).

When this phenomenon emerged, economists started asking why these countries were so successful. Kahn (1979) labeled the culture shared by these East Asian regions as 'Neo-Confucian', as it is derived from Confucius' teachings. Such cultural inheritance created a competitive advantage that facilitated the success of their economies (Hofstede & Bond, 1988). It became vital to establish a framework that allows researchers to not only understand but also, more importantly, measure Confucian culture. Although, the four culture dimensions were seen as being universal[1], there

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[1] The findings of the IBM survey and another similar study, the Rokeach Value Survey, overlapped with each other, as seen in the scores of six nations involved in both samples. The Rokeach Value Survey used a completely different set of questionnaires, was conducted in different years, and studied different

was concern that some of the questions developed in the West may have been irrelevant to non-Westerners, while others that were relevant may not have been included. As a result, the Chinese Value Survey (CVS) was created. It comprised a 40 – item Chinese language questionnaire that was administered to 100 respondents in 23 countries/regions (Hofstede, 2001; Hofstede & Bond, 1988).

The results of the CVS identified three dimensions similar to power distance, individualism vs. collectivism, and masculinity vs. femininity. However, the uncertainty avoidance dimension was missing in the CVS data, and another new dimension was discovered. This was initially named Confucian dynamism (Hofstede & Bond, 1988), and later on referred to as long-term vs. short-term orientation (Hofstede, 2001).

Long-Term versus Short-Term Orientation

Long-term versus short-term orientation "can be interpreted as dealing with a society's search for virtue" (Hofstede, 1991, p. 171). Individuals from long-term oriented societies tend to maintain a concern with respecting the demands of virtue, adapt traditions to modern situations and contexts, respect social and status obligation within limits, have strong capability of saving for investment, are thrifty, persevere to achieve their goals, and are willing to subordinate themselves for a purpose. On the other hand, people with short-term orientation normally are more concerned with possessing the absolute truth, exhibit great respect for traditions, as well as social and status obligation regardless of the cost, have relatively small propensity to save for future, and expect quick result (Hofstede, 1991).

Criticisms of Hofstede's Dimensions

Despite the widespread use of Hofstede's work, some researchers have criticized it. Ford, et al. (2003) argue there are three major concerns regarding Hofstede's (1980) dimensions of national culture. The first concern is related to the assumption that

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populations, except for a few overlapping nations. The similarity in the findings indicated the universality of the culture dimensions established from the IBM studies (Karahanna, et al., 2005).

culture falls along national boundaries, and is static over time (Myers & Tan, 2002). The second is that his taxonomy assumes that national cultures are homogenous within countries (Bottger, Hallein, & Yetton, 1985; Straub, Loch, Evaristo, Karahanna, & Strite, 2002) and does not clearly acknowledge the existence of subcultures (Myers & Tan, 2002). The final concern is the misuse of the dimension indices: although they were designed to be employed at the national level[2], they are sometimes used at the organizational or individual level. This is considered an example of ecological fallacy (Hofstede, 1980). For instance, although the United States is rated highest on individualism among the countries Hofstede studied, the ecological fallacy would be perpetrated if researchers assumed that all Americans are individualistic (Bond, 2002).

In response to those concerns, the following facts can be presented. First of all, a nation or country is an appropriate unit in a region or the world. Although the concept of a nation is reasonably new compared to the concept of culture (Myers & Tan, 2002), many worldwide and region-wide organizations have been formed based on the former concept since nations emerged. These include the United Nations (UN), International Olympic Committee (IOC), World Trade Organization (WTO), European Union (EU), Asia-Pacific Economic Corporation (APEC), and the North Atlantic Treaty Organization (NATO). Karahanna, Evaristo and Srite (2005) suggest that cultures consists of values and practices. Values are very stable once they are formed and have a strong influence on national culture. As a result, national culture is considered to be relatively static over time.

Secondly, generally speaking, Individuals from the same country, even from regions that are far from each other, share similar values, norms, rules, and ways of thinking, feeling and reacting, which constitute their national culture. This concept of culture can also be extended to the supranational level, such as regional, ethnic, religious and linguistic cultures, or narrowed down to professional, organizational and group levels

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[2] As Hofstede (1994) states "The questions and dimensions in this questionnaire have been chosen for comparing countries and the questionnaire is meant for use at the country level" (p. 3).

(Karahanna, et al., 2005). Hofstede's dimensions are designed for measuring cultural differences in the national level without denying the existence of the others.

Finally, Hofstede's (1980) dimensions were established by analyzing individual responses to large-scale questionnaires. They represent the general characteristics of the individuals from the same country as a whole. While we cannot assume that individuals from the United States are the most individualistic people in the world, it is highly likely that Americans are more individualistic than people from other countries. As Sanchez-Franco, et al. (2009) note, "[Hofstede's] value dimensions, which distinguish national value systems, would affect individuals and organizations; central tendencies in a nation are replicated in their institutions through the behavior or practices of individuals." (p. 590) Moreover, scholars suggest that Hofstede's (1980) culture dimensions can be adapted for use at the organizational or individual level, and can be valid depending on the research questions (Kirkman, Lowe, & Gibson, 2006; Sivakumar & Nakata, 2001).

Organizational Culture

Hofstede's (2001) defined organizational culture as the actions, behaviors, and activities carried out in an organization based on its well-accepted and shared values. It is a compound of organizational artifacts that consists of values, underlying assumptions, organizational structures, and processes (Ngwenyama & Nielsen, 2003). It provides members of an organization the basic understandings about what matters; what, why, and how things are done (Louis, 1981). As a result, it influences individuals' views and perceptions of organizational realities (Hofstede, 1981; Pettigrew, 1979; Smircich, 1983).

Compared to the popularity of Hofstede's (1980) framework in culture-ICT studies, there is no single comparable framework for organizational culture. However, one model that is used reasonably frequently for studying the impact of organizational culture on ICT adoption and use is the competing values framework (CVF) (Cameron & Quinn, 2011; Quinn & Rohrbaugh, 1983).

The Competing Values Framework

The Competing Values Framework (CVF) originated as a framework for organizational effectiveness analysis. It was the result of a two-stage study that was conducted to identify the major criteria that influence organizational effectiveness (Quinn & Rohrbaugh, 1983). Since its invention, CVF has been found to be consistent with many other well-known and well-accepted frameworks that explain how culture organizes people's values and assumptions, and the way they think and process information (Cameron & Quinn, 2011). As a result, CVF has also been frequently employed as a framework for analyzing organizational cultures.
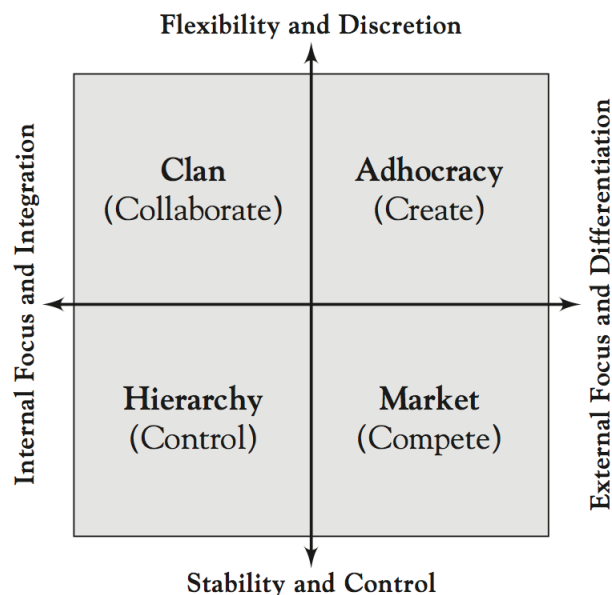
Figure 1. Competing Values Framework, from Cameron and Quinn (2011)

The dimensions of CVF explain not only different organizational orientations, but also competing values, which reflect the characteristics of human behaviors (Cameron & Quinn, 2011). There are two major dimensions in CVF. As Figure 1 shows, the horizontal dimension is related to organizational focus, and ranges between internal and external organizational orientation. As the emphasis changes from integration (on the left) to differentiation (on the right), the factors that affect organizational effectiveness also change. For example, some organizations are considered effective if they have harmonious internal characteristics, while others are seen to be effective

when they focus on interacting with others in the external environment. The vertical dimension reflects an organization's preferences for structure, and ranges from flexibility and discretion to stability and control. For flexibility-oriented organizations, effectiveness is achieved by adapting their forms and/or products to the environment. On the other hand, stability-oriented organizations acquire effectiveness by controlling their output.

These two dimensions form four quadrants, each of which represents a cluster of organizational effectiveness criteria. These criteria indicate what individuals' value about an organization's performance, which in turn define what is considered good, right and appropriate. In other words, these four quadrants reflect the core values, or the basic assumptions in an organization, which have a high degree of congruence with the elements that make up organizational culture. Ultimately, each quadrant is identified as a type of organizational culture.

The Hierarchy (Control) Culture

Organizations with the hierarchy culture have an internal focus and emphasize control. They are expected to maintain centralized control structures as well as formalized rules and procedures in place to govern what people do and how to do it. By doing so, the organizations are hopping to achieve stability, predictability and efficiency (Cameron & Quinn, 2011).

The Market (Compete) Culture

Organizations with the market culture are orientated toward the external environment and focus on stability and control. They are driven by the markets, and their strategies are based on economic market mechanisms and competitive dynamics. The primary goal of this type of organizations is to establish competitiveness and productivity (Cameron & Quinn, 2011).

The Clan (Collaborate) Culture

Organizations with the clan cultures are collaboration oriented. Information and knowledge sharing, teamwork, communication, cohesion and participation are valued within this type of organizations. The basic assumption behind this culture type is that organizations are likely to develop, improve and move forward with involvements and collaboration of internal parties (Cameron & Quinn, 2011).

The Adhocracy (Create) Culture

Organizations with the adhocracy culture believe "innovative and pioneering initiatives lead to success, … adaptation and innovativeness lead to … profitability" (Cameron & Quinn, 2011, p. 50). Thus this type of organizations values adaptively, flexibility and creativity, and has high anticipation of future. They are not threatened by uncertainties, but instead see them as opportunities and are willing to take risks for them.

Interaction between National and Organizational Cultures

As described previously, organizational culture can reflect national culture, but not always (Karahanna, et al., 2005). When organizations globalize, subsidiaries inherit their headquarters' organizational culture, which is influenced by the national culture of the location where the headquarters is located, to maintain a set of unified management practices across them. At the same time, these subsidiaries have to be compatible with the national cultures of the countries they are operating in so as to function effectively. Their local staff members also introduce their national culture. As a result, organizational and national cultures interact, with uncertain outcomes. One culture starts to dominate, and such dominance is reflected in individual behavior (Karahanna, et al., 2005).

By definition, both national and organizational culture consist of values and practices as their critical elements Values are "relationships among abstract categories that are characterized by strong affective components and imply a preference for a certain type of action" (Karahanna, et al., 2005, p. 5). In other words, "a value is an enduring belief

that a specific mode of conduct or end-state of existence is personally or socially preferable to an opposite or converse mode of conduct or end-state of existence" (Rokeach, 1973, p. 5).

As a result, values provide individuals with basic assumptions of reality (Karahanna, et al., 2005), and are a crucial influence as to how they think and behave (Lachman, Nedd, & Hinings, 1994). Furthermore, values are acquired throughout individuals' lives beginning in early childhood through socialization and education (Calhoun, Teng, & Cheon, 2002; Hofstede, 1991; Trompenaars & Hampden-Turner, 1998). They are relatively stable and fairly hard to change (Ali & Brooks, 2009; Cabrera, Cabrera, & Barajas, 2001; Gallivan & Srite, 2005; Karahanna, et al., 2005; Lachman, et al., 1994; Shore & Venkatachalam, 1996), but can alter over time, reflecting the changes in culture (Karahanna, et al., 2005). Values are highly-accepted and agreed on, and hence critical in regulating social behaviors (Erez & Earley, 1993; Lachman, et al., 1994).

On the other hand, practices are developed later in life, through socialization at the workplace after individuals' values are firmly in place. They provide individuals with guidance on how to do things (Karahanna, et al., 2005). Practices are considered to be peripheral values (Erez & Earley, 1993). They can be altered through life, and are easier to change compared to values (Karahanna, et al., 2005).

In terms of the relationship between values and practices, the literature suggests that they are intertwined. Practices influence values only during their formative periods, and continue evolving after they no longer affect values. Practices sometimes reflect values and at other times, can be incompatible with values (Karahanna, et al., 2005). Moreover, while values and practices exist alongside each other, their importance differs in various cultural levels. In other words, the balance between values and practices is dynamic across the levels of culture. Generally speaking, as Figure 2 shows, values are more important at higher level of cultures, whereas practices are more crucial in lower level cultures. More specifically, research indicates that individual values are predominantly affected by national culture, while individual practices are primarily influenced by organizational culture (Hofstede, 2001; Karahanna, et al., 2005).

The interaction between national and organizational cultures can be explained by utilizing the dynamics of values and practices across the various levels of culture. As elaborated previously, individual behavior is shaped by, and reflects, the various cultures one is exposed to. Since national culture influences one's values, "behaviors that involve consideration of values as a major factor of the decision as to whether to engage in a behavior are [mainly] influenced by national culture" (Karahanna, et al., 2005, p. 7). In other words, decision-making in an organization will reflect the organization's national culture, while practices in the organization will influenced by its organizational culture (Karahanna, et al., 2005).

Supranational

National

Professional

Organizational

Group
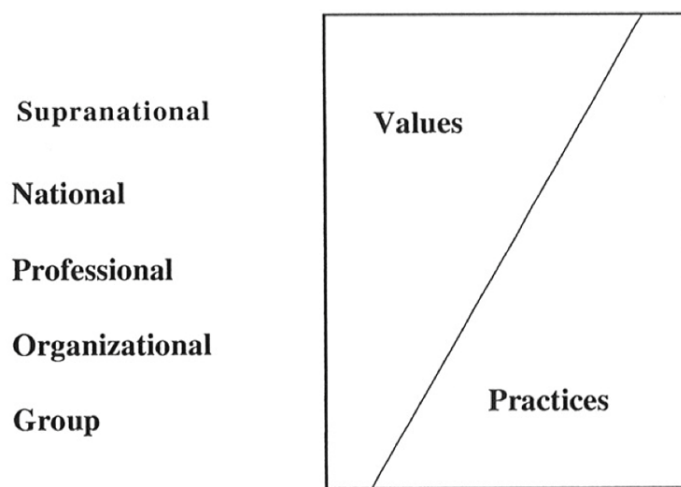
Values

Practices

Figure 2. **Values and Practices Dynamics, from Karahanna, et al. (2005)**

Senior managers of subsidiaries of multinational organizations are normally assigned to their positions by their headquarters. In most of the cases, these top managers share the values of the management at the organization's headquarters, which represent the national culture of the country/region the headquarters is located in. At the same time, daily operations in these subsidiaries follow the set of practices common across the entire firm, which primarily reflect their shared organizational culture. As a result, overseas subsidiaries of multinational organizations are influenced by different national cultures through their structures, including regulations, laws and political systems, as well as through local employees' and clients' values, beliefs, goals and preferences (Adler & Doktor, 1986).

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However, these two cultures have little effect on each other. Gerhart (2008) studied the degree to which different countries' national cultures constrained the organizational cultures of subsidiaries of multi-national organizations operating within them. Using Cohen's (1988) classification of effect size (small: $r=0.10$, $r^2=0.01$; medium: $r=0.30$, $r^2=0.09$; large: $r=0.50$, $r^2=0.25$), the study re-analyzed empirical data from two studies: Nelson and Gopalan (2003), which used data from three countries, and House, Hanges, Dorfman and Gupta (2004), which examined data from the 62 countries involved in the GLOBE study. The re-analysis showed that national culture explained less than 1% ($r^2<0.01$) of the variation in organizational culture in the first study, and 6% ($r^2=0.06$) in the second study. Overall, Gerhart (2008) suggests: "national culture is meaningfully related to organizational culture, but not as strongly as has often been claimed and, arguably, not strongly enough for national culture to be a major constraint on organizational culture" (p. 252).

The next section discusses the context in which the impact of these cultures will be studied: ICT use and adoption.

ICT Adoption and Use

The notion of ICT adoption is much more ambiguous than ICT use (Sarosa, 2007), and several major definitions can be found in the literature. The first one was proposed by Rogers (1995) as a part of his diffusion of innovation theory. It defines adoption as "the physical acquisition of technical artifacts or a commitment to implement innovation with the emphasis being on the decision to adopt, [and] the commitment to use the innovation is the result of … adoption" (Sarosa, 2007, p. 20). Since this theory is derived from communication theory, the definition does not focus on how the technological innovation is put to use, rather it concentrates on communicating the idea of technological innovation to potential adopters. As a result, adoption is achieved in the adopter's mind (Sarosa, 2007). Similarly, Thong and Yap (1995) define ICT adoption as "[the intention, strategy or the way of] using computer hardware and software applications to support operations, management, and decision-making in the business" (p. 431).

Bøving and Bøker (2003) support the above definitions but add that adoption only takes place if the technology is used as intended by the designer without modification and reinvention. Lastly, Zaltman, Duncan, and Holbek (1973) divide the process of innovation adoption into two stages, initiation and implementation. Palen and Grudin (2003) use the term adoption for the initial decision-making process and deployment for the stage that makes the innovation available for utilization.

The major difference among the three sets of definitions lies in their focus. Rogers (1995) and Thong and Yap (1995) emphasize the decision-making stage, Bøving and Bøker's (2003) stress the use of the technology, while the others emphasize both the decision-making and the actual implementation or deployment (Palen & Grudin, 2003; Zaltman, et al., 1973).

After reviewing these definitions, this study considers that the ICT adoption process includes both cognitive and behavioral activities. The former consists of the decision-making activity about whether, how and when to adopt a certain technology, while the latter refers to the subsequent implementation or deployment of the selected technology.

Compared to ICT adoption, ICT utilization or use is defined more clearly. Within organizations, ICT use can be mandatory or voluntary (Brown, Massey, Montoya-Weiss, & Burkman, 2002; Hartwick & Barki, 1994; Venkatesh & Davis, 2000). The former refers to ICT use under formally established and defined company policies, standard procedures, regulations, or employment contracts, which employees are obligated to follow. The latter describes ICT utilization practices that are not officially mandated, allowing individual staff members to decide for themselves whether they are interested in adopting the new ICT.

Overall, taking into account Karahanna, et al.'s (2005) distinction between values and practices , this study proposes that, although ICT adoption and use are essentially individually-driven activities, ICT adoption reflects an organization's strategy and the values of its senior managers, while ICT use is more closely associated with an organization's procedures and practices.

The next section examines the impact of culture on ICT development, implementation and use.

Culture and ICT

"An understanding of culture is important to the study of information technologies in that culture at various levels, including national, organizational, and group, can influence the successful implementation and use of information technology" (Leidner & Kayworth, 2006, p. 357). Since most information and communication technologies are created by Western companies and designed for Western users, Western cultural assumptions are often embedded in them (R. M. Davison & Martinsons, 2002). This may result in cultural conflict when they are adopted by organizations in other parts of the world (R. Davison & Jordan, 1998; Walsham, 2002). On the other hand, even when systems are technically appropriate for an organization, they may still be resisted by users. This takes place when there is an "ICT-culture misfit". This term indicates that, despite adequate technical validity, organizational cultural validity is also required to make ICT work in organizations (Gallivan & Srite, 2005). Indeed, culture influences individuals, organizations, information, ICT and their interaction within societies. Many theories of culture have been developed to explain and predict a wide range of social behaviors and organizational outcomes, such as employee job attitudes, administrative practices, and firm effectiveness and performance, including ICT-related strategies and practices (Leidner & Kayworth, 2006).

Although culture can be broke down to five levels, namely supranational, national, professional, organizational and group (Hofstede, 2001; Karahanna, et al., 2005), researchers interested in the relationship between culture and ICT have focused on the influence of national and organizational culture on various ICT related areas (Gallivan & Srite, 2005; Leidner & Kayworth, 2006). At the national level, Western-developed culture theories were used to investigate cross-cultural ICT development, adoption and utilization after their applicability for non-Western cultures had been evaluated. At the organizational level, organizational cultural theories were adopted to explain the contradictory consequences of ICT in organizations (Leidner & Kayworth, 2006).

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"Unfortunately, these two streams of work have evolved in parallel, rarely citing each other's frameworks and contributions, and often failing to acknowledge the other's existence" (Gallivan & Srite, 2005, p. 297). With this in mind, two reviews of the literature on culture and ICT were carried out recently:

a) Leidner and Kayworth's (2006) review investigates the construct of culture and its connection to the field of ICT, categorizes the different streams of literature on ICT and culture, and forms theory and propositions that provide directions for future research. They also investigate the overlap of national and organizational cultural ICT research literature, and identify the possible value conflicts between culture and ICT in various contexts, including ICT development, adoption, utilization and management.

b) Gallivan and Srite's (2005) review identifies the key differences between the national and organizational culture-ICT research traditions, and illustrates a new conceptual framework that explains the complex and rich implications of individuals' social identity that shape ICT adoption and utilization.

These two papers have found that national culture is described in various taxonomies such as Hofstede (1980) (its dimensions are power distance, uncertainty avoidance, individualism versus collectivism, and masculinity versus femininity); Trompenaars's (1996) universalism versus particularism, affective versus neutral relationships, specificity versus diffuseness, achievement versus ascription, and internal versus external controls; Hofstede and Bond's (1988) Confucian dynamism or long-term versus short-term orientation; Hall and Hall's (1990) polychronism versus monochronism; and Hall's (1976) communication context. Compared to national culture, a wider range of dimensions are used in organizational cultural research. Such dimensions differentiate organizations from each other based on the dominant values or other cultural attributes that guide organizational behaviors (Leidner & Kayworth, 2006).

There were 82 papers selected in Leidner and Kayworth's literature review in total, 51 of which studied culture and ICT at the national level, while 31 examined culture and ICT at the organizational level or sub-levels. Hofstede's (1980) dimensions were the

most adopted framework among the selected papers investigating national culture and ICT; about 60 percent utilized one of more of dimensions. 85 percent of the other studies focused on culture and ICT at the organizational level and 15 percent at sublevels. The themes of these studies were categorized into six groups, namely culture and IS development; culture, ICT adoption and diffusion; culture ICT use and outcomes; culture ICT management and strategy; ICT's influence on culture; and ICT culture (Leidner & Kayworth, 2006).

Gallivan and Srite (2005) reviewed 56 papers on national culture and ICT. Once again, Hofstede's (1980) dimensions were also identified to be the most important model for cross-culture research: "it is impossible to discuss research on national culture without mentioning the contribution of Hofstede, whose findings have spurred hundreds of cross-cultural studies in both the IS and cross-cultural management literatures" (Gallivan & Srite, 2005, p. 302). Base on the general content of the selected papers and Adler's (1983) typology[3], five categories were established: studies on ICT adoption, implementation or use of a specific system or technology; studies of ICT diffusion within international context; studies of ICT professionals and human resource practices comparison across different countries; studies of senior managers' beliefs and practices that are related to ICT management; and miscellaneous studies.

In the following section, the findings of these two reviews are summarized under the common themes.

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[3] The widely accepted typology categorizes, characterizes, and describes six approaches to cross-cultural issues within management research. Each approach corresponds to a different research design for investigation of cross-cultural management. The first approach is termed Parochial, as it considers cross-cultural elements to be irrelevant when testing theories, while the others acknowledge the influence of national culture on the phenomena being researched. The other approaches are as follows: the comparative research approach identifies similarities and differences between research objects by comparing them, the Ethnocentric design tests theory developed in one culture in another, the Polycentric approach involves researchers immersing themselves into new cultures and inducing their studies to explain their members' beliefs and practices; the Geocentric approach exposes the challenges of multinational organization management in a descriptive instead of theoretically-grounded way; and Synergistic research examines cross-cultural interaction within organizations (Gallivan & Srite, 2005).

Classifying research on the impact of culture on ICT

Culture and ICT Development

In this category, some studies have investigated variations in national cultures that differentiate approaches to ICT development. For example, in the development process, software designers from some cultures prefer a people-oriented approach and focus on user experiences, while those from other cultures are in favor of a process-oriented approach and emphasize technical issues (Dagwell, Weber, & Kling, 1983; Kumar, Bjorn-Andersen, & King, 1990). Uncertainty avoidance was found to significantly influence views and behaviors in project risk management. Generally, the level of uncertainty avoidance of the country of origin of the project managers is positively correlated with the level of perceived severity of the project risks, and the likelihood of the project's continuance (Keil et al., 2000).

At the organizational level, the focus has been on the influence of organizational culture on improving the process of ICT development. The studies found that the success of software development projects depends on the fit between the developing organizations' values and the values embedded in the development processes (Dube & Robey, 1999; Ngwenyama & Nielsen, 2003). Overall, as software development becomes outsourced globally, it is important to understand the cultural influences in such processes (Leidner & Kayworth, 2006).

Culture and ICT Adoption, Implementation, Utilization, Diffusion, and Outcomes

This category has been dominant type of study within culture-ICT research (Gallivan & Srite, 2005). This is also the domain in which Hofstede's (1980) national culture dimensions were heavily employed. Among the five dimensions, uncertainty avoidance and power distance are the most popular(Gallivan & Srite, 2005; Leidner & Kayworth, 2006). ICT comes with risks, and represents change and uncertainty. Some people may perceive it as a potential threat to their current situation that they are familiar with. As a result, uncertainty avoidance, as a measure of the level of comfort that people

interact with uncertainties, is considered to play a significant part in determining whether or not and how individuals implement, adopt, and use ICT.

Studies have found that a culture's uncertainty avoidance is negatively correlated to the likelihood and willingness of individuals from such cultures to adopt ICT (Hasan & Ditsa, 1999; Png, Tan, & Wee, 2001; Thatcher, Srite, Stepina, & Liu, 2003). However, one study (Galliers, Madon, & Rashid, 1998) reviewed by Leidner and Kayworth (2006) had a contradictory finding. It found that Pakistan's low level of uncertainty avoidance led to a lack of concern with available information within the management of a public sector, which resulted in decreasing interests among decision makers in system adoption.

Leidner and Kayworth (2006) argue that the essential issue in the study might have been the inconsistency between the perceptions of and attitudes toward information and ICT. On one hand, a high level of uncertainty avoidance discourages individuals from adopting technologies. On the other hand, the same high level of uncertainty avoidance drives them to gather as much information as possible to understand and minimize the risks and uncertainties. On the whole, Leidner and Kayworth (2006) assert that, rather than treating IT as a single construct, it should be broken down into its information and technology aspects.

Similar to the influence of uncertainty avoidance on ICT adoption, the level of power distance could both facilitate and impede ICT adoption. DeVreede, Jones and Mgaya (1999) contend that a country's level of power distance is positively correlated with the acceptance of group support systems (GSS), since a high level of power distance meant that employees were unlikely to challenge management's decision to adopt and use the technology. However, Hasan and Ditsa (1999) found that in cultures with low power distance , IT employees were more willing to share their thoughts and views on technologies with managers. Managers valued ideas from their subordinates, making it more likely that ICT adoption would succeed.

Leidner and Kayworth (2006) also studied whether culture affects the purpose of ICT use. The data overwhelmingly suggested that differences in cultures led to significant

differences in ICT use and outcomes. One study found that individuals from cultures that value shared loyalty and relationships used the Internet primarily for social communications, while those from cultures that value personal competence and loyalty to oneself used the Internet mainly for information searching (Chau, Cole, Massey, Montoya-Weiss, & O'Keefe, 2002). Another study found a negative correlation between uncertainty avoidance and the use of executive information systems (Leidner, Carlsson, Elam, & Corrales, 1999), consistent with the other studies on the relationship between uncertainty avoidance and ICT adoption. A third one revealed that power distance and collectivism have positive impact on reducing harmful status influence by using Computer Mediated Communication (CMC) tools (Tan, Wei, Watson, Clapper, & Mclean, 1998).

Besides Hofstede's (1980) dimensions, Hall's dimensions[4] have also been tested by some researchers. The level of cultural context was found to be positively correlated with the likelihood of experiencing information overload, and hence negatively correlated with ICT use (Calhoun, et al., 2002). Time orientation has also been used to explain ICT use and studies suggest that ICT is better perceived in monochronic cultures than polychronic cultures (Rose, Evaristo, & Straub, 2003).

Several interesting points were raised by Leidner and Kayworth (2006) on the relationship between culture and ICT adoption and use at the national level. First, the full ICT adoption process should be studied, rather than individual aspects of it. Second, "culture is less instrumental in predicting whether or not an IT will be adopted than it is in predicting the time of adoption, breadth of diffusion, and the objective of adoption" (p. 366). Finally, the impact of power distance, which has been studied in

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[4] They are the communication context and the culture's time-orientation (monochronic versus polychromic). The former indicates the importance of contextual cues in interpretation of messages. In high-context cultures, such contextual cues are crucial for communications, while in the low-context cultures, "most of the information is contained explicitly in words" (Van Everdingen & Waarts, 2003, p. 222). The latter represents cultures' attitudes toward time. People from monochronic tend to be well organized, punctual, and focus on one thing at a time, whilst people from polychronic cultures are less organized, less punctual and doing mangy things at once (Van Everdingen & Waarts, 2003).

contexts such as GSS usage, may have been weak or non- significant because the studies used student samples, in which the members had equal power status.

At the organizational level, various studies have identified several organizational cultures that favor ICT adoption and diffusion. These include mercenary cultures that are low in sociability and high in solidarity (Hoffman & Klepper, 2000), adhocracy cultures that have a high level of flexibility and innovativeness (Quinn & McGrath, 1985; Quinn & Rohrbaugh, 1983), and organizational cultures that are flexible, open and long-term oriented (Kitchell, 1995).

Similar to ICT adoption, studies investigating culture and ICT use and outcomes at the organizational level were interested in finding out which cultures generated greater user satisfaction from ICT and success in ICT implementation. Generally, organizations with group-oriented and/or task oriented cultures had more satisfied ICT users (Kangungo, 1998; McDermott & Stock, 1999), and organizations that had rational-oriented and/or people-oriented cultures were more likely to experience ICT implementation success (Harper & Utley, 2001; McDermott & Stock, 1999).

To integrate culture-ICT research from both the organizational and national levels, Leidner and Kayworth (2006) argued that a values-based approach, which "conceptualize[d] culture, at any level, in terms of values" (p. 360), should be adopted. In other words, since ICT-associated information and technologies come with embedded values, ICT is more likely to be accepted if its embedded values match or fit the values of the adaptors and users. For example, even though the headquarters and subsidiaries of global organizations were located in different countries or regions, they shared some common values[5]. As a result, systems that were successfully implemented and utilized in the headquarters were highly likely to be successful in subsidiaries (Robey & Rodriguez-Diaz, 1989).

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[5] For example, task-oriented organizational cultures are consistent with individualistic national cultures, while people-oriented organizational cultures are similar to collectivistic national cultures (Leidner & Kayworth, 2006).

Culture and ICT Management and Strategy

This section examines the influence of culture on ICT management and strategy. ICT management includes organizational ICT decision- and policy-making, ICT governance, information resource management, information ethics and privacy. At the national level, the majority of this type of research involves a comparison of ICT managerial issues between organizations from Asian cultures and those from Western cultures (represented mainly by North American organizations) (Gallivan & Srite, 2005; Leidner & Kayworth, 2006). Some studies in this research category used a Delphi study methodology, which makes them descriptive and atheoretical in some level (Gallivan & Srite, 2005). Others adopted one or more of Hofestede's dimensions.

The findings suggest there may be different philosophies between Eastern and Western IT managers and executives in terms of the perceptions of ICT benefits, issues and their perceived severity. Moreover, differences in cultures also result in differences in approaches to IT employment structures. For example, "firms with collectivist values emphasizing loyalty and community tended to hire more from within while those with individualistic values tended toward more externalized employment structures" (Leidner & Kayworth, 2006, p. 369).

National cultures also affect ICT ethical and social issues, such as regulatory approaches to privacy, attitudes toward intellectual property rights and software piracy. The findings imply that managers need to adapt their approaches across cultures to deal with unethical behaviors and their effects (Leidner & Kayworth, 2006).

At the organizational level, the relations between organizational culture and ICT strategies were examined. Various studies found that organizational cultures can help to recognize the importance of strategic systems investments (Grover, Teng, & Fiedler, 1998) and facilitate innovative ICT strategy (Kanungo, Sadavarti, & Srinivas, 2001; Wallach, 1983). The strategic utilization of ICT also develops internal ICT cultures within organizations (Tomlin, 1991). On the whole, although there are a number of studies on strategic ICT planning and alignment, only a few study the role of cultures in such processes (Leidner & Kayworth, 2006).

ICT's Influence on Culture

Most of the empirical research on IS and culture has focused on culture's impact on ICT. Only a few studies explicitly investigated the potential impact of ICT on culture. This has been true for both national and organizational cultures. In their review, Leidner and Kayworth (2006) were able to identify two papers that studied the effects of ICT on national culture. One found evidence that the emergent uses of information systems in rural India led to cultural transformations, involving changes in people's perceptions of status, hierarchy, leadership as well as the redistribution of power between the central government and local councils (Madon, 1992). The other study suggested that, over time, the use of geographic information systems (GIS) may affect Indian culture, although no actual culture changes were observed (Walsham, 2002). At the organizational level, two studies found that the adoption and utilization of ICT transformed various aspects of organizational culture, including flexibility, empowerment, integration values, customer and performance orientation, and quality focus (Doherty & Doig, 2003; Doherty & Perry, 2001).

Two implications from the studies in this category are that: 1) ICT could potentially be used in organizational culture reengineering[6]; and 2) different technology artifacts influenced different cultural values (Leidner & Kayworth, 2006).

ICT Culture

Leidner and Kayworth (2006) suggest that ICT "is not value neutral … rather, (it) is inherently symbolic and value-laden" (p. 371). Research indicates that information can be symbolic and represent competency, legitimacy, equality, progressivism, community and even emotionality (Feldman & March, 1981; Scholz, 1990). Such values are formed through individuals utilizing ICTs over time in organizations. These values attributed to ICT by groups of individuals cluster together to construct ICT culture.

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[6] For instance, ERP systems affect organizational structure and business processes (Davenport, 1998).

Understanding ICT culture can help organizations "social groups perceive and ultimately respond to I[C]T-based change" (Leidner & Kayworth, 2006, p. 371).

Assumptions in ICT Culture Research

In their review, Gallivan and Srite (2005) identified four assumptions that lay behind studies on national culture and ICT. The first two assumptions are that: 1) the properties and attributes of cultures are fixed over time, and 2) cultural groups are homogeneous, which fails to recognize the variations within them, such as organizational cultures within national cultures. These two assumptions are consistent with Ford et al.'s (2003) criticism on the use of Hofestede's national culture dimensions in ICT research, as described previously. Gallivan and Srite found that, in contrast, the literature on the impact of organizational culture on ICT generally held that culture was malleable and culture, while usually being an integrative force, could also fragment organizations.

One interesting point raised while describing these assumptions was that Gallivan and Srite (2005) implied it would be more appropriate if the scores of national culture dimensions were measured on a case-by-case basis, instead of using Hofstede's (1980) original indices that were developed more than 30 years ago. This would have been true, if the aim of the studies had been to reveal the influence of culture on ICT in particular cases. However, in most of the cases, the findings were meant to be generalizable. In that case, the empirically tested data is more accurate, given the fact that culture is reasonably stable over times.

Gallivan and Srite (2005) found that the literature on IT and national culture considers each individual to be a member of a single cultural group, while the literature on organizational culture and IT held that cultural groups are mutually exclusive. This combination of views is unable to account for the possibility that individuals could be born in one country, educated in another, and work in a third one, and thus be influenced by the cultures of all three countries, as well as the culture of the organization they work for. Lastly, Gallivan and Srite (2005) found that the literature on IT and national culture, and a substantial portion of the literature on IT and

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organizational culture, considered ICT to be a fixed artifact that remained unchanged during use. Consequently, if the values embedded in the ICT were in conflict with the users' cultural values, the technology would be abandoned (Orlikowski, 1992). This last assumption fails to recognize the possibility that the technology could be modified or improved during utilization, so that it would not be abandoned but instead assimilated.

This chapter has summarized and presented the various theories, concepts, frameworks, themes, findings, and assumptions found in culture-ICT research. Culture has been studied in various aspects of IS use, development and management, and although the dominant thrust has been to study national culture, many studies have examined the effect of corporate/organizational culture. Besides studying the impact of different cultures in the aggregate (e.g. using Hofstede's framework), researchers have also examined the impact of various dimensions of culture. The next chapter will use this information to develop propositions on the interaction of the two types of culture.

Chapter 3: Conceptual Development

A series of propositions are developed in this chapter based on the summary of the literature presented in the previous chapter. The goal of these propositions is to specify in details on how national and organizational culture interact to affect ICT adoption and use.

Conceptual Framework

Leidner and Kayworth (2006) argued that despite the emergence of national and organizational culture research as two separate streams with little overlap, "they both share a focus on defining the values that distinguish one group from another" (p. 360). Such a value-based theoretical approach has been employed quite heavily in the literature. To remain consistent with, and maintain access to, the rich theoretical foundation of the ICT-culture domain, Leidner and Kayworth (2006) adopted the value perspective to: a) investigate how culture at different levels can explain the way individuals interact with ICT in organizations, and b) uncover possible similarities and/or contradictions between the effects of national and organizational culture on ICT adoption and use.

The values-based approach recognizes three types of values: individual values (influenced by each individual's national and organizational cultures); ICT values (representing the assumption of the work behaviors the ICT is designed to enable); and ICT culture values (the values derived from the culture that was formed by the adoption and use of ICT). This approach analyses the possible conflicts that could arise when these values interact (Leidner & Kayworth, 2006).

Gallivan and Srite (2005) took a different approach to Leidner & Kayworth (2006) in their review. They integrated Karahanna et al.'s (2005) theory of interrelated levels of culture (see Figure 3) and Tajfel's (1970) social identity theory (SIT) into a new model that acknowledges the simultaneous existence of different levels of culture, namely supernational (regional, ethnic, religious and linguistic), national, professional, organizational and sublevel, and the interrelated influences of these cultures on

individuals. Each of the layers represents a type of culture that can affect a person's beliefs, behaviors and so on. As a whole, it suggests "each individual contains different 'layers' of cultural identity and experiences … they can shift, depending on time and circumstances" (Gallivan & Srite, 2005, p. 300); and instead of a single culture affecting individuals, this model emphasizes the convergence and interactions of different cultural identities and experiences that shape individual views and behaviors. It is important to note that these different social identity layers are not necessarily set in a hierarchy (Gallivan & Srite, 2005) . For instance, a particular ethnic culture may represent only some residents in a country, and different professional cultures exist in each organization.
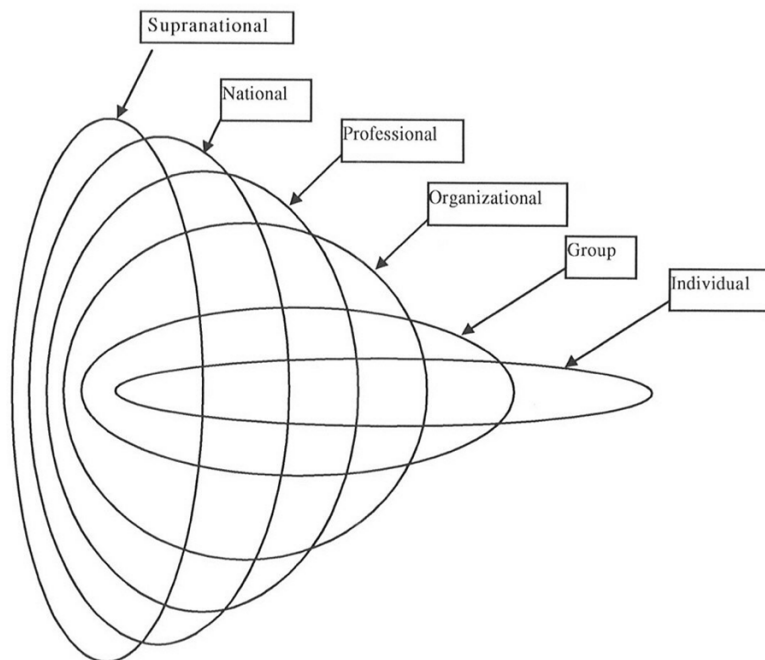

Figure 3. **Interrelated Levels of Culture, from Karahanna, et al. (2005)**

Both Leidner and Kayworth's (2006) values-based approach and Gallivan and Srite's (2005) model of interrelated cultures recognize the existence of organizational and national cultures at the same time, and their simultaneous influence on individual behavior in the realm of ICT adoption and use. However, they also have limitations. For example, Gallivan and Srite's (2005) approach did not reveal the interactions among cultures at different levels. Leidner and Kayworth's (2006) approach examined such

interactions, but only from the perspective of cultural values, ignoring others such as practices.

This study follows the values-practices dynamics approach of Karahanna, et al. (2005) for a few reasons. It recognizes the existence of values and practices as crucial elements of cultures, and accepts that they shift in importance and predominance at different levels of culture. It also asserts that the different values could come into conflict with each other. Thus, it is a useful framework for investigating the interactions among different cultures and the magnitude of their influences on each other and the parties involved.

The Development of Propositions

Culture consists of values, practices and other elements, such as symbols, beliefs, basic assumptions, and rules. According to Karahanna, et al.'s (2005) values-practices dynamics framework, values and practices are crucial elements of both national and organizational cultures. Values describe individuals' basic assumptions of reality, which are acquired in early age and remain reasonably stable throughout life. They have a significant impact on how people think and behave. On the other hand, practices are formalized and standardized human behaviors, actions and activities, which are imbibed through socialization at workplaces after one's values are firmly in place, and are relatively easy to change. Practices offer guidance on how individuals do things. While both values and practices co-exist in the different types of culture, individual values are influenced more by their national cultures, while organizational culture has a stronger impact on individual practices.

Based on the previous discussion in Chapter 2, this paper defines ICT adoption as a decision-making process, as well as the subsequent implementation or deployment activities. ICT use can be mandatory, if it is defined in formal company rules, standard procedures or employment contracts, or voluntary, if it is followed by some or most employees but is not officially mandated. While ICT adoption and use are essentially behaviors, ICT adoption, especially its decision-making aspect, is more closely associated with an organization's strategy, which reflects the values of its key

personnel, while ICT use is more closely related to an organization's formal or informal procedures and practices, which are part of its organizational culture.

Since: a) both organizational and national cultures affect individuals' values, b) national culture is more influential when making ICT adoption decisions, because the type of ICT chosen is based on a firm's strategy, which reflects its managers' values, and c) implementation is based on these decisions, this paper proposes:

Proposition 1a: The national culture of an organization's decision-makers has a stronger impact on its ICT adoption decisions compared to its organizational culture.

Similarly, while both organizational and national cultures influence the practices that individuals follow, organizational culture is more influential. Mandatory ICT use in organizations is ensured by their formal policies and rules, which are elements of its organizational culture. Such rules and policies also reflect policy makers' values or national cultures. On the other hand, voluntary ICT use mainly represents employees' commitment to follow their organization's well-accepted practices to maintain its productivity, as well as the values of their national culture. Thus, this study proposes:

Proposition 1b: Organizational culture has a stronger impact on individual ICT use decisions compared to their national culture.

The next section discusses the combined effects of national and organizational cultures on ICT adoption and utilization in more detail. Since the lack of research on this topic means that no established frameworks exist to examine it, this study uses the contingency approach (Donaldson, 2001), focusing on the extent of fit between an organization's organizational and national cultures. This research argues that if these two types of cultures are consistent with each other, their combined effect on ICT use and adoption will be similar[7]. Likewise, if the two cultures have dissimilar attributes, they will have conflicting effects on ICT use and adoption, with the stronger culture

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[7] This study focuses on the directionality of the effects (i.e. negative or positive), not their magnitude.

having a more decisive impact on the final outcome. This approach reflects Leidner and Kayworth's (2006) analysis of the types of conflict that arise when the different sets of values (group member values, group values towards ICT, and values embedded in specific ICTs) in an organization contradict each other. Thus,

Proposition 2a: When national and organizational cultures are consistent, their combined effect on ICT adoption and utilization remains the same as the effect of either culture.

Proposition 2b: When national and organizational cultures are inconsistent, ICT adoption and utilization will be affected by the more dominant culture.

These propositions form the basis for more specific propositions that relate to specific elements or dimensions of both types of cultures. Before that, determination of the basis by which national cultures can be compared with organizational cultures is required. Hofstede's (1980) national culture dimensions and Cameron and Quinn's (2011) competing value framework (CVF) will be employed for this, as they are the most frequently cited[8] models in the existing literature on the relationship between culture and ICT.

This paper next proceeds to compare the various dimensions of these models to evaluate their similarity or dissonance, as the case may be. Examining these two models in detail, it is possible to find examples of consistency. For example, Hofstede's (1980) dimension of power distance shares some common properties with the hierarchical organizational culture[9]. The former describes the power distance between individuals with different levels of authority. Less powerful individuals, such as

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[8] The popularity of Hofstede's national culture dimensions was explored in the previous section reviewing the literature of national culture While Cameron and Quinn's (2011) CVF only had a limited number of adopters, compared to the dominance of Hofstede's (1980) national culture taxonomy, it is still the most widely-used model of organizational culture, according to Leidner and Kayworth's (2006) review.

[9] Hofstede's (1980) national culture taxonomy constitutes of culture dimensions, while Cameron and Quinn's (2011) CVF describes culture types. One can argue that they are not at the same level or scope. However, as Quinn (1988) suggests, these culture types can mutually exist, allowing us to compare these two culture models.

employees, in high power distance cultures are more likely to follow decisions made by more powerful individuals, such as managers. Decision-makers in high power distance cultures would expect employees to respect authority and follow established procedures and practices. Hierarchical organizational cultures focus on the maintenance of centralized control, stability, efficiency, timeliness, consistency, and uniformity, which are easier to establish with strong authority and power within organizations.

Hierarchies are also a good fit for cultures that are high in uncertainty avoidance. Like hierarchies, cultures high in uncertainty avoidance develop and maintain a set of formalized rules and procedures to achieve organizational stability and predictability. Thus, individuals from high power distance and high uncertainty avoidance cultures would be more compatible with organizations with a hierarchical culture.

In contrast, cultures that are low in uncertainty avoidance are a better match for adhocracies. Individuals from uncertainty accepting societies are not likely to be threatened by the unknown; instead, they tend to be innovative, creative and keen to embrace new things. Another example is the fit between societies that are more collectivist and feminine and clan organizational cultures. Both of these cultures emphasize communication and collaboration, and decision-making through group consensus.

Before examining the combined impact of national and organizational cultures on ICT adoption and use, their separate impacts will be specified first. They will be revealed in this order: 1) the influence of national culture on ICT adoption; 2) the influence of organizational culture on ICT adoption; 3) the influence of national culture on ICT use; and 4) the influence of organizational culture of ICT use. Given the focus on examining the interactivity between the different types of cultures, only the national culture dimensions and organizational culture types that share common attributes as identified above will be used for developing the following propositions.

The Influence of National Culture on ICT Adoption

As discussed earlier, the process of ICT adoption consists of decision-making activities and implementation activities guided and based on the decisions. Thus, the discussion of ICT adoption below focuses on the decision-making activities.

Power Distance

Hofstede (1991) suggests that individuals from cultures that have high levels of power distance tend to accept an unequal distribution of power and maintain their power status, authority and organizational hierarchies. Decision makers from such cultures are unlikely to be open to constructive suggestions from subordinates, while subordinates are likely to take less initiative to communicate and exchange ideas with superiors. Thus, sharing innovative knowledge is largely constrained. Complex organizational hierarchies like these may also reduce the speed with which problems are reported. As a result, senior managers may not realize in time that their organizations need to adopt new technologies for solving certain problems. Furthermore, decision makers may see innovations, which represent changes, as threats for their current power status and authorities. Contrarily, decision makers from low power-distance cultures are likely to be more innovative and open to new ideas and technologies. Therefore:

> *Proposition 3a: organizations with decision makers from high power-distance cultures are less likely to adopt ICT than those with decision makers from low power-distance cultures.*

Uncertainty Avoidance

Uncertainty avoidance is "the extent to which the members of a culture feel threatened by uncertain or unknown situations" (Hofstede, 1991, p. 113). Within organizations, decision makers from cultures that are high in uncertainty avoidance are likely to consider new innovations as uncertain and risky, and thus will be less willing to adopt them. On the other hand, managers from cultures that are low in uncertainty

avoidance will be more likely to view new technologies as opportunities, and be more willing to embrace them. Hence:

> *Proposition 3b: organizations with decision makers from cultures high in uncertainty avoidance are less likely to adopt ICT than those with decision makers from cultures low in uncertainty avoidance.*

Individualism versus Collectivism

Individualism versus collectivism refers to the tightness of the relationships between a group and its individual members (Hofstede, 1991). In workplaces, decision makers from individualistic cultures are more comfortable making their own choices, and have more freedom to try and experience new technologies. In contrast, their peers from collectivistic cultures are expected to communicate and collaborate with other parties in their organizations to reach a consensus on the adoption of new innovations.

> *Proposition 3c: Organizations with decision makers from more individualistic cultures are more likely to adopt ICT than decision makers from cultures that are more collectivistic.*

Masculinity versus Femininity

Within masculine cultures, individuals are decisive, assertive, and aggressive. Key personnel influenced by this culture make decisions based on facts, rather than group consensus. Moreover, masculine cultures emphasize performance and recognize improvements, which are considered to be innovative (Hofstede, 2001). In contrast, individuals from feminine cultures are gentle, modest, and concerned with others. Leaders with such backgrounds value and consider others' opinions, seek agreement before formal decisions are made, and are willing to negotiate and even compromise. Therefore, if consensus is not reached during the decision making process, adoption is unlikely to be carried out.

Proposition 3d: Organizations with decision makers from masculine cultures are more likely to adopt ICT than those with decision makers from more feminine cultures.

As summarized in Chapter 2, Leidner and Kayworth's (2006) review found evidence to support Propositions 3a and 3b. However, the effect of individualism/collectivism (Proposition 3c) and masculinity/femininity (Proposition 3d) on ICT adoption is empirically untested.

The Influence of Organizational Culture Types on ICT Adoption

Hierarchy

Hierarchical organizations have, as discussed above, similar attributes as national cultures that are high in power distance and uncertainty avoidance. Hierarchies focus on developing and maintaining centralized control, formalized rules and procedures, as well as stability and predictability. Decision makers in such organizational cultures are likely to consider ICT as something they do not entirely understand and do not have full control over. Thus:

Proposition 4a: Organizations with hierarchical organizational cultures are less likely to adopt ICT.

Adhocracy

Adhocracies do not consider uncertainties threats, but opportunities. From that perspective, they can be considered to be low in uncertainty avoidance. Leaders from such organizations are willing to embrace uncertainty and take risks. They also value innovativeness, creativity, flexibility, and would like to be future ready. Therefore:

Proposition 4b: Organizations with adhocratic organizational cultures are more likely to adopt ICT.

Clan

Clan organizational cultures emphasize information sharing, communication, participation, teamwork, cohesion and collaboration, making them a poor fit for individualistic national cultures. Leaders in clan cultures are unlikely to make decisions without consulting others. Further, if consensus across different groups within the organization is not reached, a decision is unlikely to be made. As ICT may be perceived quite differently by individuals, consensus may not be easily reached, which will effectively make the ICT adoption decision more unlikely. Thus:

> *Proposition 4c: Organizations with clan organizational cultures are less likely to adopt ICT.*

The Influence of National and Organizational Culture on ICT Use

ICT adoption and use are closely connected[10], although the former is at the organizational level and the latter at the individual level. Both behaviors involve the consideration of, among other factors, the benefits and costs of particular technologies and their fit with their values and practices before a decision is made- either by the organization to adopt it or by the individual to use it (assuming that this decision is being made in a voluntary use context). Given the similarity of the logic underlying both decisions, it is expected that the impact of the various national culture dimensions and organizational culture types on ICT use will resemble their impact on ICT adoption. Thus:

> *Proposition 5a: Individuals from high power-distance cultures are less likely to use ICT than those from low power-distance cultures.*

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[10] For example, the tightness of the connection between ICT adoption and ICT use is reflected in Thong and Yap's (1995) definition of ICT adoption, which is "[the intention, strategy or the way of] using computer hardware and software applications to support operations, management, and decision-making in the business" (p. 431).

Proposition 5b: individuals from cultures high in uncertainty avoidance are less likely to use ICT than those from cultures with low levels of uncertainty avoidance.

Proposition 5c: Individuals from more individualistic cultures are more likely to use ICT than those from less individualistic cultures.

Proposition 5d: Individuals from masculine cultures are more likely to use ICT than those from feminine cultures.

Proposition 6a: Individuals from hierarchical organizational cultures are less likely to use ICT.

Proposition 6b: Individuals from adhocratic organizational culture are more likely to use ICT.

Proposition 6c: Individuals from clan organizational cultures are less likely to use ICT.

Chapter 4: Research Methodology

Two reviews were recently carried out in the field of culture and IT (Gallivan & Srite, 2005; Leidner & Kayworth, 2006) and have revealed useful perspectives for integrating existing research on this topic. Using those reviews as a takeoff point, the previous chapters of this study have uncovered some gaps that remain in our understanding of the impact of culture on IT. The propositions listed in Chapter 3 are extensions of the results of the two reviews, and they will be evaluated by examining studies that were published after the two reviews. By doing this, this project achieves two objectives: a) a summary of studies in the IT-culture field from 2005 to the present, and b) a preliminary assessment of the relationships between various IT constructs and IT use/adoption (Chapter 3) which were not addressed in the previous two reviews.

The next sections describe the methods and criteria by which the studies used to evaluate the propositions were located, and how they were coded.

Identification of Culture-IT Studies

Studies that were relevant for this project were identified following the steps recommended in Webster and Watson (2002). First, journal databases, such as Computers & Applied Sciences Complete (EBSCO), Science Direct, and ABI/INFORM Complete (ProQuest), were searched for review articles on the impact of culture on ICT adoption/use. By doing so, the identification of relevant papers was accelerated, because the major contributions are likely to be found in such leading journals (Webster & Watson, 2002). This led to the identification of the two recent review articles: '*A Review of Culture in Information Systems: Toward a Theory of Information Technology Culture Conflict*' by Leidner and Kayworth (2006), and '*Information Technology and Culture: Identifying fragmentary and Holistic Perspectives of Culture*' by Gallivan and Srite (2005).

After the two review articles were identified, papers that cited them were located through Web of Science. 91 papers citing Leidner and Kayworth (2006) and 83 papers citing Gallivan and Srite (2005) were identified. Each of the 174 papers was then

assessed for its relevance to this study. Only those papers that were relevant would be selected for coding. To determine the level of relevance, the following criteria were employed.

1. The papers should focus on the impact of national and/or organizational culture on ICT adoption or use.
2. The episode of ICT adoption or utilization being studied should take place in an organization and for work -related purposes[11]. This excluded papers that investigated the impact of culture on personal or private ICT adoption and use, as well as studies that did not clearly indicate the purpose for which the ICT was adopted or used.
3. The papers should empirically validate their hypotheses; these were to exclude purely conceptual/theoretical pieces.

It was possible that some studies on this topic may not have cited either of the two review articles. To avoid missing out these papers, Web of Science and Google Scholar were used to search for articles published between 2000 and 2011 with the following keywords: 'culture', 'Information Technology', 'Information Technologies', 'Info Tech(s)', 'Information System(s)', 'Info Sys', 'IT', 'IS', 'organization', 'corporate', 'adoption', 'implementation', 'use', 'utilization' and 'Usage'. 85 papers were found. The criteria mentioned above were used to assess their relevance. In addition, these papers were also examined to see that neither did they cite nor were they cited by the two review articles.

Based on the criteria mentioned, the final set of papers comprised 15 studies on the impact of national culture on ICT adoption/use, 14 on the impact of organizational culture on ICT adoption/use, and one study on the joint effect of these two cultures on ICT adoption/use. Once these papers were collected, they were analyzed to clarify the culture dimension/model that was used and its effect on ICT adoption/use decisions. These results were then aggregated to evaluate the propositions.

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[11] University students who use or adopt ICT for their studies are considered as having satisfied this criterion.

Chapter 5: Results

This chapter firstly presents summarized findings from the literature review. It then uses these findings to evaluate the propositions developed in Chapter 3.

Summary of ICT-Culture Studies

A detailed description of the studies that were analyzed is provided in Appendix A. Table 2 below summarizes these studies.

Table 2. *Summary of Recent Research on the Impact of Culture on IT Adoption/Use*

Author (Year)	Culture Type, Framework (Dimensions)	ICT Issue
National Culture		
Al-Gahtani, et al. (2007)	Hofstede (Power Distance, Uncertainty Avoidance, Individualism, Masculinity)	Use
Erumban and De Jong (2006)	Hofstede (Power Distance, Uncertainty Avoidance, Individualism, Masculinity, Long-Term Orientation)	Adoption
Guo, Tan, Turner, and Xu (2008)	Hofstede (Power Distance, Individualism /Communication Context, Masculinity, Uncertainty Avoidance, Long-Term Orientation)	Use
Hwang (2011)	Hofstede (Power Distance, Individualism/Collectivism)	Use
Kollmann, Kuckertz, and Breugst (2009)	Hofstede (Power Distance, Uncertainty Avoidance, Individualism, Masculinity)	Adoption
Leimeister, et al. (2009)	Hofstede (Power Distance, Individualism, Masculinity, Uncertainty Avoidance)	Adoption
Li (2010)	Culture Dimensions (Language, Thinking Logic, Level of Perceived Credibility of Voluntarily Shared Knowledge)	Use
Lippert and Volkmar (2007)	Hofstede (Masculinity, Individualism)	Use
Qu, Yang, and Wang (2011)	Hofstede (Power Distance, Uncertainty Avoidance, Individualism)	Adoption
Sanchez-Franco, et al. (2009)	Hofstede (Uncertainty Avoidance, Individualism)	Use
Taksa, et al. (2009)	Hofstede (Power Distance, Uncertainty Avoidance, Individualism, Masculinity, Long-Term Orientation)	Use
Van Everdingen and Waarts (2003)	Hofstede (Power Distance, Uncertainty Avoidance, Individualism, Masculinity, Long-Term Orientation), Hall (High / Low Communication Context, Monochronic / Polychronic Time Perception)	Adoption

Vatanasakdakul, D'Ambra, and Rambruuth (2010)	Cultural Fit Dimensions (Personal Relationships, Long-Term Relationships, Inter-Organizational Trust, Ability to Communicate in English, Western Influence	Use
N. Zhang, Guo, Chen, and Chau (2008)	Confucian Value ('Hexie')	Use
N. Zhang, Guo, Chen, and Song (2008)	Hofstede (Power Distance, Uncertainty Avoidance, Long-Term Orientation)	Use
Organizational Culture		
Bai and Cheng (2010)	Culture Context (Interpersonal Harmony, Outcome Orientation, Innovation, Control, Efficiency)	Adoption
Caccia-Bava, Guimaraes, and Harrington (2006)	Competing Values Framework (Group, Developmental, Rational, Hierarchical)	Adoption
Callen, Braithwaite, and Westbrook (2007)	Culture Dimensions (Constructiveness, Passive-Defensiveness, Aggressive-Defensiveness)	Use
Cronley and Patterson (2010)	Culture Dimensions (Rigidity, Proficiency, Resistance)	Use
Ifinedo (2007)	N/A	Adoption
Jackson (2011)	Grid and Group Cultural Theory (Fatalism, Hierarchism, Egalitarianism, Individualism)	Adoption
Ke, Liu, Wei, Gu, and Chen (2006)	Competing Values Framework (Group, Developmental, Rational, Hierarchical)	Adoption
Liu, Ke, Wei, Gu, and Chen (2010)	Competing Values Framework (Group, Developmental, Rational, Hierarchical)	Adoption
Lopez-Nicolas and Merono-Cerdan (2009)	Competing Values Framework (Clan, Adhocracy, Hierarchy, Market)	Adoption
Park (2005)	Culture Dimensions (Trust, Sharing Information Freely, Working Closely with Others, Developing Friends at Work)	Adoption
Park and Jeong (2006)	Blake and Mouton (Production-Orientation, People-Orientation)	Use
Rivard, Lapointe, and Kappos (2011)	Culture Dimensions (User Values, User Group Values)	Adoption
Seng, Jackson, and Philip (2010)	Grid and Group Cultural Theory (Fatalism, Hierarchism, Egalitarianism, Individualism)	Use
Wang, Archer, and Pei (2008)	Culture Dimensions (The Basis of Truth and Rationality, Long- vs. Short-Term Orientation, Stability vs. Change Culture, Production vs. People Oriented Cultures, Isolation vs. Collaboration Cultures, Centralized vs. Decentralized Control, Internal vs. External Orientation)	Adoption
National and Organizational		

Guo & D'Ambra (2009)	Hofstede (Power Distance, Uncertainty Avoidance, Individualism, Masculinity, Long-Term Orientation)	Use

Out of the 16 studies that examined the influence of national culture on ICT adoption and usage (consisting of the 15 papers that investigated only its impact and the single paper that examined the joint impact of both types of culture on ICT use), 13 papers (80 percent) employed two or more of Hofstede's (1980) dimensions. Individualism-collectivism was the most-cited dimension among the five, with 12 papers using it. It was followed by uncertainty avoidance and power distance, which were both used by 11 papers. Nine papers relied on the masculinity dimension and six examined long-term orientation. Three papers used only the original four dimensions, while five papers used all five dimensions. These statistics are similar to Leidner and Kayworth's (2006) results. Nine papers used the Technology Acceptance Model (TAM)[12] in their studies of the impact of national culture and ICT adoption and use.

14 papers studied the impact of organizational culture on ICT adoption and use. Compared to the dominance of Hofstede's (1980) framework, there was no similarly dominant model in this set of studies. The most common one was the competing values framework (CVF) (Cameron & Quinn, 2011), which was used by four of the 14 papers.

The CVF describes four organizational cultures by juxtaposing organizational structure (flexibility versus control) against organizational focus (internal versus external). Interestingly, the four studies that used the CVF model referred to these four organizational types in two different ways. One paper (Lopez-Nicolas & Merono-Cerdan, 2009) used the terms given by Cameron and Quinn (2011), which are clan, adhocracy, market, and hierarchy, while the other three (Caccia-Bava, et al., 2006; Ke, et al., 2006; Liu, et al., 2010) referred to them as group, developmental, rational and hierarchical. Clan and group represents organizational cultures that are flexibility-

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[12] The Technology Acceptance Model (TAM) focuses on two theoretical constructs that represent the fundamental ICT use determinants: perceived usefulness and perceived ease of use. These two constructs "accounted for a large proportion of the variance in behavioral intentions and voluntary usage behaviors of new ITs. Empirical validations of TAM have typically accounted for between 15% and 45% of the variance in the 'intention to use' and self-reported 'usage'" (Al-Gahtani, et al., 2007, p. 682).

oriented and internal-focused; adhocracy and developmental present organizational cultures that are flexible and external-focused; market and rational describe organizational cultures that are control-oriented and external-focused; and hierarchy and hierarchical indicate organizational cultures that are control-oriented and internal-focused.

Evaluation of Propositions

Comments

It is worth noting that some studies related dimensions of national/organizational culture directly to ICT adoption and use, while others included mediators in the relationship, such as ICT perceptions, ICT attitudes, and intention to adopt/use ICT. The former set of studies indicates the direct relationship between cultural aspects and IT use/adoption, whereas the latter set emphasizes how these relationships are established. The indirect influences of culture on ICT also occurred in the form of moderation, such as the impact of culture on the relationship between ICT's perceived ease of use and individuals' attitudes toward ICT, as well the relations between people's attitudes toward ICT and their intention to use it. Both direct and indirect impacts will be taken into considerations when assessing the propositions.

This study begins by examining the impact of individual dimensions of national culture on ICT use and adoption, before proceeding to assess the impact of different types of organizational culture on ICT use and adoption. It then investigates the joint impact of both types of culture on ICT use and adoption.

The Influence of National Culture on ICT Adoption and Use

Power Distance and Uncertainty Avoidance

Propositions 3a and 3b suggested organizations with decision makers from cultures that had a high level of power distance or uncertainty avoidance were less likely to adopt ICT. These propositions were supported based on the findings of the studies that were reviewed: both power distance and uncertainty avoidance had a negative effect

on organizational ICT adoption (Erumban & De Jong, 2006; Qu, et al., 2011; Van Everdingen & Waarts, 2003) and individual ICT use (Guo, et al., 2008). One outlier was Qu, et al. (2011), which argued that uncertainty avoidance positively affects the adoption of open source software (OSS) because OSS is seen to be more reliable than closed source software. The differences between these two streams of findings was that the first set treated ICT as a whole, reflecting the overall impression that ICT innovations were uncertain, while the latter focused on a unique and specific type of ICT.

Power distance was found to be negatively correlated with people's perception of ICT (Leimeister, et al., 2009), which in turn, impeded their intention to adopt it. For instance, Leimeister, et al. (2009) in their comparison of the perceived strategic importance of RFID for CIOs in Germany and Italy, found that power distance negatively influenced CIOs' perceived potential of RFID. This finding was explained in terms of the outcomes of adopting RFID. Lower power distance meant greater equality across power levels, creating a more cooperative and a more stable social environment. As a result, CIOs in both countries believed by adopting RFID, a higher level of equality between their customers and themselves could be reached.

Leimeister, et al. (2009) also found that the high uncertainty avoidance scores in both Italy and Germany meant that CIOs from these countries believed uncertainty could be reduced through following clear procedures, strategies and rules and greater information transparency. RFID was an example of an ICT that could be used to achieve such goals, as it provided reliable real-time information about products and stocks, reducing inconsistencies in stock and optimizing stock levels. Moreover, RFID adoption was also associated with automation, which would make businesses more productive. Thus, uncertainty avoidance's positive correlation with the perceived potential of RFID encourages CIOs to adopt RFID.

Uncertainty avoidance was also found to positively moderate the positive impact of ICT's perceived ease of use on individuals' attitudes towards ICT as well as people's attitudes toward ICT on their intentions to use it. Sanchez-France, et al. (2009) explained this is because individuals in high uncertainty avoidance cultures adjust their

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attitudes before engaging in behaviors. Furthermore, uncertainty avoidance drives individuals to acquire enough information and knowledge before entering unclear and unstructured situations.

Interestingly, among people from high power distance and uncertainty avoidance cultures, power distance and uncertainty avoidance both promote organizational readiness for ICT adoption. The reason behind it is that the high level of inequality in high power distance cultures ensures ICT implementation being carried out smoothly once adoption decision is made. High uncertainty avoidance level can lead to a fear of missing out on potentially profitable ICT-based opportunities, making non-adoption riskier than adoption, and motivating firms to adopt new technologies (Kollmann, et al., 2009).

Overall, the findings revealed the relationship between power distance, uncertainty avoidance and ICT can be either direct or indirect. Both power distance and uncertainty avoidance have a direct negative relationship with organizational ICT adoption and individual ICT utilization. As a result, Propositions 3a and 5a, which posit a negative relationship between power distance and ICT adoption and use, are supported, while Propositions 3b and 5b, which posit a negative relationship between uncertainty avoidance and ICT adoption and use, received mixed support.

Individualism/collectivism

Proposition 3c argues that decision makers from more individualistic cultures are more likely to adopt ICT than decision makers from cultures that are more collectivistic. Similarly, Proposition 5c asserts that individuals from more individualistic cultures are more likely to use ICT than those from less individualistic cultures.
Individualism was found to be positively correlated with organizational ICT adoption (Erumban & De Jong, 2006; Van Everdingen & Waarts, 2003) and individual ICT utilization (Guo, et al., 2008) within organizations. The logic for the result is that, compared to individuals from collectivistic cultures, people from individualistic cultures are more determined to make their own choices (Erumban & De Jong, 2006; Van Everdingen & Waarts, 2003). In an organizational context, individualistic

individuals are more eager to try new innovations than those who are from more collectivistic cultures.

The studies also revealed that individualism was negatively correlated with individuals' perceptions of ICT, such as its perceived usefulness (Hwang, 2011; Lippert & Volkmar, 2007) and potential (Leimeister, et al., 2009). These effects are noteworthy because these perceptions of ICT are known to positively affect ICT adoption and use. The argument underlying the negative relationship between individual perceptions of ICT and individualism is that ICT enables communication and collaboration within social groups (Hwang, 2011), making it more useful for individuals from collectivistic cultures. These individuals thus have a more positive view of ICT's perceived potential, usefulness and strategic importance than those from individualistic cultures.

Some studies found that individualism positively moderates the relationship between perceived ease of use and perceived usefulness, as well as the positive relationship between perceived usefulness and individuals' ICT use intentions. This is said to be due to the individualistic attributes of instrumentality, self-efficacy and a willingness to challenge traditions (Sanchez-Franco, et al., 2009).

Similar to power distance and uncertainty avoidance, individualism also directly and indirectly influence organizational ICT adoption and individual ICT use. Based on the findings, Propositions 3c and 5c are both partially supported. Decision-makers from individualistic cultures are more likely to adopt ICT and while individuals from individualistic cultures are also more likely to use ICT, they may also have negative perceptions of its value.

Masculinity

Proposition 3d posits that organizations with decision makers from masculine national cultures are more likely to adopt ICT than those with decision makers from less masculine national cultures, while Proposition 5d argues that individuals from more masculine cultures are more likely to use ICT than those from less masculine cultures.

Lippert and Volkmar (2007) found that a country's level of masculinity was negatively correlated with individual awareness of ICT functionalities and perceptions of ICT performance, which are related to individual ICT use. They argue that this is because individuals who are less masculine are more aware of and sensitive to information about other parties in their work processes. They thus use the features of new technologies that cater to issues such as relationship maintenance and group identification.

Van Everdingen and Waarts (2003) found that a country's level of masculinity is negatively correlated to organizational ICT adoption. This is contrary to the argument put forward by Hofstede (2001) that individuals in masculine cultures emphasize rewards, performance recognition, improvement and achievement, which motivate decision makers to adopt innovations. Van Everdingen and Waarts (2003) suggest that the contradictory finding might be due to the specific type of ICT being studied, which was an ERP system in this case.

Further, masculinity was also found to play a positive role in moderating the positive association between ICT's perceived strategic importance and decision makers' willingness to adopt it (Leimeister, et al., 2009), as well as be positively related to users' expectations of ICT's performance and their intentions to use it (Taksa, et al., 2009).

Given the small sample of studies utilizing this construct, it is difficult to come to a conclusion for these propositions. However, even within so few studies, there was a divergence of outcomes. Thus, this research is unable to state anything conclusive about the validity of these two propositions.

Long-Term versus Short-Term Orientation

Researchers have found that long-term orientation positively affects organizational ICT adoption (Van Everdingen & Waarts, 2003) and individual ICT use (N. Zhang, Guo, Chen, & Song, 2008). Such cultures view ICT as a representation of the future that is expected to be beneficial in the long run. This fits their world-view: such cultures are persistent

and willing to adapt their traditions and personalities, because they believe that the most important events in life occur in the future (Van Everdingen & Waarts, 2003).

Summary of findings of National Culture Influence on ICT

Overall, the findings revealed that various aspects of national culture both directly and indirectly influence ICT adoption; through perceptual constructs such as usefulness, potential, strategic importance, ease of use, performance, and intention to adopt/use. This fits with the arguments made previously that national cultures will have a stronger impact on ICT adoption because they influence individual values that come into play when decision-makers have to decide on ICT adoption.

Broadly, cultures with high levels of power distance, individualism, and masculinity were found to be more likely to adopt and use ICT. However, the relationship between uncertainty avoidance and ICT adoption and use in the studies was in the opposite direction from the propositions. While there was strong support for power distance, the other dimensions of national culture had less robust support. In addition, the impact of the dimensions was both direct and indirect.

The Influence of Organizational Culture on ICT

The studies suggested that organizations that were clans or adhocracies (i.e. organizations that had a flexibility orientation) were more likely to adopt ICT. This effect was direct (Lopez-Nicolas & Merono-Cerdan, 2009) and indirect through the organizations' absorptive capability (Caccia-Bava, et al., 2006). However, rational and hierarchical organizations (i.e. organizations that had a control orientation) had higher levels of managerial ICT knowledge, as well as internal and external communication channels, which are an indicator of an organization's level of absorptive capacity. They are thus more likely to do better with their ICT investments, since absorptive capacity is a significant indicator of ICT adoption success (Caccia-Bava, et al., 2006).

It was also unveiled that organizational cultures can play moderating roles in ICT adoption. On one hand, organizations which were flexible, with clan and adhocracy cultures, positively moderate the positive impact of perceived coercive pressure on its

intention to adopt ICT (Liu, et al., 2010). On the other hand, organizations that had a controlling orientation, manifested as market and hierarchy cultures, negatively moderate the positive influence of both the perceived normative and coercive pressures on ICT adoption intentions (Ke, et al., 2006; Liu, et al., 2010).

Propositions 4a and 4c are generally supported, while an opposite sign was found against Proposition 4b. On the other hand, Proposition 6a, 6b, and 6c could not be evaluated, because, our literature search did not uncover any studies on the relationship between organization culture and ICT use that used the CVF framework.

Other Findings about Organizational Culture and ICT

Other aspects of organizational culture (i.e. non-CVF based) were also studied in the context of ICT adoption and use. Organizations with these attributes were found to be more likely to adopt ICT: possessing a rational decision making style; having a long-term orientation; being change-oriented, production-oriented, internal-oriented (Wang, et al., 2008); outcome-oriented (similar to production oriented), innovation-oriented, or having a high degree of interpersonal harmony (Bai & Cheng, 2010).

Organizational cultures that were trusting, freely shared information, and worked closely with others (Park, 2005) were found to facilitate ICT implementation / adoption. Similarly, an organizational culture's level of constructiveness and aggressive defensiveness (Callen, et al., 2007), rigidity, proficiency, resistance (Cronley & Patterson, 2010), and people orientation (Park & Jeong, 2006) were positively correlated with ICT use.

Summary of Findings of Various Aspects of Culture on ICT

Propositions 3a, 4a, 4c and 5a have the strongest level of support, while Propositions 3c, 3d and 5c were weakly supported. Results that were the opposite of what this paper predicted were found for Propositions 3b, 4b and 5b. Propositions 6a, 6b and 6c could not be assessed as no relevant studies were found.

Combining these results with the similarities between national culture dimensions and organizational culture types identified previously, and using the values-practices dynamic to distinguish between national and organizational cultures[13], and keeping in mind the differences between organizational ICT adoption and individual ICT use[14], the overall set of results can be summarized in the following manner:

National cultures high in power distance are consistent with hierarchical organizational cultures, and both of them negatively influence decision-makers' perceptions of ICT, which in turn weakens their intention to adopt ICT.

Collectivistic national cultures are consistent with clan organizational cultures, and both of them positively influence decision-makers' perceptions of ICT, which in turn, enhances their intention to adopt ICT.

National cultures high in power distance negatively influence users' perceptions of ICT, which affects their intention to use ICT. Therefore, these cultures are negatively correlated with individual ICT use.

Combined Impact of National and Organizational Culture

The overall goal of this study is to examine the interaction between the two types of cultures and their joint impact on ICT adoption and use. Our literature search uncovered four papers that examined the influence of organizational culture on ICT adoption using the CVF framework. This paper will use these to evaluate Propositions 1a and parts of 2a and 2b on the combined effects of national and organizational culture on ICT adoption.

To examine these propositions, this research takes another look at the four papers that used CVF in their study of organizational culture and ICT adoption. For each of those papers, the county where the study conducted was presented, based on the

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[13] National culture has strong influence on individuals' values, while organizational culture mainly impacts on organizations' practices.
[14] ICT adoption focuses on strategic decision-making, whereas ICT use reflects how things are done within organizations.

interrelated cultures theory (Karahanna, et al., 2005) and SIT (Tajfel, 1970) that recognize the simultaneous existences of multiple cultures, including national and organizational cultures, and asserts that each of them influences individual decisions and behaviors. This enables us to examine the interactive impact of organizational culture and national culture on ICT adoption. The table below summarizes the studies (Table 3):

Table 3. *Summary of Papers Used for Validating Propositions about the Combined Influence of National and Organizational Cultures on ICT Adoption and Use*

Author (Year)	Country	Industry	ICT
Caccia-Bava, et al. (2006)	US	Hospitals	ICT
Ke, et al. (2006)	China	N/A	Internet-Enabled Supply Chain Management System (sec)
Liu, et al. (2010)	China	Manufacturing, Service	Internet-Enabled Supply Chain Management System (eSCM)
Lopez-Nicolas and Merono-Cerdan (2009)	Spain	Various	ICT for Knowledge Management (KM)

One of the four studies identified above was conducted in Spain, which is characterized as low to medium in power distance according to Hofstede's (1983) original national culture dimension index and the latest national culture dimensions country scores (Hofstede, 2012). This level of power distance is expected to have low to medium positive influence on decision makers' intention to adopt ICT (following Proposition 3a). The organization had a hierarchical culture, which should, according to Proposition 4a, have a negative impact on ICT adoption. However, the study found that the hierarchical culture had no significant impact on ICT adoption. As a result, it is possible that the national culture neutralized the negative influence of the organizational culture on ICT adoption, providing some support for Proposition 1a, which argues that ICT adoption is influenced more by adopters' national cultures. The study also provides support for part of Proposition 2b, which suggests when national and organizational cultures are inconsistent, the combined effect of theirs on ICT adoption remains the same as the effect of the more influential culture, which is national culture in this case*.

Two of the studies were conducted in China, which is rated high in collectivism and high in power distance. The findings from these studies suggested that a flexibility-oriented clan culture has a positive indirect influence on ICT adoption, while a hierarchy culture has a negative indirect impact on ICT adoption. These findings provide some justification for part of Proposition 2a that suggests when national and organizational cultures are consistent, the combined effect of theirs on ICT adoption remains the same as the effect of either culture.

However, while the previous three studies found some support for the propositions, the fourth study had the opposite set of findings compared to the propositions. It was set in the US, whose national culture is rated extremely high in individualism or low in collectivism (Hofstede, 1983, 2012). The organization on the other hand had a group-based culture. However, the results suggested that ICT adoption was enhanced by the organization's group culture indirectly through its managerial IT knowledge. This is contrary to Proposition 2b, which asserts when national and organizational cultures are inconsistent, the combined effect of theirs on ICT adoption remains the same as the effect of the more influential culture, i.e. national culture.

It is worth examining Guo and D'Ambra (2009), the only extant study that specifically investigated the joint influence of both organizational and national cultures on IT use, to validate the remaining propositions. They argued that Australians would be more likely to embrace new technologies compared to South Koreans, Malaysians and Thais because Australian culture was more individualistic. They examined this hypothesis among the employees of an Australian multi-national company who were based in these four countries. They found that, despite the differences in national cultures, the employees had very similar preferences for media richness and email use. Guo and D'Ambra (2009) argued that organizational culture was more influential than national culture in the case of individual ICT use. In this particular example, the unified work practices of the international subsidiaries were maintained by keeping their organizational cultures highly consistent with their headquarters' organizational and national culture.

While the study is very insightful, it has some limitations. For instance, the ICT adopted in the study was email, which, at present, is very widely accepted and commonly used all over the world, and not potentially as resistible by users as other technologies mentioned by the papers identified in our review. Secondly, the most traditional way of communication, face-to-face, was also perceived by most of the respondents as richer and more preferable media along with the newest way of communication, email, over the others. It suggests factors other than culture may have been more influential in this case, or culture may have affected the use of email in a different/opposite direction. For example, email was preferred over telephone for intercultural communication (e.g. Australian and South Korean cultures) perhaps because of language differences (Guo & D'Ambra, 2009). Generally speaking, email may be more accurate as it does not require an instant a response compared to telephone conversations. In this case, the language, as a part of their national culture, may have facilitated the use of email among the South Korean employees, which is contrary to what had been hypothesized. Thus, the impact of Korean culture is consistent with the hypothesized relationship between organizational culture on ICT use. A key issue was that a study of the proposed difference in magnitude between the influence of national and organizational cultures could not be carried out. Further, the small size of the sample used in this study was not able to provide sufficient statistical power for proving the point (Guo & D'Ambra, 2009). Finally, the authors did not adopt any organizational culture framework in their investigation, which would have helped to systematically explain and predict the impact of organizational culture on ICT.

Overall, the study was able to find some support for Propositions 1a, 1b, 2a, and 2b, although it is not very strong or consistent. The challenge is to find cases that use both the national and organizational culture frameworks so that they can be compared consistently.

Chapter 6: Discussion and Conclusion

The aim of this study was to investigate and examine the combined influence of national and organizational culture on ICT adoption and use. The study began by discussing the various ways, in which culture has been defined, and the models and frameworks for describing and analyzing it. Next, the similarities and differences between ICT adoption and use were clarified. This was followed by a summary of research on ICT and culture, which identified gaps in our understanding, and the differences between research on national culture, which is dominated by Hofstede's framework, and organizational culture, which is fragmented, in comparison. In addition, the fit between different dimensions of national cultures and the four ideal organizational culture states of Cameron and Quinn's (2011) Competing Values Framework was discussed.

These various components were integrated into a conceptual model based on Karahanna et al. (2005), which posits that: individuals operate in and respond to different cultures at the same time, these values may come into conflict with one another, and distinguishes between values and practices. This paper argues, based on the review of the literature, that ICT adoption is fundamentally a cognitive decision guided by the values of the decision-makers, while ICT use is an individual behavior driven by organizational practices.

Following this underlying logic, six sets of propositions were developed: two on the joint effects of national and organizational culture on ICT adoption and use, and four on aspects of national and organizational culture whose impact on ICT adoption and use has not been examined previously. The propositions were evaluated by examining the results of empirical studies that had been conducted over the last six years. It is important to note that this is not an exhaustive method for testing the relationships embodied in the propositions. This is one clear limitation of the study, and for future research, using meta-analysis would best test these relationships. The collection of studies been identified here are suitable for the latter approach as they are empirical and provide statistical data on the relationship between the different constructs.

The 30 studies that were used to assess the propositions were chosen based on certain criteria (listed in Chapter 4) and comprise studies carried out in various countries and industries, thus providing a good measure of generalizability for the results. While some of the findings were in line with the propositions, indicating that aspects of national culture affect ICT adoption and use, and aspects of organizational culture affect ICT adoption, other relationships were contrary to what had been proposed. The propositions about organizational culture and ICT use could not be tested because of insufficient data.

Finally, the propositions on the joint impact of organizational and national culture on ICT adoption and use were examined. However, only five studies could be used for this purpose: four of them because they used the CVF framework and described the national origins of the firms in their sample, and the last one because tested IT use across different national cultures while holding organizational culture constant. Once again, the findings provide support for the propositions at some level, but also suggest that some of the propositions were contrary to what the data showed.

It is worth noting that in many of the studies, cultural aspects were not correlated directly with ICT adoption and use, but rather, affected the latter through some mediator. These mediators include individuals' perceptions of or attitudes toward ICT, and people's intention to adopt and/or use ICT. These relationships were often found in studies on the Technology Acceptance Model (TAM), which is widely used in research on the impact of national culture on ICT use/adoption.

Contribution, Limitations and Implications

Using information effectively and efficiently is key to organizational success today, and ICT is the tool to achieve these goals. Within organizations, cultures at different levels (i.e. national and organizational cultures) influence ICT adoption and use decisions. Under different circumstances, the interaction of the value and practices embodied in these various cultures can facilitate or impede ICT adoption and use. To date, the impacts of national and organizational cultures on ICT have been two separate research streams that have been well studied. However, little research has discussed

their joint influence on ICT-related activities. This research project is the first study that systematically investigates and examines the combined effects of national and organizational cultures on both organizational ICT adoption and individual ICT use. Furthermore, it systematically uncovers the similarities between national and organizational cultures, as well as makes distinctions between organizational ICT adoption and individual ICT use.

This study was designed as a narrowly focused review, whose propositions could be expeditiously evaluated with secondary data. Thus, although the findings are interesting and point out areas for future research, they are more slight indications of the validity of the suggested relationships than strong evidence. The more significant contribution of this project is that it provides a framework to integrate the two streams of ICT research on culture, and uses the logic underpinning the framework to develop propositions that can be more rigorously tested in the future. Techniques that could be used to do so include meta-analysis (Hunter & Schmidt, 1990) and qualitative comparative analysis (Rihoux & Ragin, 2009).

Another opportunity for future research is to map the constructs used by the studies on organizational culture that do not use the CVF framework to the CVF dimensions. Since these studies form the majority of research in the organizational culture field, they could provide a deeper pool of data for evaluating the propositions. Currently, by limiting the assessment to the CVF studies, this study is unable to offer strong support for the interaction propositions, which are the core focus of this study. Finally, researchers can use the review and the propositions developed here to craft empirical studies that will specify and measure the different cultural dimensions more accurately and consistently. Guo and d'Ambra (2009) are a good start in this domain and their results show the interesting questions that such studies can lead to. Ideally, researchers in this area should carry out longitudinal studies that track the adoption and use of new ICT in organizations from before the adoption decision to post-implementation. That would enable them to capture the entire range of behaviors, which is important given the different roles that values and practices play in the process of ICT adoption and use, as delineated in this study.

The review and the preliminary results from the evaluation of the propositions can be useful to organizations, because they point out how culture can be strategically utilized in their own favor when investing in ICT. For example, as economies globalize, organizations have been expanding their businesses all round the world. Employees working for their subsidiaries may come from cultures that against ICT utilization. In such cases, this study shows that by creating organizational cultures that embraces technologies, these subsidiaries may be able to neutralize or even overcome the resistance in ICT utilization, since national cultures do not necessarily constraint the organizational cultures of the corporates located in these countries (Adler & Doktor, 1986).

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Appendices

Appendix A. List of IT-Culture Studies Reviewed

		Title	Technology	Culture Dimension	Country	Findings	Notes
National Culture & IT Adoption/Use							
1		Al-Gahtani, et al. (2007)	Computer	Hofstede • Power Distance • Uncertainty Avoidance • Individualism • Masculinity	Saudi Arabia	• Saudi Arabia's culture is low on Individualism. It values the collective opinions of others. It influence individual behavioral intentions and result in positive relationship between subjective norm and behavioral intention. • Subjective norm has a positive impact on behavioral intentions to use computers. • Saudi Arabia's culture is high on Uncertainty Avoidance. The facilitating conditions serve such culture by reducing uncomforting uncertainties. • Facilitating conditions do not have a significant impact on computer usage behavior.	• UTAUT • ICT utilization, individual level
2		Erumban and De Jong (2006)	Information and Communication Technology (ICT)	Hofstede • Power Distance • Uncertainty Avoidance • Individualism • Masculinity • Long-Term Orientation	Two datasets containing 42 and 49 Countries	• A country's level of power distance is negatively correlated to its ICT adoption rate. • A country's level of uncertainty avoidance is negatively correlated to its ICT adoption rate. • A country's level of individualism is positively correlated to its ICT adoption rate. • A country's long-term orientation is not significantly correlated to its ICT adoption rate. • A country's masculinity is not consistently correlated to its ICT adoption rate.	• ICT adoption across countries, at the macro level • Secondary data

3	Guo, et al. (2008)	• Instant Messaging (IM) • Email • Short Messaging Service (SMS) • Telephone	Hofstede • Power Distance • Individualism / Communication Context • Masculinity • Uncertainty Avoidance • Long-Term Orientation	• China • Australia	• A country's level of power distance and uncertainty avoidance is negatively correlated to its individuals' ICT adoption and use. • A country's level of individualism is positively correlated to its individuals' ICT adoption and use.	• ICT adoption and utilization, individual level • For study purposes
4	Hwang (2011)	Enterprise Resource Planning (ERP)	Hofstede • Power Distance • Collectivism / Individualism	• US • Japan • Australia • Brazil • Romania • Argentina • Korea • India • Pakistan • Bulgaria • China • Taiwan • Singapore	Power Distance • A country's level of power distance is negatively correlated to its individuals' general computer self-efficacy. • An individual's general computer self-efficacy has a positive impact on ICT's perceived ease of use. • ICT's perceived ease of use has a positive impact on individuals' Intentions to Use. • ICT Perceived ease of use has a positive impact on its Perceived Usefulness. Collectivism (Individualism) • A country's level collectivism (Individualism) is positively (negatively) correlated to ICT's perceived usefulness. • ICT's perceived usefulness has a positive impact on Individuals Intentions of Use.	• ICT utilization, individual level • TAM
5	Kollmann, et al. (2009)	Electronic Business (E-Business)	Hofstede • Power Distance • Uncertainty Avoidance • Individualism	29 European Countries	• A country's power distance moderates the positive correlation between organizational readiness and e-business adoption, in high power distance countries. • A country's uncertainty avoidance moderates the positive correlation between organizational readiness and e-business	• ICT adoption, organizational level • Secondary data

					adoption, in high uncertainty avoidance countries. • A country's masculinity moderates the positive correlation between organizational readiness and e-business adoption, in low masculinity countries. • A country's individualism does not significantly moderate the positive correlation between organizational readiness and e-business adoption.	
6	Leimeister, et al. (2009)	Radio Frequency Identification (RFID)	Hofstede • Power Distance • Individualism • Masculinity • Uncertainty Avoidance	• Germany • Italy	• A country's level of uncertainty avoidance is negatively correlated to its CIOs' experience with RFID, which is positively correlated to the perceived strategic importance of RFID. • A country's level of individualism is negatively correlated with its company sizes, which is positively correlated to the perceived strategic importance of RFID. • A country's level of uncertainty avoidance is positively correlated to its CIOs' perception of ICT potentials, which is positively correlated to the perceived strategic importance of RFID. • A country's level of individualism is negatively correlated to its CIOs' perception of RFID potentials, which is positively correlated to the perceived strategic importance of RFID. • A country's level of power distance is negatively correlated its CIOs' perception of RFID potentials, which is positively correlated to the perceived strategic importance of RFID. • The perceived strategic importance of RFID is positively correlated to the willingness to invest/adopt on RFID. And the level of masculinity positively moderates such correlation.	• TAM • CIOs' Willingness of ICT adoption/investment, organizational level
7	Li (2010)	Online Communities of Practice (OCoP)	• Language • Thinking Logic • Level of Perceived Credibility of	• China • US	Language • English generates barriers for Chinese respondents to share knowledge in forms of reluctance to use OCoP to post, no desire to make extra effort to express ideas when not	• ICT utilization, individual level

				Voluntarily Shared Knowledge		required, and concerns of misinterpretation of their expressions. • However it is not a problem for perceive knowledge for Chinese respondents using OCoP.	
8	Lippert and Volkmar (2007)	Collaborative Visibility Network (CVN)	Hofstede • Masculinity • Individualism	• Canada • US	• A country's level of masculinity is positively correlated to the level of gender difference in its individuals' normative expectations toward ICT. • A country's level of masculinity is positively correlated to the level of gender difference in its individuals' awareness of supply chain. • A country's level of masculinity is positively correlated to the level of gender difference in its individuals' attitudes toward ICT. • A country's level of masculinity is not correlated to the level of gender difference in its individuals' perception of ICT performance. • A country's level of masculinity is negatively correlated to its individuals' awareness of supply chain. • A country's level of masculinity is negatively correlated to its individual's attitudes toward ICT. • A country's level of Masculinity is not correlated to its individuals' utilization of ICT. • A country's level of Masculinity and individualism are negatively correlated to its individuals' perception of ICT performance.	• TAM • ICT utilization, individual level
9	Qu, et al (2011)	Open Source Software (OSS)	<u>Hofstede</u> • Uncertainty Avoidance • Power Distance • Individualism	29 European Countries	• A country's level of uncertainty avoidance is positively correlated to its organizations' OSS adoption. • A country's level of power distance is negatively correlated to its organizations OSS adoption. • A country's level of Individualism is not significantly correlated to its organizations OSS adoption.	• ICT adoption, organizational level • Secondary data

					• A country's level of uncertainty avoidance positively moderates the positive impact of proprietary IT-based networks on OSS adoption. • A country's level of uncertainty avoidance negatively moderates the positive impact of open IT-based networks on OSS adoption.	
10	Sanchez-Franco, et al. (2009)	Web-Based Electronic Leaning System (E-Learning)	Hofstede • Individualism • Uncertainty Avoidance	Nordic Culture • Finland • Denmark • Sweden • Norway PSG-Mediterranean Culture • Greece • Spain • Portugal	• A country's level of individualism positively moderates the positive impact of a web-based e-learning system's perceived usefulness on its educators' intentions to use it. • A country's level of individualism positively moderates the positive impact of a web-based e-learning system's perceived ease of use on its perceived usefulness. • A country's level of individualism positively moderates the positive impact of a web-based e-learning system's perceived ease of use on its perceived enjoyment. • A country's level of uncertainty avoidance positively moderates the positive impact of its educators 'attitudes towards a web-based e-learning system's usage on their intentions to use it. • A country's level of uncertainty avoidance does not significantly moderate the positive impact of a web-based e-learning system's perceived usefulness on the educators' attitudes towards its usage. • A country's level of uncertainty avoidance positively moderates the positive impact of a web-based e-learning system's perceived ease of use on its educators' attitudes towards its usage. • A country's level of uncertainty avoidance negatively moderates the positive impact of a web-based e-learning system's perceived enjoyment on its educators' Attitudes towards its usage.	• TAM • ICT utilization intention, individual level

					• A country's level of uncertainty avoidance negatively moderates the positive impact of a web-based e-learning system's perceived enjoyment on its educators' intentions to use it.	
11	Taksa, et al. (2009)	Search Engine	Hofstede • Power Distance • Individualism • Masculinity • Uncertainty Avoidance • Long-Term Orientation	N/A	• A country's level of uncertainty avoidance is not significantly correlated to the number of search engines used by its individuals to complete tasks. • A country's level of uncertainty avoidance is positively correlated to the number of searches its individuals perform through search engines to complete tasks. (Not strongly confirmed) • A country's level of masculinity is positively correlated to the preference of its individuals using quantitative information over qualitative information retrieved from search engines. (Strongly confirmed) • A country's masculinity significantly moderates the correlation between performance expectancy and behavioral intention, in high masculinity countries. (Not strongly confirmed) • A country's masculinity does not significantly moderate the correlation between effort expectancy and behavioral intention, in low masculinity countries. • A country's collectivism positively (Individualism negatively) moderates the correlation between social influence and behavioral intention. (Weakly confirmed) • A country's power distance significantly moderates the correlation between performance expectancy and behavioral intention, in high power distance countries. (Barely confirmed)	• UTAUT • ICT utilization, individual level
12	Van Everdingen and Waarts	Enterprise Resource	Hofstede • Power Distance	• Finland • Sweden	• A country's level of power distance is negatively correlated to its organizations' ICT adoption rate.	• ICT adoption, organizational level

	(2003)	Planning (ERP)	• Uncertainty Avoidance • Individualism • Masculinity • Long-Term Orientation Hall • High / Low Communication Context • Monochronic / Polychronic Time Perception	• Norway • Denmark • Netherlands • Belgium • France • Spain • Italy • UK	• A country's level of uncertainty avoidance is negatively correlated to its organizations' ICT adoption rate. • A country's individualism is positively correlated with its organizations' ICT adoption rate in the early stage of the adoption only. • A country's masculinity is negatively correlated to its organizations' ICT adoption rate. • A country's long-term orientation is positively correlated to its organizations' ICT adoption rate. • A country's level of communication context is negatively correlated to its organizations' ICT adoption rate. • In monochronic countries, organizations are more likely to adopt ICT than in polychronic countries.	
13	Vatanasakdakul, et al. (2010)	Internet-Based Business-to-Business (B2B) Systems • Email • E-Marketplace	Cultural Fit Dimensions • Personal Relationships • Long-Term Relationships • Inter-Organizational Trust • Ability to Communicate in English • Western Influence	• Thailand	• The cultural fit perception has positive impact on an organization's B2B technology utilization. • An organization's ICT utilization has positive impact on its performance.	• ICT utilization, organizational level
14	N. Zhang, Guo, Chen, and Chau	E-Government System (EGS)	Confucian Value 'Hexie'	• China	• Perceived fit represent Hexie value in the workplace • An EGS's perceived fit has a positively impacts on the general evaluation toward it.	• TAM • ICT utilization evaluation, individual level

					• An EGS's perceived fit has a positive impact on its perceived usefulness.	• E government failures largely lie on lack of fit, which may be rooted in high-level power distance in cultures of the Far East.
15	N. Zhang, Guo, Chen, and Song (2008)	Mobile Government Terminal (MGT)	Hofstede • Power Distance • Uncertainty Avoidance • Long-Term Orientation / Confucian Dynamics	China	• China's high level of power distance drives Chinese vitalizing leader's support. As a result, a user's perception of such support has positive impact on his attitude toward MCT adoption and utilization. • China has high level of uncertainty avoidance, but Chinese people do not tend to avoid new technology. As a result, a user's perception on his technology experience has no impact on the attitude toward MCT adoption and utilization. • A user's perceived fit of a technology, as a representation of Confucian Dynamics of Chinese culture, has positive impact on his attitude toward MCT adoption and utilization.	• ICT utilization, Individual level • TAM?
Organizational Culture & IT Adoption/Use						
1	Bai and Cheng (2010)	Enterprise Resource Planning (ERP)	Organizational Culture in the Chinese Context • Interpersonal Harmony • Outcome Orientation • Innovation • Control • Efficiency	China	• An organization's Innovation Orientation culture has direct positive impact on ERP assimilation. • An organization's Control culture has direct positive impact on ERP assimilation. • An organization's Efficiency culture has direct positive impact on ERP assimilation. • An organization's Users participation after ERP implementation has positive impact on ERP assimilation. • An organization's Interpersonal Harmony culture positively influences its ERP assimilation through its users' participation. • An organization's Outcome Orientation positively influences its ERP assimilation through its users' participation.	• ICT implementation/adoption, organizational level; assimilation/utilization, individual level • According to Purvis et al.,' definition, assimilation refers to "the extent to which the use of technology diffuses across the organizational projects

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						or work processes and becomes reutilized in the activities of those projects and processes."
2	Caccia-Bava, Guimaraes, and Harrington (2006)	Information Technology (IT)	Quinn and Rohrbaugh's Competing Values Model • Control vs. Flexibility structure • People vs. Organization focus Four Culture Types • Developmental • Rational • Hierarchical • Group	US	• A hospital's level of Group, Developmental and Rational culture are positively correlated to its level of managerial IT knowledge; A hospital's level of Hierarchical culture is negatively correlated to its level of managerial IT knowledge. • A hospital's level of Developmental and Rational culture are positively correlated to its levels of internal and external communication channels; A hospital's level of Group and Hierarchical culture are not significantly correlated to its levels of internal and external communication channels; • A hospital's level of managerial IT Knowledge, as a dimension of absorptive capability, is directly positively correlated to its level of IT implementation success. • A hospital's levels of internal and external communication channels, as dimensions of absorptive capability, are directly positively correlated to its level of IT implementation success.	• ICT adoption, organizational level
3	Callen, Braithwaite, and Westbrook (2007)	Computerized Provider Order Entry System (CPOE)	• Constructiveness • Passive-Defensiveness • Aggressive-Defensiveness	Australia	• Hospital A with high level of Constructiveness in its organizational culture use of CPOE is supported. • Hospital B with high level of Aggressive-Defensiveness in it organizational culture use of CPOE is discourages.	• ICT utilization, individual level
4	Cronley and Patterson (2010)	Homeless Management Information	• Rigidity • Proficiency • Resistance	US	• Homeless service providers with high level of Rigidity in its organizational culture have clear and systematic work procedures that reduce uncertainty and facilitate HMIS use.	• ICT utilization, individual level

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		System (HMIS)			• Homeless service providers with high level of Proficiency in its organizational culture value competency among staff members that encourages learning of HMIS use. • Homeless service providers' High level Resistance is also found to increase HMIS use.	
5	Ifinedo (2007)	Enterprise Resource Planning (ERP)	N/A	• Finland • Estonia	• An organization's culture that is conductive to ERP adoption is positively correlated to its ERP success. • An organization's culture influences ERP success, and its level of IT assets is positively correlated to such success. • An organization's culture influences ERP success, and its level of IT resources is positively correlated to such success.	• ICT adoption, organizational level.
6	Jackson (2011)	Virtual Learning Environment (VLE)	Grid and Group Cultural Theory • Fatalism • Hierarchism • Egalitarianism • Individualism	UK	• Hierarchism: The organization (college) is hierarchical, bureaucratic and administrative. The senior management's power domination does not provide support for the VLE adoption. • Fatalism: Within the organization, users feel isolated and are not interested in taking part in adopting VLE. There is continued reliance on traditional routines and processes. • Individualism: The user champions of the organization behave egotistically by putting their interests above all the others'. They do not address the concerns of the other users. It, in turn, creates the lack of user interest towards the VLE.	• ICT adoption, organizational level
7	Ke, Liu, Wei, Gu, and Chen (2006)	Electronic Supply Chain Management (eSCM)	Quinn and Rohrbaugh's Competing Values Model • Control vs. Flexibility structure • People vs. Organization	China	• An organization's Developmental culture positively moderates the positive impact of organizational trust on its intention to adopt eSCM. • An organization's Rational culture negatively moderates the positive impact of normative pressures on its intention to adopt eSCM. • An organization's Rational culture negatively moderates of the positive impact of coercive pressures on its intention to adopt eSCM.	• ICT adoption, organizational level

			focus Four Culture Types • Group • Developmental • Hierarchical • Rational			
8	Liu, et al. (2010)	Internet-Enabled Supply Chain Management System (eSCM)	Quinn and Rohrbaugh's Competing Values Model • Flexibility vs. Control Orientation • Internal vs. External Focus Four Culture Types • Group • Developmental • Rational • Hierarchical	China	• An organization's Flexibility Orientation does not significantly moderate the positive impact of its perceived normative pressures on its eSCM adoption intention. • An organization's Flexibility Orientation negatively moderates the positive impact of its perceived coercive pressures on its eSCM adoption intention. • An organization's Control Orientation positively moderates the positive impact of its perceived normative pressures on its eSCM adoption intention. • An organization's Control Orientation positively moderates the positive impact of its perceived coercive pressures on its eSCM adoption intention.	• ICT adoption (intentions), organizational level • Senior executives interviewed
9	Lopez-Nicolas and Merono-Cerdan (2009)	Information and Communication Technology (ICT) for Knowledge Management (KM)	Quinn Competing Values Model • Flexibility and Discretion vs. Stability and Control • Internal Focus and Integration vs.	Spain	• An organization's Hierarchical culture has no significant correlation to its ICT use for codification KM strategy. • An organization's Clan culture enhances its ICT use for personalization KM strategy. • An organization's Adhocracy culture enhances its ICT use for both KM strategies. • An organization's Market culture has no significant correlation to its ICT use for both KM strategies.	• ICT use / adoption (strategic), organizational level • CEOs interviewed

			External Focus and Differentiation Four Culture Types • Clan • Adhocracy • Hierarchy • Market			
10	Park (2005)	Knowledge Management Technology	Organizational Culture Attributes • Trust • Sharing Information Freely • Working Closely with Others • Developing Friends at Work	US	• An organization's culture attribute Trust is positively correlated to it Knowledge Management Technology implementation success. • An organization's culture attribute Sharing Information Freely is positively correlated to it Knowledge Management Technology implementation success. • An organization's culture attribute Working Closely with Others is positively correlated to it Knowledge Management Technology implementation success. • An organization's culture attribute Developing Friends at Work is not significantly correlated to it Knowledge Management Technology implementation success.	• ICT implementation, organizational level
11	Park and Jeong (2006)	Knowledge Management Technology	Blake and Mouton • Production-Orientation • People-Orientation	• US • UK • Mainland Europe	• An organization's People-Oriented culture orientation is positively correlated to effective collective technology utilization. • An organization's Production-Oriented culture orientation is not significantly correlated to effective distributive technology utilization.	• ICT utilization, organizational level
12	Rivard, et al. (2011)	Clinical Information System (CIS)	• User Values • User Group Values	Canada	Propositions proved by 3 case studies or not disproved by other empirical studies • An organization's CIS implementation is facilitated, when	• ICT implementation, organizational level • Implementation

					there are consistencies between its characteristics or some of its implementation practices and common User Values (based on which all users reach a consensus) within the organization. • An organization's CIS implementation is hindered, when there are inconsistencies between its characteristics or some of its implementation practices and common User Values (based on which all users reach a consensus) within the organization. • An organization's CIS implementation is facilitated, when the inconsistencies between its characteristics or some of its implementation practices and common User Values within the organization, which cause the hindered implementation, are removed by changing the characteristics of CIS or its implementation practices. • An organization's CIS implementation is hindered, when there are inconsistencies between its characteristics or some of its implementation practices and User Group Values of some user groups within the organization. An organization's CIS implementation is facilitated, when the inconsistencies between its characteristics or some of its implementation practices and User Group Values of some user groups within the organization, which cause the hindered implementation, are removed by changing the characteristics of CIS or its implementation practices.	practices defined
13	Seng, et al. (2010)	Information System (IS)	Grid and Group Cultural Theory • Fatalism • Hierarchism • Egalitarianism • Individualism	Malaysia	Hierarchism • Council A is bureaucratic, lack of IT leadership, has reduced IT budget that impedes the IT development. • Council B is more flexible, management is supportive in IT budgeting and development, IT champions exist and providing IT helps to others.	• ICT utilization, individual level • ICT development/implementation/adoption, organizational level • Junior, middle and senior

						managers interviewed
					Fatalism	
					• Council A has IT resistance, fear and apathy among users. • Council B has little evidence of Fatalism.	
					Individualism	
					• Council A does not support and encourage individuals using IT, is not innovative, and is lack of experienced IT staff. • Council B support and encourage individuals using IT, is innovative, and has IT experts.	
					Egalitarianism	
					• Council A is lack of teamwork, management is reluctant in participating in using collaboration technologies, has culture of blame and mistrust. • Council B is strong in teamwork, regularly and widely uses collaboration technologies, has culture of trust and cooperation.	
14	Wang, et al. (2008)	Hospital Information System (HIS)	• The Basis of Truth and Rationality • Long- vs. Short-Term Orientation • Stability vs. Change Culture • Production vs. People Oriented Cultures • Isolation vs. Collaboration Cultures • Centralized vs. Decentralized	China	• A hospital's Rational decision-making culture leads to more successful HIS implementation. • A hospital's Long-Term Oriented culture achieves a more successful HIS implementation than a short-term oriented culture. • A hospital's Change Oriented culture has a more successful HIS Implementation. • A hospital's Production-Oriented culture favors its HIS implementation. • A hospital's Internal-Oriented culture and the tendency to proactive use of external information favor its HIS implementation and use.	• ICT implementation / adoption, organizational level

			Control • Internal vs. External Orientation			

National Culture, Organizational Culture and ICT Use					
1	Guo & D'Ambra (2009)	Email	<u>Hofstede</u> • Individualism • Uncertainty Avoidance • Power Distance • Masculinity Long-Term Orientation	• Korea • Malaysia • Thailand • Australia	• Australia has a significant higher level of Individualism comparing to Korea, Malaysia, and Thailand. And there is no significant difference among Korea, Malaysia, and Thailand. • There is no significant difference in users' preferences of email between Australian group and Asian group. • The preference of email among both Australian and Asian respondents is possibly generated by social influences and the wide availability of email in the organization. • Organizational culture has significant impact on the email use in the organization's Asian subsidiaries. • It proves the existence of interaction between national culture and organizational culture. Within the organization studied, the organizational culture is influenced by the national culture of the country (Australia) that the headquarters are in, and influences the national culture of its subsidiaries (Korea, Malaysia, and Thailand).	• ICT utilization, individual level.