

THE ROLE OF ESPOUSED NATIONAL CULTURAL VALUES IN TECHNOLOGY ACCEPTANCE¹

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Abstract

Prior research has examined age, gender, experience, and voluntariness as the main moderators of beliefs on technology acceptance. This paper extends this line of research beyond these demographic and situational variables. Motivated by research that suggests that behavioral models do not universally hold across cultures, the paper identifies espoused national cultural values as an important set of individual difference moderators in technology acceptance. Building on research in psychological anthropology and cultural psychology that assesses cultural traits by personality tests at the

individual level of analysis, we argue that individuals espouse national cultural values to differing degrees. These espoused national cultural values of masculinity/femininity, individualism/collectivism, power distance, and uncertainty avoidance are incorporated into an extended model of technology acceptance as moderators. We conducted two studies to test our model. Results indicated that, as hypothesized, social norms are stronger determinants of intended behavior for individuals who espouse feminine and high uncertainty avoidance cultural values. Contrary to expectations, espoused masculinity/femininity values did not moderate the relationship between perceived usefulness and behavioral intention but, as expected, did moderate the relationship between perceived ease of use and behavioral intention.

Keywords: Culture, technology acceptance, adoption, TAM, masculinity/femininity, individualism/collectivism, power distance, uncertainty avoidance, espoused cultural values

Introduction

In an increasingly global business environment, there is a growing need to utilize information technology to achieve efficiencies, coordination, and communication (Broussel 1992; Magnet 1992; Martin 1989; Porter and Millar 1985). This presupposes the diffusion and use of technologies across national boundaries. However, cultural differences between countries impact the effectiveness and efficiency of international IT deployment. Motivated by research that suggests that behavioral models do not universally hold across cultures (e.g., Hofstede 1980; Keil et al. 2000; Straub et al. 1997; Suh et al. 1998), we examine how national culture may influence individual-level acceptance behaviors. While national culture

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is a macro-level phenomenon, acceptance of technology by end-users is an individual-level concern. Thus, to avoid the ecological fallacy (Robinson 1950), we take a cultural psychology and psychological anthropology perspective that assesses cultural traits by personality tests at the individual level of analysis (e.g., Tyler et al. 2000). We argue that individuals espouse national cultural values to differing degrees. Thus, we treat espoused national cultural values as an individual difference variable. These espoused national cultural values of masculinity/femininity, individualism/collectivism, power distance, and uncertainty avoidance are incorporated into an extended model of technology acceptance as moderators of key relationships.

Our approach diverges from the majority of prior research that examines the impact of national culture on individual behavior (e.g., Straub et al. 1997). This prior research typically tests these individual-level models in aggregate in different countries. Differences in observed results are attributed to country-level differences on the dimensions of culture. Drawing on research in cultural psychology (e.g., Howard 2000; Sussman 2000; Tyler et al. 2000) and information systems (Gallivan and Srite 2005; Karahanna et al. 2005; Straub et al. 2002), we posit that national culture impacts the cultural values an individual holds, which in turn influence technology acceptance.

In addition to extending previous research on culture and technology acceptance, this work furthers our understanding of individual and situational characteristics in technology acceptance. Prior research has incorporated individual characteristics as moderators of key relationships in technology acceptance models (see Venkatesh et al. 2003). These moderators mainly include demographic and situational variables such as age (Morris and Venkatesh 2000; Venkatesh et al. 2003), gender (Venkatesh and Morris 2000; Venkatesh et al. 2000), experience (Davis et al. 1989; Karahanna et al. 1999; Morris and Venkatesh 2000; Taylor and Todd 1995; Thompson et al. 1991; Venkatesh and Morris 2000), and voluntariness (Hartwick and Barki 1994; Venkatesh and Davis 2000). The current study extends this body of research by incorporating an additional set of individual differences—espoused national cultural values—into technology acceptance models. These values are theoretically derived from manifestations of national culture at the individual level of analysis.

The remainder of this paper is organized as follows. The theoretical bases of the study are described next. An extended technology acceptance model (TAM) (Davis 1989) is used as the foundation for the theoretical model of the study. Based on cross-cultural research and cultural psychology literature,

we argue for an individual-level conceptualization of national cultural values. These espoused national cultural values (espoused masculinity/femininity, espoused individualism/collectivism, espoused power distance, and espoused uncertainty avoidance) are then incorporated into the model as moderators of the technology acceptance relationships and specific hypotheses are developed. The research methodology and data analysis are presented next. The paper concludes with a discussion of results, limitations, contributions to theory and practice, and suggestions for future research.

Theoretical Background

In this section, we review both the culture and technology acceptance literatures to develop the theoretical model and hypotheses.

Espoused National Cultural Values

Even though there have been many definitions of national culture, Hofstede's definition is arguably the most predominantly used (for a review of cultural definitions, see Straub et al. 2002). Hofstede defines culture as "the collective programming of the mind which distinguishes the members of one human group from another" (1980, p. 260). He also proposes four widely cited dimensions of national culture: individualism/collectivism, power distance, uncertainty avoidance, and masculinity/femininity (Hofstede 1980). Later long-term orientation was added as a fifth dimension (Hofstede and Bond 1988).

It should be noted that while culture is a macro-level phenomenon, it often lacks precision in explaining behavior at the individual level. As Straub et al. (2002) suggest,

Most such definitions [of culture] rely on the assumption that an individual's membership in a cultural group, such as their national culture, defines the nature of values they espouse. However, an individual's values are influenced and modified by membership in other professional, organizational, ethnic, religious, and various other social groups, each of which has its own specialized culture and value set. Thus, individuals vary greatly in the degree in which they espouse, if at all, values dictated by a single cultural group, such as their national culture (p. 18).

[For instance] it is very common in cross-cultural studies to assume that all Japanese demonstrate the

universal cultural characteristic of collectivism (Hofstede 1980); yet we know that there will be variation in the strength of this characteristic and, in the case of highly entrepreneurial Japanese, it may disappear entirely. To generalize cultural characteristics across an entire nation of people is to flirt dangerously with what Robinson (1950) calls the "ecological fallacy," where stereotypes are substituted for individualistic and idiosyncratic traits. Therefore, an *in situ* measurement of culture is appropriate (p. 20).

The implication is that individuals may identify with national culture to varying degrees. As such, it is inappropriate to use country scores on a cultural dimension to predict individual behavior (Ford et al. 2003; McCoy et al. 2005; Straub et al. 2002). Doing so is to commit ecological fallacy, which assumes that one can validly use ecological correlations (which apply to collective entities such as groups) to substitute for individual correlations. Hofstede (1994) himself cautions against using country scores on his dimensions to predict individual behavior, stating that his country-level analysis could not explain individual behavior, which he considered as a theoretically distinct problem.

To examine the impact of national culture on individual behavior while avoiding the ecological fallacy trap, we argue that at the individual level of analysis culture can be treated as an individual difference variable. Such an approach is consistent with studies in psychological anthropology that focus on the interaction between culture and personality and measure cultural traits by personality tests at the individual level of analysis (see Hofstede 1984) as well as with approaches in cultural psychology that examine the impact of culture on self. It is also consistent with a number of recent IS articles (Gallivan and Srite 2005; Karahanna et al. 2005; McCoy et al. 2005; Straub et al. 2002) that argue for such individual-level manifestations of culture. As Tyler et al. (2000) state,

This individual level, psychological approach to cultural values is not without precedent. Although past studies have often used value scores to identify the characteristics of entire cultures (see, e.g., Triandis 1989[a]) researchers have also recognized that value orientations can be used to reflect the characteristics of individuals (Betancourt and Lopez 1993; Triandis 1995). Such a psychological analysis is more sensitive to the possible effects of cultural values on the behavior of particular people than are analyses that treat all of the members of a culture as the same (p. 1141).

Additional support for this position is provided by research on cultural and social identities. Cultural identity is the extent to which individuals accept a specific culture's norms and values (Campbell 2000; Driedger 1975; Erikson 1968). This is a concept akin to social identity (Tajfel 1981), which refers to the aspect of an individual's self concept that derives from knowledge of membership in a group and the level of importance ascribed to belonging to the group. Cultural identity differs from social identity in that social identity presupposes conscious awareness of belonging to a group while awareness of membership is not essential to the operation of cultural identity (Deaux 1993; Tajfel 1982). Indeed, beliefs, values, and self-motivated behavior may be shaped by culture (Tyler et al. 2000) yet individuals may not recognize the imprint left by culture (Sussman 2000). Since an individual may belong to many cultural groups at the same time (Howard 2000; Karahanna et al. 2005; Straub et al. 2002), one may have multiple cultural identities. The degree to which they espouse the norms and values of the specific culture provides the mental framework through which individuals define their ontology, motivate their actions, and define the relationship between self and collective (Sussman 2000).

Based on this and since at the national level culture is primarily defined through values (Hofstede 1980; Straub et al. 2002), we suggest that at the individual level of analysis national culture manifests through an individual's espoused national cultural values. Espoused national cultural values are defined as the degree to which an individual embraces the values of his or her national culture. Values are enduring beliefs 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 1960). Five sets of values or dimensions have been identified by Hofstede as comprising the facets of national culture. Based on these, Table 1 presents the definitions of four espoused national cultural values used in the study (we have chosen not to examine Hofstede's fifth dimension of culture, that of long-term orientation, due to its focus on Asian value systems, which are not the primary interest of our study).

One can argue that culture is a collective phenomenon and, thus, irreducible to the individual level of analysis. Nonetheless, culture can only manifest itself through the individual (Straub et al. 2002) and then be aggregated to the collective. The effect of culture is not homogeneous but rather dependent on the extent to which the individual subscribes to various cultural values. As such, assessing each individual's espoused cultural values is both appropriate and meaningful for predicting individual level behavior.

Table 1. Espoused National Cultural Values

Espoused Cultural Value	Definition
Individualism/Collectivism	Degree to which the individual emphasizes his/her own needs as opposed to the group needs and prefer to act as an individual rather than as a member of a group.
Power Distance	Degree to which large differentials of power and inequality are accepted as normal by the individual. Power distance will condition the extent to which the employee accepts that his/her superiors have more power.
Uncertainty Avoidance	Uncertainty avoidance is the level of risk accepted by the individual, which can be gleaned by his/her emphasis on rule obedience, ritual behavior, and labor mobility. This dimension examines the extent to which one feels threatened by ambiguous situations.
Masculinity/Femininity	The degree to which gender inequalities are espoused by an individual. Individuals who espouse masculine values emphasize work goals such as earnings, advancement, competitiveness, performance, and assertiveness. On the other hand, individuals who espouse feminine values tend to emphasize personal goals such as a friendly atmosphere, comfortable work environment, quality of life, and warm personal relationships.

Our approach diverges from the majority of prior research that examines the impact of national culture on individual behavior (e.g., Rose and Straub 1998; Straub et al. 1997). This prior research typically tests individual-level models in equivalent samples in two or more countries and attributes differences in results to cross-cultural differences. The two approaches are neither theoretically irreconcilable nor mutually exclusive. Rather they provide complementary perspectives on the impact of culture on behavior (Ford et al. 2003). Specifically, while the method used in prior research has focused on understanding how culture impacts aggregate behaviors, the current approach provides insights into how culture can manifest at the individual level and influence each individual's behavior. Thus, both approaches provide distinct explanatory and predictive perspectives on the phenomenon.

To date, our understanding of how culture influences technology acceptance is limited. Despite the plethora of TAM or TAM-related studies (which is the theoretical model used in the current research) in North America, there has been little cross-cultural research on the phenomenon. Notable exceptions are Straub et al. (1997) and Rose and Straub (1998). The former study examined technology acceptance in the United States, Japan, and Switzerland while the latter examined TAM in the Arab culture (Jordan, Egypt, Saudi Arabia, Lebanon, and the Sudan). Their evidence suggests that TAM generalizes to the Swiss and Arab cultures, but not to the Japanese culture, thus suggesting that the theoretical relationships posited by TAM are valid across at least a small number of cultures other than that of the United States. Even though these studies provide valuable insights into technology acceptance in different cultures in the aggregate, they cannot

predict any single individual's behavior because doing so would assume that all individuals in a country espouse national cultural values to the same extent and that the effect of national culture is uniform across all individuals in a specific country.

Technology Acceptance Model

Of the models used in IS to study acceptance of technology—the theory of reasoned action (TRA; Ajzen and Fishbein 1980), the theory of planned behavior (TPB; Ajzen 1991), and the technology acceptance model (Davis 1986)—TAM is arguably the most parsimonious and widely accepted. TAM suggests that perceived ease of use influences perceived usefulness and, in turn, both beliefs influence behavioral intention to use a specific IT.

TAM, in its initial conceptualization, makes no attempt to incorporate the effect of the social environment on behavioral intention. Since culture is a collective phenomenon (Hofstede 1984) one would expect it to primarily manifest through the social environment factors that influence technology acceptance. Research in social information processing (Salancik and Pfeffer 1978) suggests that an individual's attitudes, beliefs, and behavior are influenced by their social context and that individuals learn about behavior through the study of the informational and social environment to which they belong. Clearly, culture plays a key role in defining the social context within which individuals behave. In addition, espoused national cultural values are likely to affect the degree to which subjective norms play a role in influencing an

individual's beliefs and behaviors. Consequently, the social component of technology acceptance models is a key mechanism through which the cultural values shared by the population manifest and impact behavior. As a result, subjective norms, defined as "a person's perception that most people who are important to him/her think s/he should or should not perform the behavior in question" (Fishbein and Ajzen 1975, p. 302) has been added to TAM. A key component of TRA and TPB, as well as of extensions to TAM such as TAM2 (Venkatesh and Davis 2000) and UTAUT (Venkatesh et al. 2003), subjective norm has been shown to be an important determinant of acceptance behaviors in numerous studies (Karahanna and Straub 1999; Taylor and Todd 1995; Thompson et al. 1991; Venkatesh and Davis 2000; Venkatesh and Morris 2000; Venkatesh et al. 2003). Inconsistent results concerning the relationship between social norms and behavioral intention have been attributed to moderating effects by experience, gender, voluntariness, and age (Karahanna et al. 1999; Morris and Venkatesh 2000; Venkatesh and Davis 2000; Venkatesh et al. 2003). Although several other extensions to TAM have been proposed in the literature (for a review, see Venkatesh et al. 2003), these are mostly culture independent and thus beyond the scope of the current study, which focuses on the effect of espoused cultural values on the acceptance of technology.

Since espoused national cultural values are individual difference variables that are hypothesized to moderate relationships in TAM, it is important to situate this research within the larger technology acceptance domain and briefly review other individual difference variables that play a similar *moderating* role. Table 2 summarizes variables that have been proposed and tested as moderators of immediate antecedents of behavioral intention. These moderators include age, gender, experience, and voluntariness. However, individual differences such as espoused cultural values that extend beyond such demographic and situational variables (for a review, see Zmud 1979) have been lacking from studies of technology acceptance. National cultural values have been shown to influence needs and motives for using a product, product use, and attitude toward purchasing and using products (Hofstede and Associates 1998). Thus, the current study extends this stream of research to include value-based constructs² that allow the cultural context to be incorporated into technology acceptance. These value-based constructs are theoretically derived from manifestations of national culture at the individual level of analysis.

²Seligman (2001) also incorporated values related to technology acceptance in TAM but as direct antecedents of perceived usefulness and perceived ease of use.

Research Model

The research model, presented in Figure 1, integrates espoused national cultural values into the extended TAM to show the effect of espoused cultural values on technology acceptance. Hypotheses are grouped by cultural dimension.

Masculinity/Femininity

Masculine values reflect emphasis on work goals, assertiveness, and material success as opposed to feminine values which focus on quality of life goals, nurturing, and modesty (Hofstede and Associates 1998). Hofstede (1984) defines work goals to include an emphasis on earnings, recognition, advancement, challenge, greater work centrality, and achievement defined in terms of wealth. In contrast, quality of life goals place a greater emphasis on cooperation, employment security, a friendly atmosphere, an environment where work is less central, and where achievement is defined in terms of human contacts. According to Hofstede, the first set of values, termed ego goals, ego-boosting goals, or ego-enhancing goals is thought to be associated with masculine cultures and the second, termed social goals, ego-effacing goals, or relationship-enhancing goals with feminine cultures. Similarly, at the individual level of analysis, research on psychological gender and gender roles using the Bem Sex Role Inventory (BSRI) (Bem 1981) or Spence and Helmreich's (1978) Personal Attributes Questionnaire (PAQ) defines masculinity (M) in terms of self-ascribed instrumental personality traits (e.g., competitive, independent) and femininity (F) in terms of self-ascribed expressive traits (e.g., gentle, compassionate) (Bem 1981; Spence et al. 1974). The process of sex-role identification (Spence 1985) describes how the cultural dimension of masculinity/femininity influences an individual's espoused masculinity/femininity values. The sex-role identification process suggests that an individual learns society's gender role standards and expectations and acquires attitudes, behaviors, and values that society deems gender appropriate.

It should be noted that masculinity/femininity is not synonymous with gender as defined by biological sex (male versus female).³ Masculinity/femininity, a measure of psychological gender, refers to whether a society or an individual espouses masculine values (e.g., being aggressive) versus feminine values (e.g., being nurturing) (Bem 1981; Hofstede 1984). Thus, males and females can espouse masculine and feminine values to different extents (Bem 1981; Constantinople 1973).

³In fact, the correlation coefficient between masculinity/femininity and gender in Study 1 was -.19 and in Study 2 was -.23, reinforcing the fact that the two concepts are distinct.

Table 2. Moderators (Adapted from "User Acceptance of Information Technology: Toward a Unified View," V. Venkatesh, M. G. Morris, G. B. Davis, and F. D. Davis, *MIS Quarterly* (27:3), 2003)

Moderator	Relationship Moderated	Study
Experience	Experience found not to moderate	Davis et al. 1989
	Attitude – BI Affect-Utilization	Karahanna et al. 1999; Taylor and Todd 1995; Thompson et al. 1994
	SN – BI Social Factors-Utilization	Karahanna et al. 1999; Morris and Venkatesh 2000; Taylor and Todd 1995; Thompson et al. 1994; Venkatesh and Morris 2000
	Perceived Usefulness – BI	Taylor and Todd 1995
	Ease of Use – BI Complexity Utilization	Davis et al. 1989; Szajna 1996; Thompson et al. 1994
	Behavioral Beliefs-Attitude	Karahanna et al. 1999
	Long-term consequences-Utilization	Thompson et al. 1994
	PBC – BI Facilitating Conditions-Utilization	Taylor and Todd 1995; Thompson et al. 1994
Voluntariness	SN – BI	Hartwick and Barki 1994; Venkatesh and Davis 2000; Venkatesh and Morris 2000.
Gender	SN – BI	Venkatesh and Morris 2000; Venkatesh et al. 2000
	Attitude – BI	Venkatesh et al. 2000
	PBC – BI	Venkatesh et al. 2000
	Perceived Usefulness – BI	Venkatesh and Morris 2000
	Perceived Ease of Use – BI	Venkatesh and Morris 2000
Age	Attitude – System Use	Morris and Venkatesh 2000
	PBC – System Use	Morris and Venkatesh 2000
	SN – System Use	Morris and Venkatesh 2000
Gender × Age	Performance Expectancy – BI	Venkatesh et al. 2003
Age × Experience	Facilitating Conditions – Use Behavior	Venkatesh et al. 2003
Gender × Age × Experience	Effort Expectancy - BI	Venkatesh et al. 2003
Gender × Age × Experience × Voluntariness	Social Influence - BI	Venkatesh et al. 2003
SN = Subjective Norms; BI = Behavioral Intention; PBC = Perceived Behavioral Control		

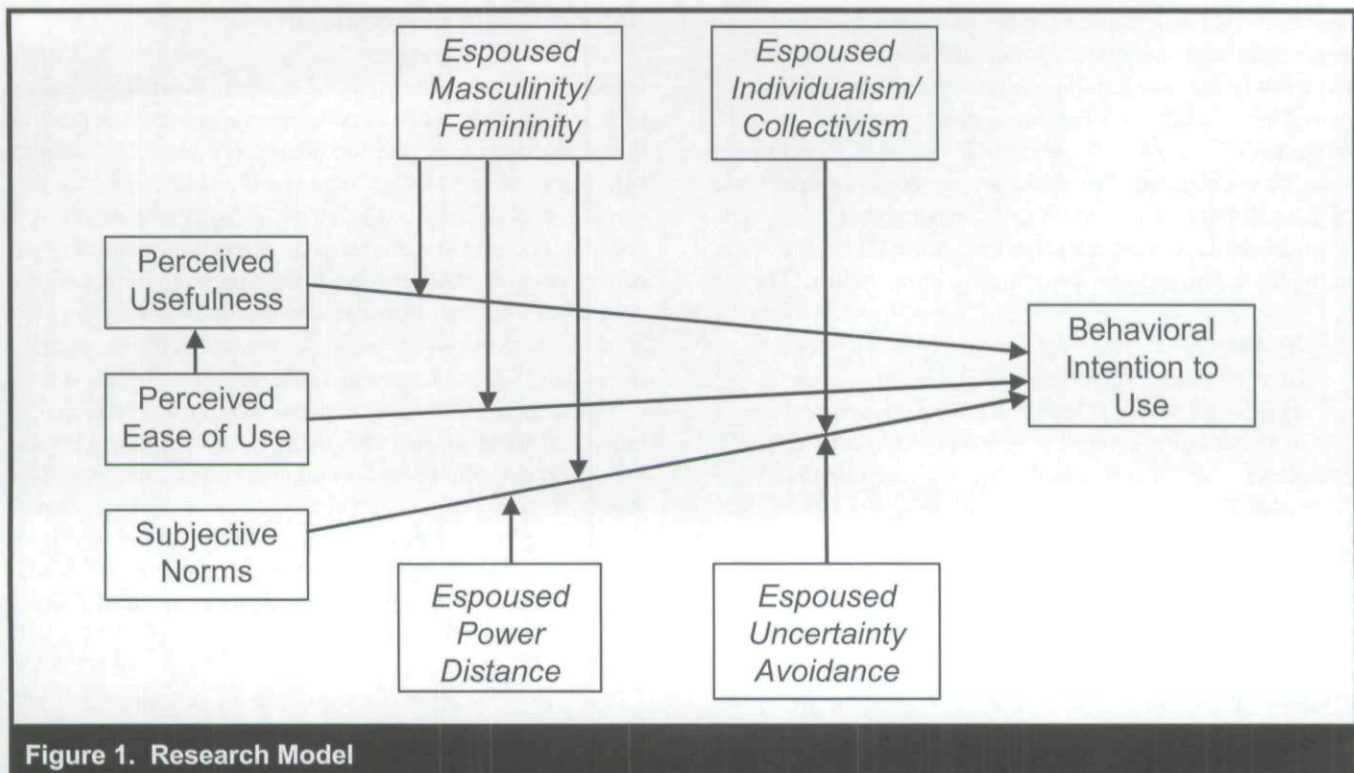


Figure 1. Research Model

Prior IS research has examined the role of gender in technology acceptance (Gefen and Straub 1997; Venkatesh and Morris 2000; Venkatesh et al. 2000; Venkatesh et al. 2003). Although gender was operationalized as male/female in these studies, the authors make theoretical arguments for gender moderating effects based on masculine and feminine values. In fact, in their conclusion, Venkatesh et al. (2003) raise the possibility that the gender effects observed could be a manifestation of effects caused by masculinity and femininity rather than just "biological sex" and call for future research to examine the possibility that "psychological gender" is the underlying cause for the observed results. In a follow-up study, Venkatesh et al. (2004) find that while masculine gender-typed individuals exhibited the same pattern of results as men in prior research, feminine-typed individuals showed a different pattern of results than females in prior research, providing further evidence that biological and psychological gender are distinct and that the effects observed can be theoretically attributed to psychological gender.

In terms of our research model, perceived usefulness (the perceived likelihood that a system will improve one's job performance) is closely related to achievement of work goals and advancement. Such instrumental values are highly regarded masculine values (Venkatesh and Morris 2000; Venkatesh et al. 2004). In fact, a meta-analysis by Taylor and

Hall (1982) suggests that masculine scales correlate with instrumental behaviors such as these and empirical results from Venkatesh et al. (2004) indicate that while technology acceptance intentions of masculine-typed individuals' were influenced by attitude (instrumental beliefs) this was not the case for feminine-typed individuals. Consequently, we would expect individuals who espouse masculine cultural values to place a higher emphasis on perceived usefulness when assessing a system than individuals who espouse feminine cultural values. Therefore, we posit

Hypothesis 1a: *The relationship between perceived usefulness and behavioral intention to use is moderated by the espoused national cultural value of masculinity/femininity such that the relationship is stronger for individuals with espoused masculine cultural values.*

Perceived ease of use refers to the facility with which one can learn and utilize the system. Effort-free use is less concerned with achievement of instrumental goals and more concerned with the creation of a pleasant and less frustrating work environment. Such quality of work life concerns are typically values espoused by feminine rather than masculine cultures and individuals. Consequently, perceived ease of use would be more salient for individuals espousing feminine rather than

masculine values. Further, Venkatesh and Morris (2000) argue that the prominence of social/affiliation needs for individuals who espouse feminine values increase the importance placed on availability of technology support staff for such individuals. As a result, perceived ease of use becomes a more salient concern. Therefore, we posit that perceived ease of use will be more important in determining use of a system for individuals who espouse feminine cultural values than for individuals who espouse masculine cultural values. Thus,

Hypothesis 1b: *The relationship between perceived ease of use and behavioral intention to use is moderated by the espoused national cultural value of masculinity/femininity such that the relationship is stronger for individuals with espoused feminine cultural values.*

In addition to moderating the above relationships, masculinity/femininity values can affect the relationship between subjective norms and intended behavior. People who espouse feminine cultural values tend to be more concerned with maintaining personal relationships, cooperation, and interpersonal harmony than people who espouse masculine cultural values (Hofstede 1984). Because of a desire to appear agreeable, the concern for harmonious social relationships, the concern for the socio-emotional well-being of others, their greater expressiveness, greater interdependence, and greater level of social interaction, people who espouse feminine values show greater influencability (Eagly 1978; Eagly and Carli 1981; Venkatesh et al. 2004). They tend to be more responsive than those who espouse more masculine values to the needs of others and to accept suggestions of others by acquiescing and agreeing (Roberts 1991). In addition, empirical evidence indicates that individuals with a feminine sex role orientation are more likely to conform to group pressures than individuals with a masculine sex role orientation (Bem 1975). In fact, empirical results by Venkatesh et al. (2004) in the context of technology acceptance indicate that while the behavioral intentions of feminine-typed individuals were influenced by subjective norm, the effect was nonsignificant for masculine-typed individuals. Therefore, individuals who espouse feminine cultural values will be more likely to yield to social influence than would individuals who espouse masculine cultural values. This leads to the following hypothesis:

Hypothesis 1c: *The relationship between subjective norms and behavioral intention to use is moderated by the espoused national cultural value of masculinity/femininity such that the relationship is stronger for individuals with espoused feminine cultural values.*

Individualism/Collectivism

In individualistic cultures, social behavior is primarily guided by personal goals, while in collectivistic cultures the goals of the collective have the dominant influence in shaping behavior (Triandis 1989a). When conflict arises between personal and collective goals, in individualistic cultures it is socially acceptable for personal goals to dominate over collective goals. As such, people from individualistic cultures tend to be more independent (Redding and Baldwin 1991) and less loyal to the group than people from collectivistic cultures (Hofstede 1984). In individualistic cultures, the self is conceived as separate from society and identity is determined by individual achievement rather than in terms of group membership and the position of the group in society (Hofstede 1980). In fact, a meta-analysis by Bond and Smith (1996) indicates that collectivistic cultures tend to show higher levels of conformity than individualistic cultures, whereas individualistic cultures place higher emphasis on individual initiative (Hofstede 1984).

Triandis (1989b) discusses the cognitive processes that link individualism/collectivism to the social influence process. He argues that an individual has a private self, a collective self (i.e., assessment by the generalized other), and a public self (i.e., assessment by a specific referent group). People who hold individualistic values have a more complex and more frequently sampled private self. As such, their own goals, beliefs, and values are more salient. The focus is on the development and maintenance of a separate personal identity (Oyserman 1993). Conversely, people who hold collectivistic values have a more complex and frequently sampled collective self. When the collective self is sampled, the norms, values, and beliefs of the in-group become more salient and individuals become more responsive to complying with these norms (Bond and Smith 1996; Hui and Triandis 1985; Marcus and Kitayama 1991; Triandis 1989a).

Similarly, Marcus and Kitayama (1991) distinguish between an independent and interdependent construal of self. Recent thinking in psychology recognizes the self as a powerful regulator of many aspects of human behavior. The self directs perception, memory, emotion, motivation, human agency, and volition (for reviews, see Fiske and Taylor 1991; Greenwald and Pratkanis 1984; Kihlstrom and Cantor 1984; Kihlstrom and Klein 1994). Those with an independent self construal focus primarily on their own internal traits, skills, and attitudes as defining the self; group memberships and relationships are less important to self-definition. Their goal is to "be true to one's own internal structures of preferences, rights, convictions, and goals" (Marcus and Kitayama 1991, p. 569). Those with an interdependent construal of self (col-

lectivistic values) "are motivated to belong and fit in rather than be unique, to promote others' goals rather than one's own" (Bond and Smith 1996, p. 126). The self is construed in a contextualized manner influenced by the norms of the social setting rather than by trans-situational personal qualities. An individual becomes attuned to the perspective of salient others and responsiveness to the needs of others drives their behavior and decisions (Jordan and Surrey 1986).

This point of view is consistent with evidence in cross-cultural studies of TRA. In a meta-analysis, Bontempo and Rivero (1990) (as cited in Bagozzi et al. 2000), found that individualists' behavior is more closely linked to attitudes and collectivists' behavior is more closely linked to norms. Exploring this further, Trafimow and Finlay (1996) discovered two groups of individuals: attitudinal controlled individuals and normatively controlled individuals. This individual difference was associated with the strength of the individual's collective self.

Thus, people who espouse individualistic cultural values are less concerned about the opinions of others in their social environment. In contrast, individuals who espouse collectivistic cultural values will comply with the opinions of their referent group. This compliance may be motivated by the greater importance attached to collective goals, by a desire not to appear deviant, or by a greater concern about how others may regard or be affected by their actions. We therefore posit that individuals who espouse collectivistic cultural values will be more likely to comply with the opinions of salient others and, as a result, the effect of normative influences may be a more important determinant of intended behavior for those who espouse collectivistic rather than individualistic cultural values. Thus,

Hypothesis 2: *The relationship between subjective norms and behavioral intention to use is moderated by the espoused national cultural value of individualism/collectivism such that the relationship is stronger for individuals with espoused collectivistic cultural values.*

Power Distance

Power distance refers to the degree to which status inequality is accepted as normal in a given culture (Hofstede 1984). It conditions the extent to which employees accept that they have less power than their superiors. We posit that espoused power distance will influence the relationship between subjective norms and intended behavior. Social influence can manifest through compliance, identification, and inter-

nalization (Kelman 1958, 1961). Compliance is when an individual accepts influence from another person or group because he hopes to gain some favorable reaction from the other and avoid punishment.⁴ Individuals with high espoused power distance cultural values will be more concerned about complying with their superiors' opinions and will fear to disagree with them (Hofstede 1984). Further, these individuals are likely to refer decisions to the judgment of their superiors (Hofstede and Associates 1998) and comply with whatever this decision may be. Thus, due to this compliance effect, it is expected that social norms will be more important determinants of intended behavior for individuals with higher espoused power distance values than for individuals with lower espoused power distance values.

The issue of authority has also been examined at the individual level in a number of recent studies that focused on the relationship between authority and power distance. Tyler et al. (2000) utilized Hofstede's (1980) and Schwartz's (1992) items to measure power distance. They examined power distance's moderating effect on the relationship between relational concerns and authority evaluation. The authors note,

The value dimension we studied [power distance] is an individual difference dimension that varies both within and across cultures, and we studied the psychological dynamics of that value dimension.... In our analyses involving power distance, however, we use comparisons based on individual responses to the power-distance measures rather than aggregate comparisons based on culture per se. ...Such a psychological analysis is more sensitive to the possible effects of cultural values on the behavior of a particular people than are analyses that treat all of the members of a culture the same" (pp. 1139, 1140-1141).

This leads to the following hypothesis:

Hypothesis 3: *The relationship between subjective norms and behavioral intention to use is moderated by the espoused national cultural value of power distance such that the relationship is stronger for individuals with higher espoused power distance cultural values.*

⁴Identification is when an individual adopts behavior derived from another person or group because the behavior is associated with a satisfying self-defining relationship to the influencing agent. Internalization is when an individual accepts influence because the induced behavior is congruent with his value system (Kelman 1958, 1961).

Furthermore, such individuals will pay more attention to the opinions of others, particularly those in a higher hierarchical position, and, therefore, they will be more attuned to social norms. Initially, this would suggest that power distance may also have a *direct* effect on social norms. However, probing further, it becomes clear that such a hypothesis (that individuals who are high on espoused power distance will perceive more social pressures to adopt/use the technology) has a pro-innovation assumption. That is, it assumes that important referents in one's social environment encourage adoption and usage of the innovation. Clearly, even in organizations, this may not always be the case. Thus, it is possible that the prominent norm by salient others could be toward *not* using the technology. Consequently, in such cases, a negative relationship would be expected between espoused power distance and social norms (which indicates the extent to which salient others believe that an individual should engage in technology use). Therefore, since the directionality of the relationship between power distance and subjective norms depends on the types of opinion salient others hold, it is not feasible to make any *a priori* predictions for a direct relationship between power distance and social norms.

Uncertainty Avoidance

In strong uncertainty avoidance cultures, individuals feel threatened by unknown or uncertain situations. This is expressed through increased nervous stress and anxiety and the need for predictability through formal rules and structure in organizations, institutions, and relationships (Hofstede 1984). Similarly, at the individual level of analysis, Rokeach (1960) distinguishes between individuals who do not appear to be afraid of uncertainty and those who do. One's social environment is a valuable source of information to reduce uncertainty and determine whether behaviors are within rules and are acceptable. Therefore, subjective norms may, through informational and normative influences, reduce uncertainty with respect to whether use of a system is appropriate (Evaristo and Karahanna 1998). Uncertainty is reduced through informational influence when near-peers and friends of individuals inform them of their own personal experiences and perceptions of the system or when they can observe peers using the system. In addition to informational influence, normative pressure from supervisors and peers to use the system reduces uncertainty since it provides strong evidence indicating whether use of the system is deemed socially desirable and appropriate. Therefore, social norms will be more influential predictors of behavior for individuals with high espoused uncertainty avoidance cultural values than for individuals with low espoused uncertainty avoidance cultural values.

There is another mechanism via which espoused uncertainty avoidance values moderate the relationship between social norms and behavioral intention. Similar to Rokeach (1960), Sorrentino and Short (1986) distinguish between two groups of individuals based on uncertainty-orientation: uncertainty-oriented individuals (those who are motivated when there is uncertainty and strive to resolve it) and certainty-oriented individuals (those who are motivated when there is no uncertainty and strive to avoid it). In terms of information processing and persuasion, uncertainty-oriented individuals tend to process arguments and use few heuristic cues (Chaiken 1980; Petty and Capioppo 1981), whereas certainty-oriented individuals tend to rely more on heuristic cues (such as an indication from the social environment that the system is appropriate) and engage in less systematic information processing (such as making their own cognitive assessment of the pros and cons of the technology) (Sorrentino et al. Hewitt 1988). As such, we would expect cues from the social environment to be more salient for certainty-oriented individuals who espouse weak uncertainty avoidance values. Consequently, we posit the following hypothesis:

Hypothesis 4: *The relationship between subjective norms and behavioral intention to use is moderated by the espoused national cultural value of uncertainty avoidance such that the relationship is stronger for individuals with higher espoused uncertainty avoidance cultural values.*

Method

Two sets of data were collected. The first, and primary, collection (Study 1) was done at a U.S. university with a sample of students from 30 countries to ensure sufficient variance in the espoused national cultural values. Out of 928 questionnaires distributed, 223 were returned for a response rate of 24 percent, which subsequently resulted in 181 usable responses. We chose usage of personal computers as the target behavior to ensure familiarity and well-formed beliefs from incoming foreign students. Since this resulted in a sample with a high level of experience with PCs, to enhance generalizability and alleviate concerns of habitual use, a second data set (Study 2) was collected from 116 MBA students, this time focusing on use of personal digital assistants (PDAs; average usage of 4.7 months).

Where possible validated scales were used to measure the constructs of the study. Perceived ease of use, perceived usefulness, and behavioral intention to use were measured using scales adapted from Davis (1989). The cultural values of

individualism/collectivism, uncertainty avoidance, power distance, and masculinity/femininity were measured using scales derived from Hofstede (1980) and Dorfman and Howell (1988). Subjective norms were measured by examining normative beliefs (i.e., an individual's beliefs of what relevant others expect him/her to do with respect to using the technology in question) for the following referent groups: family, friends, professors, and classmates at the university. Appendix A shows all items used in the study.

For Study 1, where the response rate was 24 percent, the demographic data enabled assessment of nonresponse bias by examining whether the respondents were representative of the population of the study.⁵ The demographic statistics for the sample are, in general, consistent with those of the university. The gender split (45.55 percent male, 54.45 percent female) is approximately that of the university as a whole (44.4 percent male, 55.6 percent female). The sample came from a well-distributed cross-section of 44 majors across the university, with an average age of 25.48 (standard deviation = 6.42 years) across undergraduate and graduate students. Not surprisingly U.S. respondents had more computer experience and less variability in that (mean = 10.10 years, standard deviation = 0.57) than foreign respondents (mean = 6.97 years, standard deviation = 5.27), who constituted approximately half of the sample.

Data Analysis

Partial least squares (PLS) was used to assess both the research models and the psychometric properties of the scales. In spite of differences in samples and technologies, every effort was made to keep the retained items consistent across both studies.

Reliability and Validity Assessment: Study 1

PLS was used to assess the internal consistency (reliability) and discriminant validity of the constructs in the context of the research model. The criteria for acceptable psychometric properties require that (1) internal consistencies exceed .70; (2) loadings in a confirmatory factor analysis (CFA) exceed .70; (3) loadings are greater than cross-loadings; and (4) the square root of the average variance extracted (AVE) exceeds the inter-construct correlations (Chin 1998; Fornell and Larcker 1981).

⁵This was not an issue for Study 2 where all MBA students in the class filled out the questionnaires. In Study 2, the gender split between males and females was 55.2 to 44.8 percent, the average age was 24.66 years (with a standard deviation of 4.24 years), and the participants had an average of 4.7 months of PDA experience.

Several of the original culture items adapted from Dorfman and Howell (1988) and Hofstede (1980) violated these guidelines and were eliminated from the analysis (see Appendix A).

To assess reliability, composite reliabilities were calculated. Table 3 shows that these ranged from .79 to .90 and are above the .70 recommended level (Fornell and Larcker 1981). CFA results for the final items are presented in Table 4.⁶ As can be seen from Table 4 all items exceed the .70 loading criterion with the exception of PD3. Since this item did not cross-load and had acceptable loadings in Study 2, it was decided to retain it in the analysis. Please note that the subjective norm items (NB1REL to NB4CLA) are formative in nature and are not subject to the .70 loading criterion. They are included in the CFA to indicate that these items do not cross-load on other constructs.

To assess discriminant validity, two criteria need to be met (Chin 1988). First, indicators should load more strongly on their corresponding construct than on other constructs in the model. Table 4 shows that loadings of items on their respective constructs were higher than cross-loadings of the items on other constructs. Second, the square root of the average variance extracted (AVE) (leading diagonal in Table 4) should be larger than the inter-construct correlations (implying that all constructs share more variance with their indicators than with other constructs). Since both criteria were met, we concluded that the constructs exhibit adequate discriminant validity. Thus, results suggest that the scales exhibit adequate psychometric properties.

Model Testing: Study 1

PLS was also used to test the research model. The significance of the paths was determined using the T-statistic calculated with the bootstrapping technique. All constructs except for social norms were modeled as reflective. Social norms was modeled as a formative construct since it represents the totality of influences across various referent groups such as relatives, friends, classmates, and professors. Moderating effects were modeled using the Chin et al. (2003) approach; cross-products were created by multiplying indicators of each of the interacting constructs. These cross-products were then used as the indicators in the interaction term.

A number of control variables were also tested to determine their effect on the research model. Consistent with prior research, gender (Venkatesh and Morris 2000) and age (Gist et al. 1988; Igbaria et al. 1990; Morris and Venkatesh 2000) were tested to

⁶Interaction terms were not included in the CFA because they are products of other items. Their inclusion would violate assumptions about the item's independence (Yang 1988).

Table 3. Study 1: Inter-Construct Correlations

Constructs	Mean	Std Dev	ICR	BIU	PU	PEOU	SN	MF	IC	PD	UA	Exp.
BIU	6.43	0.83	0.90	0.90								
PU	5.51	1.04	0.88	0.51**	0.80							
PEOU	6.03	0.93	0.90	0.36**	0.40**	0.83						
SN	5.75	0.97	NA	0.41**	0.37**	0.21**	0.71					
MF	3.75	1.35	0.84	-0.37**	-0.22**	-0.09	-0.11	0.80				
IC	2.50	1.42	0.87	-0.15*	-0.04	0.01	0.00	0.37**	0.79			
PD	2.80	1.05	0.82	-0.30**	-0.21**	-0.04	-0.19**	0.41**	0.27**	0.73		
UA	5.28	1.07	0.79	0.11	0.18*	0.05	0.14	-0.01	0.04	0.09	0.81	
Experience	NA	NA	NA	0.15*	0.05	0.09	0.07	-0.15*	-0.06	-0.11	-0.01	1.00

Diagonal elements in the correlation of constructs matrix are the square root of the average variance extracted. For adequate discriminant validity, diagonal elements should be greater than corresponding off-diagonal elements.

Composite Reliability = $\rho_c = (\sum \lambda_i^2) / [(\sum \lambda_i^2) + \sum \text{var}(\varepsilon_i)]$, where λ_i is the component loading to an indicator and $\text{var}(\varepsilon_i) = 1 - \lambda_i^2$

*Significant at .01; **Significant at .05

see if either of these constructs had a significant effect on behavioral intention to use, perceived usefulness, and perceived ease of use. Also consistent with prior research, accessibility to a PC (Ajzen 1988) and computer experience (Igbaria, Guimaraes and Davis 1995) were tested against behavioral intention to use. The moderating effects of experience on the relationship between subjective norms and behavioral intention (Venkatesh and Davis 2000) and on the relationship between perceived ease of use and behavioral intention (Venkatesh and Davis 2000) were also tested as controls. The model was run with all the control variables included.

Only one control variable was found to be significant in the final analysis. Experience was found to significantly affect behavioral intention (marginal effect at .1). Nonsignificant paths of the control variables were subsequently dropped from the final model. Since a holistic approach to scale validation was taken, the loadings of the items are those presented in Table 4. Loadings for all interaction terms were above .70 with the exception of one item at .64. Weights for the formative indicators of social norms were significant only for professors (weight = .97, $p < .01$), while none of the other referents were significant (weights of .02, .22, and -.15 for relatives, friends, and classmates, respectively).

Table 5 presents the results of the study. The model explains about 46 percent of the variation in behavioral intention to use in Study 1 and 16 percent of the variation in perceived usefulness. As hypothesized, espoused masculinity/femininity values and espoused uncertainty avoidance values moderate the relationship between subjective norms and behavioral intention providing support for hypothesis 1c and hypothesis 4. The

moderating effect of espoused power distance values was significant at .1 but was in the opposite direction as hypothesized (hypothesis 3). Contrary to our expectations, espoused masculinity/femininity values did not moderate the relationships between perceived usefulness and intended behavior or between perceived ease of use and intended behavior (hypotheses 1a and 1b) even though the path coefficient for the moderating effect of masculinity/femininity on the relationship between perceived ease of use and behavioral intention was high (-.492).

To assess the explanatory power of the espoused cultural values constructs, we compared the explained variance of our model to the basic TAM and to the extended TAM (TAM plus social norms). The explained variance of TAM (with experience as control) was 30.3 percent. The explained variance of TAM plus social norms (with experience as control) was 35.3 percent. All paths were significant at .01. In addition, we compared our model with models that included other known moderators of the extended TAM relationships such as age, gender, and experience and their interactions (for a review, see Venkatesh et al. 2003). Explained variance of these models ranged from 33.8 to 48.7 percent. Therefore, the addition of the espoused cultural values constructs increased the explanatory power of the extended TAM model and is on par with or better than models that include demographic moderators of technology acceptance.

Reliability and Validity Assessment: Study 2

The same process as detailed in Study 1 was used to assess the internal consistency (reliability) and discriminant validity of Study 2. As with Study 1, several of the *original* culture items

Table 4. Study 1 PLS Confirmatory Factor Analysis

	BIU	PU	PEOU	NB	MF	IC	PD	UA
BIU1	0.91	0.48	0.38	0.38	-0.35	-0.14	-0.25	0.13
BIU2	0.89	0.45	0.26	0.38	-0.31	-0.13	-0.30	0.06
PU1	0.41	0.80	0.29	0.27	-0.12	-0.04	-0.17	0.08
PU2	0.40	0.77	0.36	0.19	-0.29	-0.05	-0.16	0.22
PU3	0.34	0.83	0.29	0.37	-0.16	-0.07	-0.30	0.20
PU4	0.44	0.80	0.34	0.35	-0.13	0.02	-0.08	0.07
PEOU1	0.21	0.37	0.77	0.14	-0.05	-0.02	-0.04	0.10
PEOU2	0.38	0.37	0.90	0.20	-0.06	0.00	-0.01	0.01
PEOU3	0.22	0.25	0.80	0.17	-0.07	0.11	0.01	0.00
PEOU4	0.34	0.35	0.87	0.19	-0.14	-0.04	-0.10	0.05
NB1REL	0.24	0.17	0.20	0.58	0.02	0.03	-0.06	0.07
NB2FRI	0.24	0.14	0.25	0.58	-0.01	0.01	0.03	0.07
NB3PRO	0.40	0.38	0.19	0.98	-0.13	0.00	-0.22	0.14
NB4CLA	0.25	0.26	0.24	0.62	-0.09	0.01	-0.09	0.05
MF1	-0.19	-0.11	-0.05	-0.05	0.72	0.25	0.21	0.03
MF3	-0.29	-0.20	-0.05	-0.14	0.80	0.29	0.32	-0.07
MF4	-0.36	-0.19	-0.11	-0.08	0.87	0.33	0.40	0.01
IC1	-0.08	0.03	0.08	0.02	0.33	0.81	0.25	0.07
IC2	-0.15	-0.11	0.02	0.02	0.39	0.85	0.26	-0.02
IC3	-0.11	0.03	0.02	-0.10	0.25	0.74	0.16	-0.05
IC4	-0.11	-0.02	-0.08	0.07	0.18	0.76	0.17	0.16
PD1	-0.25	-0.19	0.00	-0.16	0.29	0.18	0.78	0.02
PD2	-0.26	-0.23	-0.05	-0.19	0.37	0.23	0.79	0.03
PD3	-0.17	-0.09	0.03	-0.02	0.28	0.24	0.64	0.16
PD4	-0.17	-0.06	-0.10	-0.18	0.24	0.13	0.70	0.10
UA1	0.10	0.24	0.05	0.15	-0.08	-0.03	-0.04	0.89
UA2	0.07	0.01	0.03	0.07	0.09	0.13	0.23	0.72

PU = Perceived Usefulness
 BIU = Behavioral Intention to Use
 IC = Individualism/Collectivism
 PD = Power Distance

PEOU = Perceived Ease of Use
 NB = Normative Beliefs
 MF = Masculinity/Femininity
 UA = Uncertainty Avoidance

Table 5. Study 1 Results

Dependent Variable	Independent Variable(s)	R ²	B
BIU		.46	
	PU		.290***
	PEOU		.294***
	SN		.666***
	EXP		.067*
	MFxPU		.042
	MFxPEOU		-.492
	MFxSN		-.319***
	ICxSN		.140
	PDxSN		-.382*
	UAxSN		.530***
PU		.16	
	PEOU		.403***

PU = Perceived Usefulness, PEOU = Perceived Ease of Use
SN = Subjective Norms, BIU = Behavioral Intention to Use
***significant at .005, **significant at .05, *significant at .10

Table 6. Study 2: Inter-Construct Correlations

Constructs	Mean	Std Dev	ICR	BIU	PU	PEOU	SN	MF	IC	PD	UA	Exp.
BIU	3.86	1.80	0.95	0.95								
PU	5.22	0.96	0.95	0.55**	0.91							
PEOU	4.61	1.11	0.90	0.51**	0.46**	0.83						
SN	3.06	1.11	NA	0.49**	0.35**	0.18	0.73					
MF	4.12	0.89	0.92	-0.12	-0.06	-0.22*	0.06	0.92				
IC	2.08	1.33	0.79	-0.16	-0.17	-0.05	-0.02	0.18*	0.70			
PD	2.68	0.88	0.74	0.22**	0.17	-0.08	0.29**	0.32**	0.08	0.66		
UA	5.08	0.92	0.80	0.10	0.08	-0.01	0.07	-0.03	0.26**	0.21*	0.82	
Experience	NA	NA	NA	0.44**	0.21*	0.25**	0.12	-0.07	-0.09	0.10	0.01	1.00

Diagonal elements in the correlation of constructs matrix are the square root of the average variance extracted. For adequate discriminant validity, diagonal elements should be greater than corresponding off-diagonal elements.

Composite Reliability = $\rho_c = (\sum \lambda_i)^2 / [(\sum \lambda_i)^2 + \sum \text{var}(\varepsilon_i)]$, where λ_i is the component loading to an indicator and $\text{var}(\varepsilon_i) = 1 - \lambda_i^2$

**Significant at .01; *Significant at .05

Table 7. Study 2: PLS Confirmatory Factor Analysis

	BIU	PU	PEOU	NB	MF	IC	PD	UA
BIU1	0.95	0.53	0.50	0.47	-0.12	-0.18	0.20	0.08
BIU2	0.95	0.52	0.47	0.46	-0.10	-0.12	0.22	0.11
PU1	0.47	0.93	0.46	0.28	-0.03	-0.19	0.11	0.11
PU2	0.58	0.86	0.40	0.40	-0.09	-0.15	0.18	-0.04
PU3	0.47	0.92	0.42	0.28	-0.02	-0.12	0.13	0.08
PU4	0.49	0.92	0.38	0.31	-0.06	-0.16	0.17	0.15
PEOU1	0.34	0.31	0.76	0.11	-0.18	-0.02	-0.12	-0.01
PEOU2	0.46	0.37	0.91	0.15	-0.14	-0.01	-0.01	0.02
PEOU3	0.54	0.49	0.86	0.21	-0.19	-0.10	0.03	0.02
PEOU4	0.30	0.29	0.80	0.07	-0.23	-0.03	-0.19	-0.10
NB1REL	0.40	0.26	0.24	0.81	0.05	0.09	0.19	0.09
NB2FRI	0.44	0.34	0.07	0.89	0.06	-0.01	0.30	0.09
NB3PRO	0.19	0.22	-0.03	0.39	0.10	0.15	0.24	0.26
MF1	-0.13	-0.06	-0.22	0.05	0.99	0.20	0.24	-0.03
MF3	-0.03	-0.04	-0.16	0.08	0.85	0.10	0.25	-0.05
IC1	-0.08	-0.11	-0.08	0.01	0.10	0.63	0.05	0.14
IC2	0.01	0.02	-0.06	0.07	0.06	0.57	0.04	0.23
IC3	-0.15	-0.17	-0.09	0.06	0.20	0.87	0.03	0.21
IC4	-0.09	-0.08	0.07	-0.04	0.07	0.70	-0.03	0.28
PD1	0.07	0.06	-0.22	0.05	0.37	-0.05	0.61	0.05
PD2	0.03	0.07	-0.16	0.17	0.40	0.01	0.52	0.09
PD3	0.24	0.16	0.00	0.29	0.14	0.04	0.91	0.23
PD4	0.08	0.08	-0.07	0.17	0.38	0.26	0.49	0.08
UA1	0.02	-0.02	-0.02	-0.08	-0.08	0.21	0.04	0.62
UA2	0.11	0.09	-0.01	0.09	-0.02	0.25	0.23	0.99

PU = Perceived Usefulness

PEOU = Perceived Ease of Use

BIU = Behavioral Intention to Use

NB = Normative Beliefs

IC = Individualism/Collectivism

MF = Masculinity/Femininity

PD = Power Distance

UA = Uncertainty Avoidance

Table 8. Study 2 Results

Dependent Variable	Independent Variable	R ²	B
BIU		.60	
	PU		.338***
	PEOU		.127
	SN		.491**
	EXP		.245***
	MFxPU		-.315
	MFxPEOU		.524*
	MFxSN		-.033
	ICxSN		.133
	PDxSN		.188
	UAxSN		.469*
PU		.21	
	PEOU		.458***

PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SN = Subjective Norms, BIU = Behavioral Intention to Use, ***significant at .005; **significant at .05; *significant at .10

adapted from Dorfman and Howell (1988) and Hofstede (1980) violated validity guidelines and were eliminated from the analysis (see Appendix A). Composite reliabilities (Table 6) range from .74 to .95 and are above the .70 recommended level. Confirmatory factor analysis results for the final items are presented in Table 7. Item loadings greater than .70 are considered acceptable (Fornell and Larcker 1981). As can be seen from Table 7, the scales mostly meet this guideline with the exception of IC1, IC2, PD1, PD2, PD4, and UA1. Since these items did not cross-load and had acceptable loadings in Study 1, it was decided to retain them in the analysis. Overall, these results suggest that the scales exhibit adequate psychometric properties.

Model Testing: Study 2

The same control variables as in Study 1 were included in the PLS model. The model was run with all the control variables included. As in Study 1, only experience was found to significantly affect behavioral intention (significant at .01). Non-significant paths of the control variables were subsequently dropped from the final model. The loadings of the items are presented in Table 7. Loadings for all interaction terms were above .70 with the exception of four items that were between .65 and .69. Weights for the formative indicators of social norms

were significant only for relatives and friends (weights = .37 and .26 respectively, significant at .01).⁷

Results of the study are shown in Table 8. The model explains about 60 percent of the variation in behavioral intention to use in Study 2. It also explains 21 percent of the variation in perceived usefulness. Espoused masculinity/femininity values moderated the relationship between perceived ease of use and behavioral intention (significant at .1) and espoused uncertainty avoidance values, as in Study 1, moderated the relationship between subjective norms and behavioral intention (hypothesis 4). In addition, the relationships of our extended TAM model were significant at the .05 level. Perceived ease of use significantly influenced perceived usefulness, which in turn significantly affected behavioral intention. Subjective norms also significantly affected behavioral intentions. As in many prior TAM studies, the relationship between perceived ease of use and behavioral intention to use was not significant. As in study 1, the model was compared with extended TAM and extended TAM with age, gender, and experience (and their interactions) as moderators. Explained variance for the alternate

⁷Study 2 does not contain classmates as a salient referent. Interviews showed that any effect this group may have on an individual's behavior was captured through the effect of friends.

models ranged from 48.7 to 58.3 percent, indicating that the model in this study compares favorably with such existing models.

Limitations

As with any research, there were a number of potential limitations in this study. Even though recent research has shown that students and workers essentially have the same values and beliefs (Voich 1995), the research needs to be replicated to examine these findings across a wider range of individuals in different environments and with different technologies. Further, future efforts should use a variety of methodologies (e.g., interviews, qualitative methods) as well as capture actual usage (Straub et al. 1995) to triangulate results. Since beliefs and values are not necessarily static, longitudinal studies that examine how the impact of cultural values evolves with respect to technology acceptance would provide additional insights into the phenomenon. In addition, future research can engage in further development and validation for the cultural values scales to improve upon their psychometric properties.⁸

Finally, our approach of measuring espoused cultural values at the individual level of analysis, while avoiding the ecological fallacy and other issues associated with using Hofstede's cultural country scores (for a discussion, see Ford et al. 2003; Oyserman et al. 2002) is not without limitations. Oyserman et al. (2002) identified three potential drawbacks of this approach. First, this approach assumes that espoused cultural values are a form of declarative knowledge (such as beliefs and values) that the respondents can report rather than deeply engrained "more subtle and implicit practices and social structures" (p. 7) that respondents cannot report because they are tacit in nature and part of normal living. The remaining two concerns are methodological in nature and center around achieving cross-cultural equivalence of constructs and scales (Hui and Triandis 1985; Karahanna et al. 2002; Poortinga 1989; van de Vijver and Leung 1997). They are only a concern if the sample contains individuals from different cultures. In such cases, the underlying assumption is that there is scalar equivalence on the scales. This means that a numerical value on the scale reflects the same magnitude of the construct regardless of the population to which the respondent belongs (Hui and Triandis 1985; Karahanna et al. 2002; van de Vijver and Leung 1997). Evidence from Ji et al. (2000) and Peng et al. (1997) suggest that scale use can systematically differ between individuals of different countries. In addition, the approach is premised upon the assumption that the

meaning of the construct is the same across cultures (conceptual/functional equivalence) and that the operational definition of the construct and items used to measure it are equally meaningful (equivalence in construct operationalization and item equivalence) (Karahanna et al. 2002; van de Vijver and Leung 1997). These issues are not unique to the approach taken in this study but are important considerations in all studies of culture. Nonetheless, they are challenges that need to be considered. To overcome some of these challenges and based on research in cultural psychology, Oyserman et al. (2002) suggest adopting a more nuanced and process-oriented conception of culture and its impacts on psychological functioning.

Discussion of Results

One general research question drove this study: How do espoused national cultural values at the individual level influence the acceptance of information technologies? The study answered this question by examining the effect of espoused national culture values on the relationship between subjective norms and behavioral intention to use, the relationship between perceived usefulness and behavioral intention to use, and the relationship between perceived ease of use and behavioral intention to use. Two studies were conducted to test the theoretical model of the study. In Study 1, two of the six hypothesized relationships were found to be significant and in the expected direction. One relationship was significant, but in the direction opposite than hypothesized. In Study 2, two of the six hypothesized relationships were significant—one in the opposite direction than hypothesized. Despite differences in results across the two studies, uncertainty avoidance emerges as a consistent significant moderator of the relationship between subjective norms and intended behavior. These results are discussed below.

Four possible explanations may account for observed differences in results across the two studies. First, the lower sample size in Study 2 may have reduced our statistical power to detect significant effects. More likely, though, espoused cultural values may play a different role depending on stages of the acceptance process. For instance, extant technology acceptance literature has shown that different factors influence the initial adoption versus continued use of a technology (Brown and Venkatesh 2003; Gefen et al. 2003; Karahanna et al. 1999) and that experience can moderate the effect of many of the TAM (or TAM2) constructs on intended behavior (Davis et al. 1989; Morris and Venkatesh 2000; Szajna 1996; Taylor and Todd 1995; Thompson et al. 1991; Venkatesh and Davis 2000; Venkatesh et al. 2003). In Study 1, the majority of our respondents were already users of PCs whereas in Study 2 the majority of our respondents (81 percent) were facing an initial acceptance/adoption decision. Thus, observed differences may be due

⁸Due to space limitations, full details relating to the scale development are not presented in this paper but are available from the authors.

to differences in stages of adoption across the two studies. Third, there may be something inherently different in the nature of the technology (PCs versus PDAs in this case). Fourth, the significant salient referents that comprised subjective norms were different across the two groups. While for Study 1 professors were significant referents (presumably authority figures for the students), in Study 2 the salient referents were relatives and friends (presumably more in-group influences). Thus, the nature of salient social influences was likely different across the two studies. Thus, the current study has shown that espoused cultural values have a role in technology acceptance, but that role may be contingent on stages of adoption or on the focal technology. Future research may more systematically examine and identify the role of these contingencies on the effect of culture on technology acceptance. Below we discuss our results for each espoused national cultural value.

Masculinity/Femininity

Masculinity/femininity had a significant moderating effect on the relationship between subjective norms and behavioral intention to use, such that this relationship was stronger for feminine cultures (Study 1). In addition, masculinity/femininity moderated the relationship between perceived ease of use and intended behavior (Study 2) such that this relationship was stronger for masculine cultures. The hypothesized moderating effect of masculinity/femininity on the relationship between perceived usefulness and intended behavior was not significant in either study.

One possible explanation for the nonsignificant findings may lie in the nature of the items measuring masculinity/femininity. Upon closer examination, it is evident that the items are measuring gender differences (e.g., "there are some jobs that a man can do better than a woman") rather than work-value differences. The rationale for our hypotheses rested on the fact that masculine cultures place greater importance on aggressive instrumental values than do feminine cultures. Given that the items did not precisely measure masculine/feminine work values, it is possible to attribute the nonsignificant results of this dimension to the loose coupling between the theoretical rationale of our hypotheses and our operational testing, even though both correspond to Hofstede's (1980) discussion and Dorfman and Howell's (1988) measurement of masculinity/femininity.

Further, it may be possible that espoused masculinity/femininity values affect behavioral intention to use through constructs other than the ones included in our model. Possible candidates may be quality of life and quality of work life that appear to be central feminine value concepts but which are absent from extant models of technology acceptance.

Individualism/Collectivism

Espoused individualism/collectivism values had no significant moderating effect on the relationship between subjective norms and intended behavior. Whereas people with individualistic values prefer to make their own decisions, in collectivistic cultures, members of the inner circle (family and friends) and outer circle play different roles with individuals of the inner circle having the greatest influence (Hofstede and Bond 1988). Our measure of subjective norms included both individuals in the inner circle (e.g., family and friends) and individuals in the outer circle (e.g., professors). We would expect individualism/collectivism to moderate only the relationship between social norms from one's inner circle (i.e., family and friends) and behavioral intentions. It is also possible that the effect of espoused individualism/collectivism is more readily manifest in cases of collaborative technology acceptance rather than acceptance of standalone systems such as PCs and PDAs. Due to use interdependence in the former context, group social norms gain considerably more salience.

Even though individualism/collectivism has been studied in other contexts (Ho et al. 1989; Tan et al. 1998), the role of espoused individualism/collectivism values on technology acceptance remains an area open to inquiry that requires further investigation. There is considerable research and debate in cultural and cross-cultural psychology on the nature and effects of individualism/collectivism on basic psychological processes (for a meta-analysis and discussion, see Oyserman et al. 2002; for rejoinders, see Bond 2002; Fiske 2002; Miller 2002). It is possible that espoused individualism/collectivism values are only distal antecedents of technology acceptance behaviors and that their effects are manifest via their impact on self-construal and its subsequent effect on behavior (Bond and Smith 1996; Marcus and Kitayama 1991). There is a rich body of work in cross-cultural and cultural psychology that can form the basis for identifying such mediating constructs and delineating the process via which individualistic/collectivistic values impact behavior.

Power Distance

Power distance moderated the relationship between subjective norms and behavioral intention to use in Study 1 such that the relationship was stronger for individuals with *low* espoused power distance cultural values. This result is counterintuitive and maybe an artifact of the study. Our measure of social norms included both individuals in a relative position of power (e.g., professors) as well as peers, friends, and family. We would expect power distance to *only* moderate the relationship between social norms from persons in authority (i.e., professors) and behavioral intentions. A *post hoc* analysis examined this possi-

bility. The model was rerun with social norms being comprised with only professors (i.e., presumed authority figures). Indeed, the path coefficient for the moderator of power distance on the relationship between social norms (authority only) and behavioral intent, although nonsignificant in both studies, was in the *expected* direction. This suggests that in studies that examine the effect of power distance on behavior, it is important to disentangle the effects of "authority social norms" and "non-authority social norms."

Uncertainty Avoidance

Uncertainty avoidance was found to have, across both studies, a consistently significant moderating effect on the relationship between subjective norms and behavioral intention to use, such that this relationship was stronger for individuals with high levels of espoused uncertainty avoidance. This suggests that individuals who espouse high uncertainty avoidance cultural values look to their social environment for cues to suggest whether technology acceptance (adoption and usage) is appropriate. Consequently, to encourage adoption and sustained usage for these individuals and, by extension, in cultures that rank high on uncertainty avoidance, emphasis may be given to mobilizing such social networks as one's occupational and departmental social worlds (Aydin and Rice 1991).

Contributions to Theory and Practice ■

How does national culture impact individual behavior? Given recent trends in the globalization of business and the prominence of multinational teams, this becomes a particularly relevant question. Drawing upon conceptualizations in cultural and cross-cultural psychology, our study presents one possible manner in which national cultural values manifest at the individual level of analysis and impact individual behavior. The study offers a series of hypotheses of how espoused cultural values influence the constructs and relationships of an extended model of technology acceptance. In doing so, it makes a contribution to the cross-cultural stream of research by treating culture not as a monolithic concept, but rather by disaggregating it into its espoused value dimensions, which can then be treated as individual difference constructs in theoretical models. This approach can be generalized to any theoretical model that warrants cross-cultural investigation at the individual level.

Extant cross-cultural studies in information systems are mostly ethnocentric (Adler 1983), meaning that they test in foreign cultures theories developed in the home cultures (mostly the United States). Even though these studies provide valuable

insights into the boundary conditions of a theory, the current study suggests a method of depicting the effect of culture in a theoretical model that captures the nuances and distinct effects of each cultural value. It is possible that two cultural values (such as individualism/collectivism and uncertainty avoidance) have the opposite effect on a construct or relationship. If culture is treated as a monolithic construct, empirical analysis will show no significant effect of cultural values on behavior deeming the relationship as culturally invariant. Disaggregating the effects of culture into its cultural dimensions and including them in theoretical models, however, will show the two individual effects and will enhance our conceptual understanding of the phenomenon.

Individual values are influenced and modified by membership in professional, organizational, ethnic, religious, and other social groups (Karahanna et al. 2005; Straub et al. 2002) besides national culture. Thus, individuals can vary greatly in the degree to which they espouse values advocated by any single cultural group, such as their national culture. The approach utilized in the current study acknowledges this in the manner taken to study the phenomenon. We believe that the predictive and explanatory power of future cross-cultural studies in information systems examining individual level phenomena would greatly benefit from a similar approach.

The social environment is a significant conduit via which culture manifests and impacts individual behavior. Studies in technology acceptance have typically viewed subjective norms as a monolithic construct that captures the effects of various salient referents. Our *post hoc* analysis and the theoretical rationale for the moderating effects of power distance and individualism/collectivism suggest that social norms need to be conceptualized in a more distinguishing manner to capture the nuances of the social environment. Espoused power distance values are likely to influence the effect of authority referents on behavior (Hofstede and Associates 1998; Tyler et al. 2000). Espoused individualism/collectivism values are likely to influence the effect of in-group referents on behavior (Bond and Smith 1996; Hui and Triandis 1985; Marcus and Kitayama 1991; Tajfel 1981; Triandis 1989a). Thus, research on impacts of culture on behavior should disaggregate social norms into at least "authority social norms" and "in-group social norms." Further, it is also possible that the nature of technology (i.e., standalone versus collaborative) may impact the moderating effect of espoused cultural values on behavior and determine the nature of the social normative forces at play. Finally, our research extends the recent stream of research on the impact of individual differences on technology acceptance. Although several individual difference variables have been posited as direct antecedents of beliefs or intention, research on individual difference *moderators* of beliefs on behavior has focused primarily on

demographic variables such as age, gender, and experience. Our research extends these to include a set of psychological characteristics, such as espoused national cultural values.

Results from the study also have direct managerial implications. Reactions to IT implementation are influenced by espoused cultural values, particularly those of masculinity/femininity and uncertainty avoidance. This may suggest various implementation interventions that can be undertaken to alleviate resistance to use. For example, the current study highlighted the importance of the social environment in technology acceptance. Thus, for individuals high on uncertainty avoidance and high on femininity, mobilization of the social environment provides an effective mechanism to encourage adoption and utilization of a technology. The literature on social influence provides more specific information on the various mechanisms by which social influence may be exerted (Aydin and Rice 1991; Compeau and Higgins 1991; Fulk et al. 1987; Rice and Aydin 1991; Rice et al. 1990; Salancik and Pfeffer 1978;). For individuals low on uncertainty avoidance and high on masculinity, the rational elements of the model (such as perceived usefulness) rather than social influences may need to be emphasized.

Further, given the consistent moderating effect of uncertainty avoidance on acceptance behaviors, it may be important for management to identify uncertainty reduction mechanisms to facilitate adoption behaviors. These may include, but are not limited to, a clear indication from management on expectations with respect to acceptance of the technology, user support groups, structured learning opportunities, and availability of situated training. Finally, organizations routinely administer personality batteries to their employees. Our approach suggests that, in addition to other personality traits, employees' espoused cultural values may be relevant to workplace behaviors. As such, organizations may want to include measures of these in personality test batteries.

Directions for Future Research

In addressing the research question, the study has raised several issues that provide fruitful avenues for future research. First, several contingencies have been identified (e.g., stage in adoption process, technology, sample) as possible culprits for explaining differences in results across our two studies and the nonsignificant findings. The study may be replicated with non-student subjects, a mix of different technologies that span both standalone and collaborative technologies, and across both the adoption and sustained usage phases of the adoption process. Along the same lines, future research may examine the model in situations where information technology use is mandated, which

may yield insights on the interplay between espoused culture and non-volitional use.

The current study examined the moderating effect of each espoused cultural dimension separately. However, espoused cultural values may interact with each other. Sample size considerations precluded us from examining these higher level interactions in the current study. However, theorizing the effect of and testing such interactions would likely make a valuable theoretical contribution to a more holistic understanding of the effect of espoused cultural values on individual behavior.

Future research on the impact of espoused national cultural values on TAM might also examine the inclusion of additional constructs. For instance, TAM focuses primarily on instrumental considerations for technology acceptance. In fact, perceived usefulness, which is a central TAM construct is job-focused, performance-centered, and results-oriented. These are expressions of masculine cultural values. Feminine values are largely absent from models of technology acceptance. These values are employee-focused (pertaining to personal and family life, personal fulfillment, and belonging), relationship-centered (focusing on quality of human relationships, the work environment, and collaboration), and people-oriented (emphasizing solidarity and empathy). Thus, concepts such as quality of life and quality of work life that embody many of the above considerations may be important technology acceptance concerns for individuals who espouse feminine cultural values. Extending TAM to include these constructs may result in an enhanced understanding of the influence of masculinity/femininity cultural values on technology acceptance and use.

Furthermore, future research may examine the interplay between different levels of culture and formulate specific hypotheses linking the various levels together. For example, there is extensive research on organizational culture. The interaction of national and organizational culture could be included as hypotheses to the research model. In the same view, the model may be extended to the acceptance of technologies used by teams composed of individuals from multiple national cultures. Such studies may be particularly relevant given the increasing use of virtual teams in multinational organizations.

Conclusion

The objective of the study was to illustrate how manifestations of national cultural values at the individual level of analysis may influence technology acceptance behaviors through their interplay with the constructs and relationships in technology acceptance models. The method used to model espoused culture and

integrate it with other constructs likely generalizes across any number of individual level phenomena besides technology acceptance and provides a useful lens for examining cultural effects at the individual level of analysis. We hope that the study provides a general framework and sets the stage for future research on the interplay between espoused cultural values and technology acceptance and stimulates further research in this arena.

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Appendix A

Questionnaire Items

Perceived Usefulness	
PU1	Using computers enhances my productivity in college
PU2	I find computers useful in my college activities
PU3	Using computers enhances my effectiveness in college
PU4	Using computers improves my performance in college
Perceived Ease of Use	
PEOU1	It is easy for me to become skillful in using computers.
PEOU2	I find computers easy to use.
PEOU3	I find it easy to get a computer to do what I want it to do.
PEOU4	Learning to operate a computer is easy for me
Behavioral Intention to Use	
BIU1	I intend to use a PC during my studies
BIU2	I intend to use a PC frequently during my studies
Subjective Norms (Normative Beliefs)	
NB1REL	My relatives think that I should use a computer
NB2FRI	My friends believe I should use a computer
NB3PRO	My professors think I should use a computer
NB4CLA	I believe that my classmates at college will think I should use a computer [†]
Masculinity/Femininity	
MF1	It is preferable to have a man in high level position rather than a woman
MF2	<i>There are some jobs in which a man can always do better than a woman</i>
MF3	It is more important for men to have a professional career than it is for women to have a professional career
MF4	Solving organizational problems requires the active forcible approach which is typical of men [†]
MF5	<i>Women do not value recognition and promotion in their work as much as men do</i>
Individualism/Collectivism	
IC1	Being accepted as a member of a group is more important than having autonomy and independence
IC2	Being accepted as a member of a group is more important than being independent
IC3	Group success is more important than individual success
IC4	Being loyal to a group is more important than individual gain
IC5	Individual rewards are not as important as group welfare
IC6	It is more important for a manager to encourage loyalty and a sense of duty in subordinates than it is to encourage individual initiative

Power Distance	
PD1	Managers should make most decisions without consulting subordinates
PD2	Managers should not ask subordinates for advice, because they might appear less powerful
PD3	Decision making power should stay with top management in the organization and not be delegated to lower level employees
PD4	Employees should not question their manager's decisions
PD5	<i>A manager should perform work which is difficult and important and delegate tasks which are repetitive and mundane to subordinates</i>
PD6	<i>Higher level managers should receive more benefits and privileges than lower level managers and professional staff</i>
PD7	<i>Managers should be careful not to ask the opinions of subordinates too frequently, otherwise the manager might appear to be weak and incompetent</i>
Uncertainty Avoidance	
UA1	Rules and regulations are important because they inform workers what the organization expects of them
UA2	Order and structure are very important in a work environment
UA3	<i>It is important to have job requirements and instructions spelled out in detail so that people always know what they are expected to do</i>
UA4	<i>It is better to have a bad situation that you know about, than to have an uncertain situation which might be better</i>
UA5	<i>Providing opportunities to be innovative is more important than requiring standardized work procedures</i>
UA6	<i>People should avoid making changes because things could get worse</i>
The italicized items were items from the original scales that were dropped from the final analysis due to poor psychometric properties.	
‡ Item was not included in Study 2.	

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