2015

Cross-National Differences in Individual Knowledge-Seeking Patterns: A Climato-Economic Contextualization

Liwei Chen
Georgia State University, liwei.chen@eci.gsu.edu

J.J. Po-An Hsieh
Georgia State University, jjhsieh@gsu.edu

Evert Van de Vliert
University of Groningen, e.van.de.vliert@rug.nl

Xu Huang
Hong Kong Polytechnic University, xu.huang@polyu.edu.hk

Cross-National Differences in Individual Knowledge-Seeking Patterns: A Climato-Economic Contextualization

ABSTRACT

Electronic knowledge repository (EKR) is one of the most commonly deployed knowledge management technologies, yet its success hinges upon employees' continued use and is further complicated in today's multinational context. We integrate multiple theoretical linkages into a research model, conceptualizing knowledge-seeking as an instrumental behavior, adopting the technology acceptance model to characterize the individual-level continued EKR knowledge-seeking behavioral model, and drawing on the climato-economic theory to explain cross-national behavioral differences. Using hierarchical linear modeling, we test the model with data from 1,352 randomly sampled knowledge workers across 30 nations. We find that two national-level factors, climate harshness and national wealth, interactively moderate the individual-level relationship between perceived usefulness (PU) and behavioral intention (BI) to continue seeking knowledge from EKR, such that the difference in the strength of this relationship is larger between poor-harsh and poor-temperate nations than between rich-harsh and rich-temperate nations. We find similar cross-level cross-national differences for the link between perceived ease of use (PEOU) and PU but not for the link between PEOU and BI. Implications for research and practice are discussed.

Keywords: Cross-National Differences, Electronic Knowledge Repository, IS Use, Climato-Economic Theory

CROSS-NATIONAL DIFFERENCES IN INDIVIDUAL KNOWLEDGE-SEEKING PATTERNS: A CLIMATO-ECONOMIC CONTEXTUALIZATION

INTRODUCTION

Knowledge-seeking in organizations is instrumental in nature, as knowledge is a critical resource that enables employees to solve problems, make decisions, and accomplish tasks (Gray & Meister, 2004). This is one major force driving 80% of leading multinational firms to deploy their own knowledge management (KM) initiatives (Lawton, 2001). Among various technologies to support organizational KM processes, the Electronic Knowledge Repository (EKR) is commonly deployed to integrate disparate knowledge resources and to enable the retrieval and reuse of codified knowledge (Markus, 2001). Industries reported that 80% of the KM involve EKR implementation (Davenport & Prusak, 1998), yet many of these initiatives have failed because of employees' reluctance to continue their EKR use (KPMG, 2000). Although employees may use an EKR in the early stage of the implementation process, the value of the system cannot be truly realized without continued and sustained usage (Agarwal & Prasad, 1997). This challenge of achieving continued EKR use becomes more complicated in multinational firms where the technology needs to be accepted by employees in different nations.

As managers have become increasingly more concerned about what inspires employees to continue seeking knowledge from implemented EKR, information systems (IS) researchers have also conducted studies to investigate this issue (e.g., Bock *et al*, 2006; Kankanhalli *et al*, 2005a; He & Wei, 2009). Toward this end, scholars have found that the technology acceptance model (TAM), originally developed for understanding users' adoption of new IS (Davis *et al*, 1989), can also be applied to explain individuals' continued use of implemented IS (e.g., Hong *et al* 2006; Szajna, 1996). Empirical EKR research has also found that TAM-related factors, such as perceived usefulness (PU) and perceived ease of use (PEOU), indeed affect individuals' knowledge-seeking from EKR (Bock *et al*, 2006). However, employees' continued use of EKR is complicated in cross-national contexts because the predictive powers of PU and PEOU on IS use (i.e., the two core relationships in TAM) may vary across nations (e.g., Straub, 1994; Straub *et al*, 1997).

So far, IS scholars have focused on national culture as the main explanation for cross-national behavioral differences in TAM. Current cross-national IS research is generally dominated by two approaches. The first approach applies national culture characteristics (e.g., culture scores) to explain why relationships in TAM vary across national boundaries (e.g., Straub, 1994; Straub *et al*, 1997). The second approach considers culture as the espoused values at the individual level and examines how these espoused cultural values moderate relationships in TAM (Srite & Karahanna, 2006; McCoy *et al*, 2007; Yoon, 2009).

Although these two approaches complementarily describe culture at different levels (i.e., national and individual levels), some researchers have raised the concern that the above two approaches are constrained by implicit underlying reasoning limitations. In particular, while culture may shape behavioral patterns, behavioral patterns also reveal the common characteristics of a particular culture (Peter & Olson, 1998; House *et al*, 2004). That is to say, culture and behavioral patterns (such as TAM) could be mutually influential such that culture itself cannot be seen as an independent predictor of behavioral patterns (Luna & Gupta, 2001). Thus, it is important to identify exogenous factors beyond national culture that may provide alternative explanations for cross-national behavioral variations.

Toward this end, the newly proposed climato-economic theory (CET) (Van de Vliert, 2009) argues that habitants of countries adapt their values, orientations, and behavioral patterns to the livability of their environments and that two national-level factors—the harshness of the thermal climate and national wealth—jointly determine environmental livability (Van de Vliert, 2007a). While climate harshness represents the survival demands imposed by the natural environment, national wealth represents the economic resources available to the habitants to cope with the demands. Importantly, the match or mismatch between climatic demands and economic resources gradually nurtures different levels of survival pressure for habitants in different climato-economic nations (Van de Vliert, 2009). In countries with stronger survival pressure, habitants tend to display stronger instrumental values, orientations, and practices, such as working for money (Van de Vliert *et al*, 2008). Given the spillover effect from family life to work (Kanter, 1977; Crouter, 1984), the more that instrumentality is emphasized in one's life environment, the more likely one would carry this emphasis to his/her workplace and focus on instrumental purposes in organizational activities.

To recap, knowledge enables employees to accomplish assigned tasks, thereby justifying their value and existence in organizations (Gray & Meister, 2004). The utilitarian nature of knowledge-seeking behaviors is consistent with the instrumentality underpinning TAM (Davis *et al*, 1989). Also, as indicated by CET, individuals' instrumental orientation is jointly shaped by such national-level factors as climate harshness and national wealth (Van de Vliert, 2009). *With this backdrop, the current study aims to synthesize (i) continued EKR knowledge-seeking behaviors, (ii) the technology acceptance model, and (iii) the climato-economic theory, given their common emphasis on instrumentality, and explain the cross-national differences in the EKR knowledge-seeking behavioral model through the lens of the climato-economic theory.*

THEORETICAL BACKGROUND

Knowledge-Seeking Behavior via EKR

Searching for knowledge from available sources mirrors humans' natural needs for survival in society (Lawrence & Nohria, 2002). Individuals who can identify knowledge more efficiently and effectively can solve survival-related problems better than those who are less capable of identifying such information (Kaplan, 1992; Kock *et al*, 2008). In the workplace, seeking knowledge is also a need-driven behavior (Zhang, 2008; He & Wei, 2009). Employees are motivated to seek knowledge from external sources when they encounter problems that are beyond their own knowledge (Gray & Meister, 2004). With knowledge from other sources, employees are better able to accomplish more complex tasks and make decisions more effectively (Gray & Meister, 2004; Gray & Durcikova, 2005). These problem-solving functions of knowledge-seeking behaviors essentially reflect the instrumental purpose of organizational activities in terms of accomplishing tasks, improving performance, and obtaining promotions and rewards.

EKR, as a key organizational knowledge reservoir, provides best practices, business solutions, and professional knowledge that help employees solve work-related problems (Lawton, 2001). EKR stores codified knowledge in a searchable format, enables employees to locate useful intelligence quickly (Kankanhalli *et al*, 2005b; Gray & Meister, 2004), technically supports employees' knowledge-seeking behaviors, and allows them to achieve utilitarian objectives (Gray & Durcikova, 2005). As such, this paper emphasizes the instrumental nature of EKR knowledge-seeking behaviors that enable employees to fulfill their task requirements.

Technology Acceptance Model

With an instrumental underpinning, TAM was originally proposed to understand employees' adoption of utilitarian IS in organizational settings (Davis, 1989; Davis *et al*, 1989) . Some later argued that factors affecting initial adoption may also affect continued use (e.g., Taylor & Todd, 1995; Szajna, 1996). Empirical studies have also provided evidence supporting the capability of TAM in predicting experienced users' behavioral intentions to continue using investigative technologies (e.g., Hong *et al*, 2006; Davis, 1989; Szajna, 1996). The above discussion suggests that TAM could be an ideal framework for studying employees' continued EKR knowledge-seeking behaviors that are instrumental in nature.

In the original TAM, behavioral intention (BI) is determined by an individuals' attitude towards using a technology as well as by the direct and indirect effects of perceived usefulness (PU) and perceived ease of use (PEOU). BI, in turn, directly affects IS usage behaviors. In their post-hoc analysis, Davis *et al* (1989) recommended a simplified version of TAM that includes only PU, PEOU, and BI. In the simplified TAM, PEOU directly affects PU, and both PU and PEOU additively influence BI. Consistent with many prior cross- national IS research studies (e.g., Straub, 1994; Straub *et al*, 1997; Srite & Karahanna, 2006; McCoy *et al*, 2007), we apply this simplified TAM as the theoretical framework for our investigation. Given our focus on continued use rather than initial adoption of EKR, in this study, we refer to BI as users' intentions to continue seeking knowledge from EKR.

PU describes whether users believe that using a particular system will enhance their job performance (Davis, 1989). It captures the notion of extrinsic motivation toward using a system, suggesting that IS use is driven by instrumental considerations such as solving task-related problems and enhancing work performance (Davis *et al*, 1992; Venkatesh *et al* 2003). PEOU also reflects instrumental concerns related to IS use. An IS that is easy to use minimizes the cognitive efforts and mental resources needed for users to operate the system, thereby facilitating human engagement with the technology (Davis *et al*, 1989; Pavlou & Fygenson, 2006). This instrumental nature of PEOU is also reflected through its impact on PU. Efforts saved by a system that is easy to use can be redeployed for users to accomplish more work (Kanfer *et al*, 1994); thus, the system is considered useful because it helps to achieve instrumental goals.

Cross-National TAM Studies

Cross-national IS studies have shown that the relationships in TAM vary across nations, and IS scholars typically attribute such differences to national cultures (Straub, 1994; Straub *et al*, 1997; Rose & Straub, 1998). The most influential cultural framework so far is that developed by Hofstede (1980). Based on the collective results of a series of studies, Hofstede concluded that there are four dimensions of national cultural values, including uncertainty avoidance, power distance, individualism/collectivism, masculinity/femininity (Hofstede, 1980), together with a fifth dimension of long-term orientation (Hofstede & Bond, 1988). Using this framework, scholars have conceived that culture is the manifestation of core values shared in a society and that culture influences individuals' cognitions, attitudes, and behaviors (Lachman, 1983; Hofstede, 1991; Trompenaars, 1993; Straub et al , 2002).

Cross-national IS research has applied Hofstede's cultural framework in two general ways. First, most studies in this stream of research have collected data from a few nations (e.g., two or more) and have then compared the behavioral models across the populations of these different nations. This comparative approach focuses on selective cultural dimensions to explain the observed behavioral differences across nations (Straub, 1994; Straub *et al*, 1997). For example, by collecting individual data from Japan and the United States, Straub (1994) found that users in nations with high power distance, uncertainty avoidance, and collectivism (in relation to those with the opposite cultural backgrounds) are more willing to use a lean IS-based medium like email. In addition, using data from Japan, Switzerland, and the United States, Straub *et al* (1997) found that PU and PEOU predict IS use better for users in high individualistic and high femininity countries.

Nevertheless, some have questioned this first approach for its assumption that each nation has its own culture and a nation's cultural characteristics can be generalized or applied to the entire population (e.g., McCoy *et al*, 2005, 2007). In other words, the terms culture and nation are used interchangeably (Sekaran, 1983; Nasif *et al*, 1991). To address this limitation, some scholars have proposed a second approach that focuses on cultural values espoused by individuals, rather than on cultural values at the national level, to explain behavioral differences between individuals (Straub *et al*, 2002). Adopting this individual-level approach, Srite and Karahanna (2006) collected data from students who had different national backgrounds but who studied in the same U.S. university. By measuring this group's espoused cultural values, they found that the link between PEOU and BI is stronger for individuals with espoused feminine cultural values than for those with espoused masculine cultural values. For another example, through data obtained from subjects across 24 nations, McCoy *et al* (2007) compared behavioral differences between individuals with high or low espoused cultural values, rather than across national boundaries.

Agreeing that culture is a key influence in individuals' responses to IS innovations, the above two approaches provide distinct, yet complementary, insights into cross-national IS studies (Srite & Karahanna, 2006). However, some researchers have pointed out the potential reasoning limitations underlying these two approaches. Geertz (1973) argued that culture may not be an exogenous construct apart from behavioral patterns. Indeed, while many researchers emphasize the influence of culture on behavioral patterns (e.g., Van Slyke *et al*, 2010), some argue that culture also manifests itself through behavioral patterns (House *et al*, 2004). Individuals' behavioral patterns reflect the embedded cultural principles that guide their interpretations of the world around them (Sackmann, 1992; Luna & Gupta, 2001). As such, culture and culturally-manifested behavioral patterns mutually reinforce each other and are, thus, inseparable (Geertz, 1973).

To avoid and address the aforementioned challenge, we distinguish cross-national studies from cross-cultural studies. While cross-national studies typically compare behavioral differences across national boundaries, cross-cultural studies may compare different cultural groups that are not categorized based on national boundaries. In this study, we focus on cross-national behavioral differences and seek other national-level factors beyond cultural values to explain individual behavioral differences across nations. In this vein, the recently proposed climato-economic theory (Van de Vliert, 2009) may serve this purpose and enrich our understanding of cross-national differences in IS-related behavioral models.

The Climato-Economic Theory

Psychologists have identified that climatic survival is a fundamental challenge that humans have to face; climatic survival concerns individuals' psychological and behavioral adaptations in order to survive in certain ecological environments (Richerson & Boyd, 2005). The climato-economic theory (CET) focuses on climatic survival and explains the reasons why habitants' values and behavioral patterns are fine-tuned to fit as well as reflect their climato-economic environments (Van de Vliert, 2009). According to CET, individuals' behavioral orientations and practices are shaped by the livability of their surrounding environment, which can be represented by two exogenous factors: the harshness of the thermal climate and national wealth (Van de Vliert, 2009).

On the one hand, climate harshness sets survival demands in terms of comfort, nutrition, and health (Van de Vliert, 2007b). Temperate climates reduce survival demands by offering thermal comfort, abundant resources, and negligible risks related to unhealthy conditions. In contrast, harsh climates, which are either too hot or too cold, are more demanding since they require people to invest more time and effort meeting basic survival needs (Van de Vliert, 2007a). Survival needs aroused by the climate are often extended into a hierarchical chain of needs. Specifically, primary needs for thermal comfort transfer to secondary needs for homeostatic goods and services and, in turn, inspire tertiary needs for money or monetary equivalence (Van de Vliert, 2007b).

On the other hand, national wealth represents available resources that a country can provide to its habitants to cope with climatic demands. Civilized societies have learned to use money (or monetarily equivalent resources) for trading homeostatic goods (such as clothing, housing, food, heating or cooling systems, medical treatment, and social security) so as to address the challenges of harsh climatic conditions (Montesquieu, 1748). However, the extent to which a country can afford to fulfill its habitants' needs depends largely on its economic affluence. In higher income countries, about half of the household income is consumed by purchasing homeostatic goods; in lower income countries, this figure rises to 90%, while for some countries with extreme poverty, most individuals' needs for homeostatic goods cannot even be satisfied (Parker, 2000).

According to CET, the interaction of climatic demands and economic resources in a particular geographic region results in differing societal emphasis on survival in terms of psychological functions and behavioral patterns (Van de Vliert, 2006, 2007a, 2007b). Meanwhile, evidence from accumulated studies has supported the existence of the spillover effect, which posits that family life impacts individuals' activities in the workplace (Crouter, 1984); that is, traditions in individuals' daily lives influence their work-related behavioral orientations (Kanter, 1977). Thus, the more survival threat is emphasized in habitants' living environments, the more likely they would be to carry this emphasis to their workplace settings and focus on instrumental purposes in their organizational behaviors. Specifically, three scenarios are delineated in the following paragraphs.

First, in lower income countries with harsh climates, resources are inadequate for their habitants to cope with the threatening living situations. This mismatch between high demands and limited resources leads to a high level of survival pressure, making habitants constantly worry about whether they have sufficient resources to cope with climatic demands. As a result, they have to strive for preserving available resources, obtaining additional resources, and applying their limited resources with careful consideration, demonstrating behavioral patterns with strong utilitarian orientations (Van de Vliert, 2009). For example, people in poor-harsh countries tend to put strong emphasis on their own interests and enculturate their children to be egoistic (Van de Vliert, 2009; Van de Vliert *et al*, 2009). In addition, to secure household survival, child labor is widely adopted by parents in poor-harsh nations (Van de Vliert, 2009). Employees in such nations, as opposed to elsewhere, tend to work more for money (Van de Vliert *et al*, 2008).

Second, the situation is remarkably different for habitants in lower income countries with temperate climates. Because temperate climates set a lower threshold for existence, habitants in poor-temperate nations experience lower survival pressure as compared to their poor-harsh counterparts (Van de Vliert, 2009). Consequently, habitants in poor-temperate countries, relative to those in poor-harsh countries, are environmentally relieved to enjoy less survival threats and are, thus, less utilitarian oriented. Prior research has found that people in poor-temperate nations, compared to their counterparts in poor-harsh nations, tend to be less selfish and give lower priority to work for money (Van de Vliert, 2006, 2007b, 2009).

Third, the aforementioned difference in instrumental orientation between habitants in poor-harsh and poor-temperate countries will be less obvious between habitants in rich-harsh and rich-temperate countries. Higher income nations provide sufficient resources that enable their habitants to go beyond the gratification of basic existence needs, thereby making them take survival for granted (Van de Vliert, 2007b). Thus, regardless of the climatic conditions (harsh or temperate), habitants in higher income nations can more flexibly convert available resources to cope with survival stress; as a result, there will be fewer differences in instrumental orientation between habitants in rich-harsh and rich-temperate nations (Van de Vliert, 2009). For instance, people in higher income countries with demanding and temperate climates, compared to people in lower income nations with demanding and temperate climates, display fewer differences in their attitudes toward work and colleagues and show fewer differences in their struggle for utilitarian goals (Van de Vliert *et al*, 2008; Van de Vliert & Einarsen, 2008).

RESEARCH MODEL AND HYPOTHESES

Research Model

We have developed a research model (see Figure 1) based on the simplified technology acceptance model (TAM) to explain employees' intentions to continue seeking knowledge via EKR. To characterize the utility orientation of TAM, we conceptually emphasize the performance-enhancement, effort-saving, and efficiency-driven mechanisms, respectively, underlying the PU-BI, PEOU-BI, and PEOU-PU relationships such that all three relationships are instrumental in nature. In addition, drawing on the climato-economic theory, we predict that climate harshness and national wealth interactively moderate the relationships in the behavioral model for different climato-economic nations.

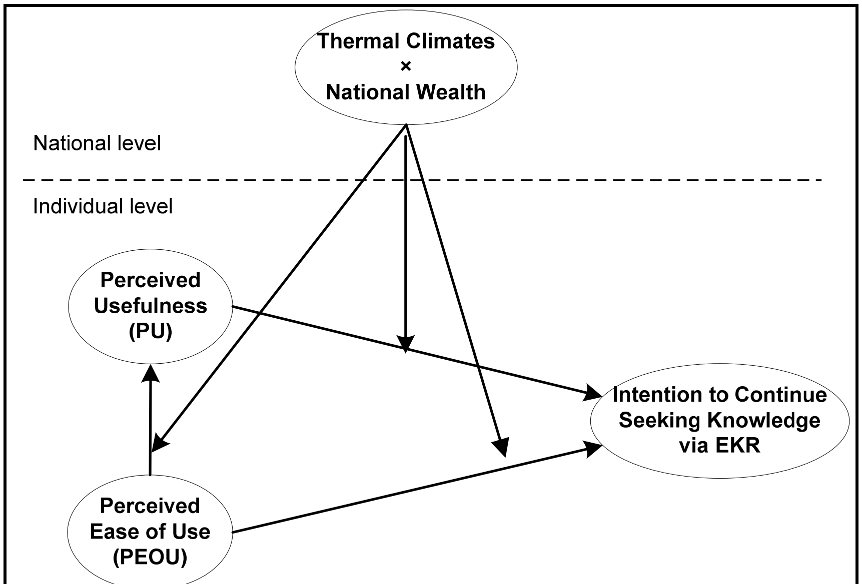


Figure 1. Research Model

Perceived Usefulness and Behavioral Intention

In the workplace, employees are likely to continue seeking knowledge from EKR based on their evaluations of the extent to which using the system can improve their task performance (Davis *et al*, 1989). Enhanced performance can lead to extrinsic benefits, such as stable job positions, promotions, pay raises, and so on (Davis *et al*, 1992). In other words, an individual's perception of an EKR's usefulness increases his/her behavioral intention to continue seeking knowledge via the EKR through an instrumental mechanism. Drawing on the climato-economic theory, we theorize that the strength of this performance-enhancement link varies according to the extent to which instrumental orientation is jointly triggered by thermal climate and national wealth.

Climatic contingencies for lower income countries

Habitants in lower income countries generally suffer from limited resources (Inglehart & Welzel, 2005). Their inferior resource condition make them particularly vulnerable and sensitive to the severity of climatic demands; thus, habitants in poor-harsh nations, relative to those in poor-temperate nations, are more likely to experience life as threatening (Van de Vliert *et al*, 2004). As a result, habitants in poor-harsh nations will demonstrate higher instrumental propensity than their poor-temperate counterparts and will be more eager to utilize resources in a pragmatic way to address all threats to their overall existence.

Following this line of reasoning, employees in organizational settings in poor-harsh countries are more outcome-driven and will, therefore, prefer more strongly to engage in activities that can enhance their job performance as compared to those in poor-temperate countries. As such, when perceiving knowledge-seeking via EKR as being useful for making decisions, solving problems, and accomplishing tasks, employees in poor-harsh countries, compared to those in poor-temperate countries, will likely be more sensitive to as well as more appreciative of the instrumental value that could be derived from continued EKR use. This, in turn, makes such individuals more inclined to continue seeking knowledge via EKR. In other words, given a certain level of perceived usefulness, the impact on individuals' behavioral intentions to continue seeking knowledge via EKR will be stronger for employees in poor-harsh nations than in poor-temperate nations.

Climatic contingencies for higher income countries

In contrast, the above differences in the strength of the PU-BI link between poor-harsh and poor-temperate nations are likely to be less dramatic between rich-harsh and rich-temperate nations. Habitants in higher income countries, relative to those in lower income nations, generally possess more and better resources (Inglehart & Welzel, 2005; Van de Vliert, 2007b). Living in such resourceful environments, habitants in higher income nations can take protective actions against climatic demands more easily regardless of their surrounding climates' harshness.

Thus, the extent to which climates are harsh or temperate would have a weaker influence on such individuals' instrumental tendencies. In this vein, there would be fewer differences in the instrumental tendencies between habitants in rich-harsh and rich-temperate nations than between habitants in poor-harsh and poor-temperate nations. Thus, we propose,

> ***H_1:*** *The harshness of the thermal climate and the level of national wealth jointly moderate the positive relationship between perceived usefulness and intention to continue seeking knowledge from EKR, such that the difference in the strength of this relationship between poor-harsh and poor-temperate nations will be greater than the difference between rich-harsh and rich-temperate nations.*

Perceived Ease of Use and Behavioral Intention

The path between PEOU and BI suggests that individuals prefer to continue using a system that is easy to operate (Davis, 1989; Davis *et al*, 1992). This relationship can be explained as an instrumental mechanism (Pavlou & Fygenson, 2006). Human beings naturally prefer simple processes to complex processes when solving problems (Kock *et al*, 2008). A system that is easy to use requires users to put forth little cognitive effort (Katz & Aspden, 1997) and prevents them from having to deal with complex operating procedures and learning processes (Bandura, 1982; Pavlou & Fygenson, 2006). Indeed, the level of cognitive effort required for operating a technology in organizations highlights the instrumental nature of the PEOU-BI relationship. Accordingly, our predictions on the differential strength of this relationship across different climato-economic conditions are delineated as follows.

Climatic contingencies for lower income countries

Lower income individuals are particularly vulnerable to a lack of resources, including cognitive resources (Williams, 1990; Bornstein & Bradley, 2003; Hsieh *et al*, 2008). For habitants in lower income countries, their vulnerability to resources makes climatic demands a key factor that shapes their response to survival pressure. Struggling against demanding climates with scarce resources, habitants in poor-harsh nations experience greater stress than their counterparts in poor-temperate nations (Van de Vliert, 2007b). The existence pressure such individuals face gradually shapes their utilitarian orientations, making them particularly favorable toward means that help reduce the effort required to solve work problems (Kock *et al*, 2008).

An EKR that is easy to use can save employees effort and minimize the cognitive resources required to operate the technology (Lepper, 1985). Employees in poor-harsh nations as opposed to those in poor-temperate nations are likely to better appreciate the advantage of having to put forth minimal effort and thus are more inclined to continue using such a system. Hence, PEOU will affect BI more strongly for employees in poor-harsh nations than in poor-temperate nations.

Climatic contingencies for higher income countries

Habitants in higher income nations, relative to those in lower income nations, possess more resources and can cope with threatening climates more flexibly; therefore, they are less sensitive to the challenges derived from climatic demands (Van de Vliert *et al*, 2004). As such, employees in rich-harsh versus rich-temperate nations will show less remarkable differences in their utilitarian orientations than employees in poor-harsh versus poor-temperate nations. In this vein, considering the effort-saving mechanism inherent in the PEOU-BI link, the differences in the strength of the PEOU-BI link between poor-harsh and poor-temperate nations may be larger than between rich-harsh and rich-temperate nations.

The above discussion, as a whole, suggests that the strength of the relationship between PEOU and continued EKR knowledge-seeking intention varies across nations in line with the extent to which instrumentality is emphasized in the society. We thus expect,

> ***H_2:*** *The harshness of the thermal climate and the level of national wealth jointly moderate the positive relationship between perceived ease of use and intention to continue seeking knowledge from EKR, such that the difference in the strength of this relationship between poor-harsh and poor-temperate nations will be greater than the difference between rich-harsh and rich-temperate nations.*

Perceived Ease of Use and Perceived Usefulness

While the extant cross-national studies have provided much understanding about the impacts of PU and PEOU on BI, researchers have only paid limited attention to the effect PEOU has on PU. Based on the CET, we expect that the strength of this relationship varies significantly across nations. To begin with, a system that is easy to use can reduce cognitive effort and help enhance work efficiency (Todd and Benbasat, 1991). In the organizational context, such a system is considered to be valuable because it permits employees to redeploy their finite resources, including their time and cognitive efforts (Kanfer *et al*, 1994), to accomplish more tasks or achieve better performance, which reflects the essence of PU (Davis *et al*, 1989). In other words, PEOU constructively impacts PU because of this efficiency-driven consideration. Hence, the strength of this relationship may also vary according to the prevalence of instrumentality in a country.

Climatic contingencies for lower income countries

Demanding climates create more serious survival threats for habitants in poor-harsh countries. Such threats push employees in these environments to continuously emphasize instrumental benefits as they reason (Van de Vliert, 2007b). Compared to those in poor-temperate nations, employees in poor-harsh nations are more likely to develop instrumental rationales and believe that a user-friendly EKR is useful because the time and effort saved by the technology can lead to more productive performance. We, therefore, expect the impact of PEOU on PU to be stronger for employees in poor-harsh nations than in poor-temperate nations.

Climatic contingencies for higher income countries

In contrast, the aforementioned difference between poor-harsh and poor-temperate nations is less obvious between rich-harsh and rich-temperate nations. As argued earlier, employees in rich-harsh and rich-temperate nations will exhibit fewer dramatic differences in their instrumental orientations than those in poor-harsh and poor-temperate nations. Given the efficiency consideration underlying the relationship between PEOU and PU, the strength of this positive link would be less different between rich-harsh and rich-temperate nations than between poor-harsh and poor-temperate nations. Thus, we anticipate the following:

> ***H_3:*** *The harshness of the thermal climate and the level of national wealth jointly moderate the positive relationship between perceived ease of use and perceived usefulness, such that the difference in the strength of this relationship between poor-harsh and poor-temperate nations will be greater than the difference between rich-harsh and rich-temperate nations.*

METHODOLOGY

Research Site

A leading multinational logistic firm that implemented a global enterprise knowledge repository (EKR) system was chosen as the investigation site. The firm has branches in over 58 countries and had an annual revenue of $5.65 billion USD in 2007. Given the intensive competition in this industry, the firm's competitiveness is contingent upon its employees' ability to access and apply the latest and the most relevant knowledge. The knowledge-centric characteristic of the logistic industry, together with the firm's global presence and EKR implementation, makes this site an ideal test bed for the proposed hypotheses.

At the time of data collection in 2008, the target firm had implemented its EKR for two years. The knowledge available in this system covers useful information to support operations across various geographical and functional areas. Such information includes governmental regulations and taxes, industrial best practices, organizational news and policies, employee experiences, and glossary of terms and abbreviations. Information can be searched by department, geographic location, or both. Besides a small group of dedicated personnel responsible for maintaining and updating the system's content, most employees are only authorized to access this repository. These employees' EKR use is restricted to knowledge-seeking rather than knowledge contribution. Unlike frontline operators, these employees are knowledge workers whose performance is contingent upon their professional knowledge. Thus, using EKR would help employees access professional knowledge when needed, thereby facilitating their task performance. As such, our investigation focuses on experienced employees who have only used EKR for seeking knowledge instead of those who have contributed knowledge. Importantly, using EKR to seek knowledge is encouraged but not mandated in this firm. Thus, employees' EKR use is voluntary in nature.

Measures

Thermal climate, expressed by the average degrees Celsius across a country's major cities, is considered harsher if the winters are colder than temperate, the summers are hotter than temperate, or both. Following previous climato-economic research (e.g., Van de Vliert, 2007a, 2007b; Van de Vliert *et al*, 2004, 2008, 2009), we used the temperature data from Parker (1997). The temperature data include four average temperatures in degrees Celsius (i.e., the average lowest and highest temperatures in the coldest and hottest months) across each country's major cities over a 30-year period. Based on these temperature data, we generated the indices of climate harshness using the same approach as prior climato-economic studies (e.g., Van de Vliert, 2007a, 2007b, 2009; Van de Vliert *et al*, 2004, 2008, 2009). In particular, we calculated the sum of the absolute deviations from 22^{o}C for the four average temperatures and generated the indices of the harshness of thermal climate. In countries whose populations are dominated by a large city, single city averages were used. For countries with many major cities, multiple city averages were weighted based on the population (for detailed information, see Parker, 1997, pp.203-226). It is important to note that in countries with large temperature variations (e.g., Australia, Canada, China, Russia, and the United States), our measure may increase the standard error of the mean and reduce the chance to detect the theorized effect of thermo-climate, if any, thereby rendering more conservative estimates.

National wealth was operationalized as the purchasing power parity per capita (PPP) calculations for 2007 published by the International Monetary Fund. TAM constructs were measured using items adapted from prior studies (see Appendix A for the survey instrument and the detailed measures). In particular, PU and PEOU were measured using scales adapted from Davis (1989) and Davis *et al* (1989). Items for behavioral intentions to continue seeking knowledge from EKR were adapted from Agarwal and Prasad (1997), who measured continued use intentions by asking experienced users to report their future use intentions. Demographic variables, such as gender, age, education, job tenure, and use history were collected for control purposes (Thompson *et al*, 1994; Burton-Jones & Hubona, 2005; Morris *et al*, 2005). Hofstede's (2001) national cultural value scores were also employed as control variables.

Data Collection

The survey instrument was developed in English, which is the official language of the firm. Minor modifications were made based on feedback from a pretest. The official data collection was conducted through an online survey. Excluding non-local employees who might blur the results, we randomly sampled 3,027 employees who had experience using the system across 30 countries and invited them to participate. The survey was administrated by the company's headquarter. Reminder letters were sent one week after the initial survey invitation to increase the response rate. After excluding incomplete responses, 1,352 responses (see Table 1 for demographics) across the 30 countries were usable for analysis, yielding a 44.7% response rate.

Table 1. Sample Demographics		
	Category	**Percentage**
Gender	Male	50%
	Female	50%
Education	Secondary/High School	18.3%
	Post-Secondary	13.4%
	University Graduate	53.9%
	Post-Graduate	11.5%
	Others	2.9%
Use History	Less than 6 months	21.1%
	More than 6 months but less than 12 months	16.6%
	More than 12 months	62.4%
	Mean	**Std. Deviation**
Age (Years)	36.60	9.79
Job Tenure (Years)	6.37	6.77

1

Table 2. Country Information

Country	Sample Size	National Wealth[a]	Climate Harshness (°C)	UA[b]	PD[b]	IC[b]	MF[b]
Australia	43	36,226	76	51	36	90	61
Bangladesh	31	1,311	44	60	80	20	55
Belgium	29	35,388	79	94	65	75	54
Canada	57	38,614	105	48	39	80	52
China	129	5,325	82	30	80	20	66
Denmark	14	37,265	83	23	18	74	16
France	36	33,509	75	86	68	71	43
Germany	103	34,212	84	65	35	67	66
Hong Kong	42	42,124	40	29	68	25	57
India	63	2,563	53	40	77	48	56
Indonesia	40	3,728	30	48	78	14	46
Italy	15	30,365	59	75	50	76	70
Japan	57	33,596	52	92	54	46	95
Korea	36	24,803	79	85	60	18	39
Malaysia	62	13,385	33	36	104	26	50
Netherlands	34	38,995	77	53	38	80	14
New Zealand	12	26,611	53	49	22	79	58
Pakistan	26	2,594	59	70	55	14	50
Philippines	60	3,383	36	44	94	32	64
Russia	38	14,705	101	95	93	39	36
Singapore	61	49,754	29	8	74	20	48
Spain	21	30,118	69	86	57	51	42
Sri Lanka	19	4,265	30	40	77	48	56
Sweden	7	36,578	89	29	31	71	5
Taiwan	81	30,322	49	69	58	17	45
Thailand	52	7,907	45	64	64	20	34
United Arab Emirates	26	37,941	53	68	80	38	52
UK	36	35,634	67	35	35	89	66
USA	68	45,725	79	46	40	91	62
Vietnam	54	2,589	48	30	70	20	40

[a] Data were accessed on October 8, 2008 from World Economic Outlook Database-October 2008, International Monetary Fund. http://www.imf.org/external/pubs/ft/weo/2008/02/weodata/index.aspx. Unit of currency: International Dollar

[b] UA: uncertainty avoidance; PD: power distance; IC: individualism/collectivism; MF: masculinity/femininity. The scores are adopted from Hofstede's (2001) Cultural Value Score.

The sample size for each nation ranges from 7 to 129 (mean=45.07; s.d.=26.93), which is acceptable for a multilevel analysis (Kreft & De Leeuw, 1998; Raudenbush & Bryk, 2002). Although this sample is far from comprehensive with respect to all of the countries in the world, it representatively covers countries with high and low national wealth as well as harsh and temperate climates (see Table 2 for country information and Figure B in Appendix B for the distribution of climate harshness and national wealth).

DATA ANALYSIS

Measurement Model

Table 3. Descriptive Statistics, Reliabilities, Average Variance Extracted, and Correlations

	Mean(S.D.)	α[a]	C.R.[b]	AVE[c]	1.	2.	3.	4.	5.
1.Behavioral Intention	5.30 (1.29)	0.91	0.92	0.79	0.89[d]				
2.Perceived Usefulness	5.34 (1.03)	0.92	0.93	0.76	0.45**	0.87			
3.Perceived Ease of Use	4.96 (1.16)	0.93	0.93	0.77	0.34**	0.58**	0.88		
4.Climate Harshness	62.29(21.80)	NA	NA	NA	0.05	-0.12**	-0.20**	NA	
5.National Wealth	23522.19(16168.34)	NA	NA	NA	0.07*	-0.16**	-0.24**	0.25**	NA

[a] Cronbach's Alpha;
[b] Composite Reliability;
[c] Average Variance Extracted
[d] Diagonals represent the square root of the average variance extracted. The off-diagonal elements are inter-construct correlations.
[e] * $p<0.05$, ** $p<0.01$

CFA was first performed using AMOS 7.0 to assess the measurement properties of the multi-item constructs (Anderson & Gerbing, 1988). The three-factor model yielded an adequate model fit (CFI=0.97, TLI=0.96, NFI=0.96 GFI=0.94, AGFI=0.90, and SRMR=0.065) (Hair *et al*, 1998). The factor loading for each indicator on its corresponding construct was significant at a 0.05 level or higher, thus supporting convergent validity. As shown in Table 3, the average variance extracted (AVE) were all above 0.5, suggesting that the explained variance was higher than the unexplained variance (Segars, 1997). The square root of the AVE for each construct was also higher than all of the inter-construct correlations, thereby establishing discriminant validity

(Fornell & Larcker, 1981). In terms of reliability, Cronbach's alpha and composite reliability were both above the recommended 0.7 (Nunnally, 1978). The above results suggest that the measurement scales for this study exhibit adequate psychometric properties.

Measurement Invariance Analyses

To evaluate the appropriateness of comparing the path coefficients across nations, we conducted measurement invariance (MI) analyses (Doll *et al*, 1998). As SEM-based analyses typically require at least 200 to 250 data points in one single group (Hair *et al*, 1998), we split the entire sample (1,352), based on the following six categorizations, one at a time, into two groups: high/low national wealth, harsh/temperate climates, high/low power distance, high/low uncertainty avoidance, individualism/collectivism, and masculinity/ femininity. Using AMOS 7.0, we performed configural and metric invariance analyses to evaluate whether the three-factor multi-item measurement models were metric invariant across the split groups. Following Steenkamp and Baumgartner's (1998) procedures and using Cheung and Rensvold's (2002) evaluation criteria, the results revealed strong support for metric invariance between the groups in terms of the above six categorizations (see Appendix C), thereby allowing for meaningful cross-group behavioral model comparisons (Doll *et al*, 1998; Steenkamp & Baumgartner, 1998).

Common Method Bias

As the three individual-level constructs (i.e., PU, PEOU, and BI) were measured through the same survey, we applied the Harman's one-factor test (Podsakoff & Organ, 1986) to gauge the threat of common method bias (CMB). For this test, (1) three distinct latent factors with eigenvalues greater than 1 were generated (Table D1 in Appendix D) and (2) the loading of each item on its principal factor was significant and much higher than its loadings on other factors (Table D2 in Appendix D). Nevertheless, one of the three factors accounted for slightly more than half of the variance (54%), suggesting some threat of CMB. As this test does not statistically control for method effects (Podsakoff *et al*, 2003), we conducted the more sophisticated and conservative common method variance factor test to further gauge the effects of CMB, if any, on relationships among the three individual level TAM factors. Following Podsakoff *et al* (2003), we assessed the measurement model by adding a latent common method variance factor and found that (1) the item loadings and (2) the correlation and covariance coefficients among the three TAM factors, together with the corresponding significance levels, remained stable between the original measurement model and the measurement model with a common method variance factor (Table D3 in Appendix D). The above results, as a whole, suggests some evidence of CMB, which, however, was not a serious threat to the relationships among the core constructs.

Research Model and Hypothesis Testing

The research model requires multilevel analyses across both national and individual levels, which can be achieved using hierarchical linear modeling (HLM). Compared to traditional single-level analysis techniques, HLM allows for improved model specifications and more accurate estimations of the standard errors when analyzing data with a nested structure, such as individuals nested within nations (Snijders & Bosker, 1999). Individuals in a particular nation who adapt to and are shaped by the same ecological environment are more likely to demonstrate similar behavioral patterns, as compared to individuals from different nations. Thus, single-level analysis techniques are not suitable in this study because they would lump individuals from all nations together and ignore the fact that their behavioral patterns may differ across nations. As a result of the potential statistical dependence among observations, the standard errors will be underestimated, leading to an overestimation of the level of significance. HLM can better ensure that the findings will not simply be the result of the distribution of individuals across nations, statistical dependence in the data, or varying sample sizes across nations, as these factors are less likely to affect HLM coefficients (Goldstein *et al*, 1998).

As the three hypotheses jointly imply a multilevel structural model, we considered applying the multilevel structural equation modeling (MSEM) technique for hypotheses testing. However, our literature review suggests that it is critically important to have a sufficient higher-level (e.g., national-level) sample size when performing MSEM analysis (Meuleman & Billiet 2009). For instance, Hox and Maas (2001) assessed the robustness of the MSEM estimators at both the lower and higher levels and found that the results are problematic for small group-level samples. They suggested that the higher-level sample size should be at least 100 for acceptable performance of MSEM estimation. Similarly, Cheung and Au (2005) conducted MSEM simulation and also found problematic estimates with a small higher-level sample size. Unfortunately, they further demonstrated that increasing the lower-level (e.g., individual-level) sample size does not necessarily address this issue. Thus, they called for the cautious application of MSEM on cross-national studies since most cross-national studies do not have a sufficient sample size that supports proper MSEM analysis and estimation.

Since our data were only collected from 30 countries, MSEM may not be appropriate to test our hypotheses. Hence, we adopted HLM, which demands a relatively smaller high-level sample size (Hox 2010). The analyses were performed using MLwiN, a software package for HLM (Goldstein *et al*, 1998). MLwiN produces an estimate for each predictor variable along with the associated standard error. Moreover, how well a given model fits the data can also be evaluated by examining changes in chi-square values.

Table 4 provides the specification of the multilevel model we used to test our hypotheses. Take the model for PU→BI as an example, the individual-level model includes a random intercept term (β_{0j}), six fixed slope terms ($\beta_{1j} \sim \beta_{6j}$) to model the effects of individual level control variables, and a random slope term (β_{7j}) to model the effects of PU. The national level model (i.e., the national-level model) specified the random intercept and random slope terms as a function of climate harshness (C), national wealth (W), and the interaction of these two national-level factors, after controlling for the main effects ($\gamma_{01} \sim \gamma_{04}$) and interaction effects ($\gamma_{71} \sim \gamma_{74}$) of national culture values. As such, the cross-level main effects of Climate and Wealth are captured by γ_{05} and γ_{06}, respectively. In addition, the interaction effect between PU and C is captured by the coefficient γ_{75}, the interaction effect between PU and W is captured by the coefficient γ_{76}, and the interaction effect between C and W is captured by the coefficient γ_{07}. The three-way interaction effect is captured by the coefficient γ_{77}. The individual-level error term (r_{ij}) and random effects (μ_{0j} , μ_{7j}) were also specified in the model.

Climate harshness, national wealth, and the four dimensions of Hofstede's culture scores were standardized at the national level to facilitate the analysis and interpretation of the interaction effects (Aiken & West, 1991). We also standardized individual-level predictors (i.e., PU and PEOU) within each country so as to disentangle individual differences and country differences (Kreft & De Leeuw, 1998). Following Aiken and West (1991), these standardized measures were then used to create the interaction terms for analysis so as to facilitate results interpretation and avoid multi-collinearity. In fact, the VIF values for all of the terms entered in the analyses turned out to be lower than 3, suggesting a minimum threat of multi-collinearity (Hair *et al*, 1998).

Table 4. Multilevel Model Specification

PU→BI	**Individual Level Model** $\mathrm{BI}_{ij} = \beta_{0j} + \beta_{1j}(\mathrm{Age}_{ij}) + \beta_{2j}(\mathrm{Gender}_{ij}) + \beta_{3j}(\mathrm{UseHistory}_{ij}) + \beta_{4j}(\mathrm{Education}_{ij}) + \beta_{5j}(\mathrm{JobTenure}_{ij}) + \beta_{6j}(\mathrm{PEOU}_{ij}) + \beta_{7j}(\mathrm{PU}_{ij}) + r_{ij}$ **National Level Model** $\beta_{0j} = \gamma_{00} + \gamma_{01}(\mathrm{UA}_j) + \gamma_{02}(\mathrm{PD}_j) + \gamma_{03}(\mathrm{IC}_j) + \gamma_{04}(\mathrm{MF}_j) + \gamma_{05}(\mathrm{C}_j) + \gamma_{06}(\mathrm{W}_j) + \gamma_{07}(\mathrm{C*W}_j) + \mu_{0j}$ $\beta_{1j} = \gamma_{10}$ $\beta_{2j} = \gamma_{20}$ $\beta_{3j} = \gamma_{30}$ $\beta_{4j} = \gamma_{40}$ $\beta_{5j} = \gamma_{50}$ $\beta_{6j} = \gamma_{60}$ $\beta_{7j} = \gamma_{70} + \gamma_{71}(\mathrm{UA}_j) + \gamma_{72}(\mathrm{PD}_j) + \gamma_{73}(\mathrm{IC}_j) + \gamma_{74}(\mathrm{MF}_j) + \gamma_{75}(\mathrm{C}_j) + \gamma_{76}(\mathrm{W}_j) + \gamma_{77}(\mathrm{C*W}_j) + \mu_{7j}$ **Mixed Model** $\mathrm{BI}_{ij} = \gamma_{00} + \gamma_{10}(\mathrm{Age}_{ij}) + \gamma_{20}(\mathrm{Gender}_{ij}) + \gamma_{30}(\mathrm{UseHistory}_{ij}) + \gamma_{40}(\mathrm{Education}_{ij}) + \gamma_{50}(\mathrm{JobTenure}_{ij}) + \gamma_{60}(\mathrm{PEOU}_{ij}) + \gamma_{70}(\mathrm{PU}_{ij})$ $+\gamma_{01}(\mathrm{UA}_j) + \gamma_{02}(\mathrm{PD}_j) + \gamma_{03}(\mathrm{IC}_j) + \gamma_{04}(\mathrm{MF}_j) + \gamma_{05}(\mathrm{C}_j) + \gamma_{06}(\mathrm{W}_j) + \gamma_{07}(\mathrm{C*W}_j)$ $+\gamma_{71}(\mathrm{UA}_j)(\mathrm{PU}_{ij}) + \gamma_{72}(\mathrm{PD}_j)(\mathrm{PU}_{ij}) + \gamma_{73}(\mathrm{IC}_j)(\mathrm{PU}_{ij}) + \gamma_{74}(\mathrm{MF}_j)(\mathrm{PU}_{ij})$ $+\gamma_{75}(\mathrm{C}_j)(\mathrm{PU}_{ij}) + \gamma_{76}(\mathrm{W}_j)(\mathrm{PU}_{ij}) + \gamma_{77}(\mathrm{C*W}_j)(\mathrm{PU}_{ij}) + \mu_{0j} + \mu_{7j}(\mathrm{PU}_{ij}) + r_{ij}$
PEOU→BI	**Individual Level Model** $\mathrm{BI}_{ij} = \beta_{0j} + \beta_{1j}(\mathrm{Age}_{ij}) + \beta_{2j}(\mathrm{Gender}_{ij}) + \beta_{3j}(\mathrm{UseHistory}_{ij}) + \beta_{4j}(\mathrm{Education}_{ij}) + \beta_{5j}(\mathrm{JobTenure}_{ij}) + \beta_{6j}(\mathrm{PU}_{ij}) + \beta_{7j}(\mathrm{PEOU}_{ij}) + r_{ij}$ **National Level Model** $\beta_{0j} = \gamma_{00} + \gamma_{01}(\mathrm{UA}_j) + \gamma_{02}(\mathrm{PD}_j) + \gamma_{03}(\mathrm{IC}_j) + \gamma_{04}(\mathrm{MF}_j) + \gamma_{05}(\mathrm{C}_j) + \gamma_{06}(\mathrm{W}_j) + \gamma_{07}(\mathrm{C*W}_j) + \mu_{0j}$ $\beta_{1j} = \gamma_{10}$ $\beta_{2j} = \gamma_{20}$ $\beta_{3j} = \gamma_{30}$ $\beta_{4j} = \gamma_{40}$ $\beta_{5j} = \gamma_{50}$ $\beta_{6j} = \gamma_{60}$ $\beta_{7j} = \gamma_{70} + \gamma_{71}(\mathrm{UA}_j) + \gamma_{72}(\mathrm{PD}_j) + \gamma_{73}(\mathrm{IC}_j) + \gamma_{74}(\mathrm{MF}_j) + \gamma_{75}(\mathrm{C}_j) + \gamma_{76}(\mathrm{W}_j) + \gamma_{77}(\mathrm{C*W}_j) + \mu_{7j}$ **Mixed Model** $\mathrm{BI}_{ij} = \gamma_{00} + \gamma_{10}(\mathrm{Age}_{ij}) + \gamma_{20}(\mathrm{Gender}_{ij}) + \gamma_{30}(\mathrm{UseHistory}_{ij}) + \gamma_{40}(\mathrm{Education}_{ij}) + \gamma_{50}(\mathrm{JobTenure}_{ij}) + \gamma_{60}(\mathrm{PU}_{ij}) + \gamma_{70}(\mathrm{PEOU}_{ij})$ $+\gamma_{01}(\mathrm{UA}_j) + \gamma_{02}(\mathrm{PD}_j) + \gamma_{03}(\mathrm{IC}_j) + \gamma_{04}(\mathrm{MF}_j) + \gamma_{05}(\mathrm{C}_j) + \gamma_{06}(\mathrm{W}_j) + \gamma_{07}(\mathrm{C*W}_j)$ $+\gamma_{71}(\mathrm{UA}_j)(\mathrm{PEOU}_{ij}) + \gamma_{72}(\mathrm{PD}_j)(\mathrm{PEOU}_{ij}) + \gamma_{73}(\mathrm{IC}_j)(\mathrm{PEOU}_{ij}) + \gamma_{74}(\mathrm{MF}_j)(\mathrm{PEOU}_{ij})$ $+\gamma_{75}(\mathrm{C}_j)(\mathrm{PEOU}_{ij}) + \gamma_{76}(\mathrm{W}_j)(\mathrm{PEOU}_{ij}) + \gamma_{77}(\mathrm{C*W}_j)(\mathrm{PEOU}_{ij}) + \mu_{0j} + \mu_{7j}(\mathrm{PEOU}_{ij}) + r_{ij}$
PEOU→PU	**Individual Level Model** $\mathrm{PU}_{ij} = \beta_{0j} + \beta_{1j}(\mathrm{Age}_{ij}) + \beta_{2j}(\mathrm{Gender}_{ij}) + \beta_{3j}(\mathrm{UseHistory}_{ij}) + \beta_{4j}(\mathrm{Education}_{ij}) + \beta_{5j}(\mathrm{JobTenure}_{ij}) + \beta_{6j}(\mathrm{PEOU}_{ij}) + r_{ij}$ **National Level Model** $\beta_{0j} = \gamma_{00} + \gamma_{01}(\mathrm{UA}_j) + \gamma_{02}(\mathrm{PD}_j) + \gamma_{03}(\mathrm{IC}_j) + \gamma_{04}(\mathrm{MF}_j) + \gamma_{05}(\mathrm{C}_j) + \gamma_{06}(\mathrm{W}_j) + \gamma_{07}(\mathrm{C*W}_j) + \mu_{0j}$ $\beta_{1j} = \gamma_{10}$ $\beta_{2j} = \gamma_{20}$ $\beta_{3j} = \gamma_{30}$ $\beta_{4j} = \gamma_{40}$ $\beta_{5j} = \gamma_{50}$ $\beta_{6j} = \gamma_{60} + \gamma_{61}(\mathrm{UA}_j) + \gamma_{62}(\mathrm{PD}_j) + \gamma_{63}(\mathrm{IC}_j) + \gamma_{64}(\mathrm{MF}_j) + \gamma_{65}(\mathrm{C}_j) + \gamma_{66}(\mathrm{W}_j) + \gamma_{67}(\mathrm{C*W}_j) + \mu_{6j}$ **Mixed Model** $\mathrm{PU}_{ij} = \gamma_{00} + \gamma_{10}(\mathrm{Age}_{ij}) + \gamma_{20}(\mathrm{Gender}_{ij}) + \gamma_{30}(\mathrm{UseHistory}_{ij}) + \gamma_{40}(\mathrm{Education}_{ij}) + \gamma_{50}(\mathrm{JobTenure}_{ij}) + \gamma_{60}(\mathrm{PEOU}_{ij})$ $+\gamma_{01}(\mathrm{UA}_j) + \gamma_{02}(\mathrm{PD}_j) + \gamma_{03}(\mathrm{IC}_j) + \gamma_{04}(\mathrm{MF}_j) + \gamma_{05}(\mathrm{C}_j) + \gamma_{06}(\mathrm{W}_j) + \gamma_{07}(\mathrm{C*W}_j)$ $+\gamma_{61}(\mathrm{UA}_j)(\mathrm{PEOU}_{ij}) + \gamma_{62}(\mathrm{PD}_j)(\mathrm{PEOU}_{ij}) + \gamma_{63}(\mathrm{IC}_j)(\mathrm{PEOU}_{ij}) + \gamma_{64}(\mathrm{MF}_j)(\mathrm{PEOU}_{ij})$ $+\gamma_{65}(\mathrm{C}_j)(\mathrm{PEOU}_{ij}) + \gamma_{66}(\mathrm{W}_j)(\mathrm{PEOU}_{ij}) + \gamma_{67}(\mathrm{C*W}_j)(\mathrm{PEOU}_{ij}) + \mu_{0j} + \mu_{6j}(\mathrm{PEOU}_{ij}) + r_{ij}$

Notes:
i and j represent individuals and countries, respectively.

PU=Perceived Usefulness	PEOU=Perceived Ease of Use	BI=Behavioral Intention
UA=Uncertainty Avoidance	PD= Power Distance	IC=Individualism/Collectivism
MF= Masculinity/Femininity	C= Climate Harshness	W= National Wealth

H1: the link between perceived usefulness and behavioral intention

Table 5 lists the results of the multilevel analysis for the PU→BI link. We now delineate the detailed procedures for testing H_1. A fully unconditional model was constructed in step 1 as a baseline model. In step 2, age, gender, use history, education, job tenure, and PEOU were entered into the model as individual-level control variables. Among these variables, prior use history positively affected (γ_{30}=0.237, p<0.01) intentions to continue seeking knowledge via EKR. Consistent with the TAM literature, PEOU also displayed a significant effect (γ_{60}=0.407, p<0.01) on employees' continued EKR usage intentions. In step 3, the individual-level main predictor (i.e., PU) was entered into the model. A significant positive coefficient (γ_{70}=0.424, p<0.01), along with a significant improvement of model fit ($\Delta\chi^2(1)$=130.162, p<0.01), indicates that PU was positively related to behavioral intentions at the individual level.

In step 4, we conducted a random slope test to examine whether the PU-BI relationship varied across nations significantly. A significant improvement in model fit ($\Delta\chi^2(2)$=8.445, p<0.05) suggests that the slope was significantly different across nations.

After the four dimensions of national culture values were added as national-level control variables in step 5, we included the two national-level main predictors (i.e., climate harshness (C) and national wealth (W)) in step 6. The results show that neither climate harshness (γ_{05}=0.143, p>0.05) nor national wealth (γ_{06}=0.119, p>0.05) alone was a significant predictor of BI.

In step 7, three two-way interactions among climate harshness (C), national wealth (W), and the main predictor (PU) (i.e., C*W, C*PU, W*PU) were added. We also controlled the two-way interactions between national culture values and PU. The significant interaction effect between PU and power distance (PD) (γ_{72}=0.161, p<0.01) suggested that the PU-BI relationship was stronger in high PD cultures than in low PD cultures.

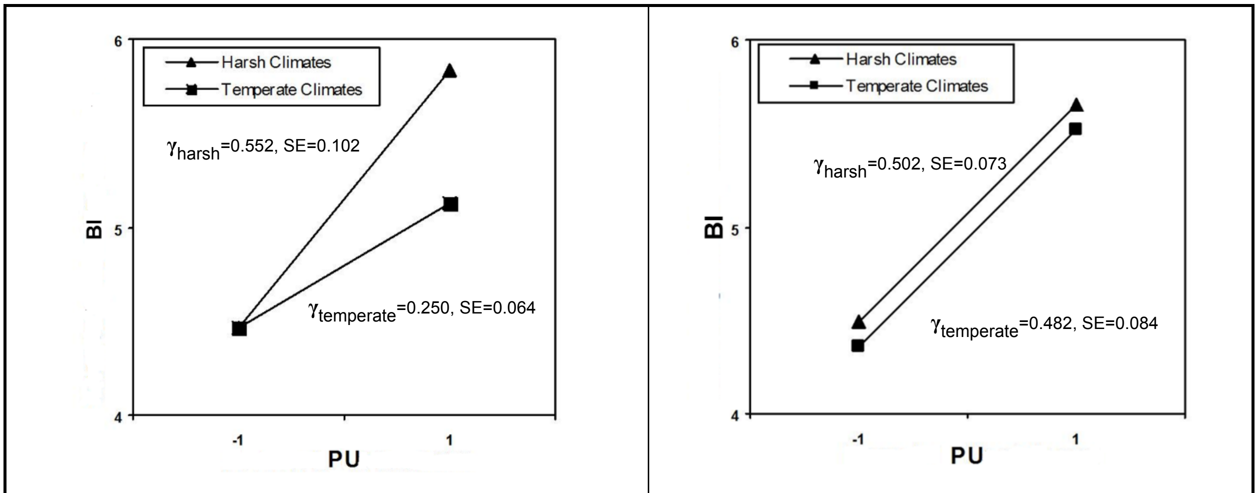
Table 5. Results of Hierarchical Linear Modeling (PU→BI)								
	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7	Step 8
Step 1:								
Constant (γ_{00})	5.283**	4.757**	4.978**	4.958**	4.963**	4.971**	4.991**	4.978**
Step 2: Individual Level Control Variable								
Age (γ_{10})		-0.007	-0.008*	-0.007	-0.008*	-0.007	-0.007	-0.007
Gender (γ_{20})		0.084	0.08	0.083	0.083	0.085	0.078	0.081
Use History (γ_{30})		0.237**	0.18**	0.181**	0.18**	0.177**	0.175**	0.175**
Education (γ_{40})		0.052	0.03	0.034	0.036	0.033	0.035	0.036
Job Tenure (γ_{50})		0.007	0.006	0.005	0.005	0.004	0.005	0.005
PEOU (γ_{60})		0.407**	0.190**	0.182**	0.182**	0.182**	0.184**	0.179**
Step 3: Individual Level Main Predictor								
PU (γ_{70})			0.424**					
Step 4: Random Slope Test								
PU (γ_{70})				0.411**	0.411**	0.412**	0.420**	0.483**
Step 5: National Level Control Variable								
UA (γ_{01})					-0.023	-0.066	-0.054	-0.057
PD (γ_{02})					0.023	0.118	0.069	0.074
IC (γ_{03})					0.06	-0.001	0.028	0.005
MF (γ_{04})					-0.001	0.018	0.012	0.019
Step 6: National Level Main Effect								
C (γ_{05})						0.143	0.101	0.111
W (γ_{06})						0.119	0.042	0.067
Step 7: 2-way Interactions								
UA*PU (γ_{71})							-0.015	0.009
PD*PU (γ_{72})							0.161**	0.122*
IC*PU (γ_{73})							0.073	0.166**
MF*PU (γ_{74})							-0.037	-0.058
C*W (γ_{07})							-0.064	-0.032
C*PU (γ_{75})							0.098*	0.049
W*PU (γ_{76})							0.113*	0.012
Step 8: 3-Way Interaction								
C*W*PU (γ_{77})								-0.119**
Model Statistics								
Deviance (-2 log-likelihood)	4492.769	4292.264	4162.102	4153.657	4153.114	4149.115	4133.662	4127.920
Increase in Model Fit (ΔX^2)		200.505**	130.162**	8.445 *	0.543	3.999	15.453*	5.742*

[a] PU: Perceived Usefulness; PEOU: Perceived Ease of Use; BI: Behavioral Intention; UA: Uncertainty Avoidance; PD: Power Distance; IC: Individualism/Collectivism; MF: Masculinity/Femininity; C: Climate Harshness; W: National Wealth

[b] * p<0.05; ** p<0.01

In step 8, we tested whether the three-way cross-level interaction (i.e., climate harshness and national wealth at the national level and PU at the individual level) influenced individual-level BI. The results reveal a significant three-way interaction effect (γ_{77} = -0.119, p<0.01) together with a significant improvement in model fit ($\Delta\chi^2(1)$=5.742, p<0.05).

To develop a more nuanced understanding, we performed simple slope tests and plotted the interaction effects in Figure 2. In lower income countries (see Figure 2a), the coefficients of the PU-BI link were 0.552 (p<0.01) and 0.250 (p<0.01) for harsh and temperate climates, respectively. In higher income countries (see Figure 2b), the coefficients were 0.502 (p<0.01) and 0.482 ($p<0.01$) for harsh and temperate climates, respectively. Following the procedures prescribed by Dawson and Richter (2006), we compared the coefficients between harsh-poor and temperate-poor and between harsh-rich and temperate-rich nations. The results show that while the PU-BI relationship differed significantly across harsh-poor and temperate-poor nations (t=3.58, $p<0.01$), it did not vary across harsh-rich and temperate-rich nations (t=0.00, $p>0.1$). The above evidence suggests that the difference in the impact of PU on EKR knowledge-seeking intentions between poor-harsh and poor-temperate nations is larger than the difference between rich-harsh and rich-temperate nations. Thus, H_1 is supported.



2a. Lower Income Countries | **2b. Higher Income Countries**

Figure 2. Interaction Diagrams—From Perceived Usefulness to Behavioral Intention

H2: the link between perceived ease of use and behavioral intention

A similar procedure was performed for testing H_2 as was used for testing H_1. The results are presented in Table 6. Importantly, the results of the random slope test (step 4) reveal no improvement in model fit ($\Delta\chi^2(2)=0.757$, $p>0.1$), suggesting that the link between PEOU and individuals' intentions to seek knowledge via EKR did not vary significantly across nations. In other words, no cross-level effect was detected in this relationship. As such, H_2 is not supported. We considered that the rejection of H_2 might be associated with the representativeness of sampled countries in terms of the harshness of climates and national wealth. To validate this explanation, we conducted an additional analysis (discussed later in Additional Analysis I) and found that the results remain insignificant.

Table 6. Results of Hierarchical Linear Modeling (PEOU→BI)

	Step 1	Step 2	Step 3	Step 4
Step 1:				
Constant (γ_{00})	5.283**	4.967**	4.978*	4.990**
Step 2: Individual Level Control Variable				
Age (γ_{10})		-0.008*	-0.008*	-0.008*
Gender (γ_{20})		0.090	0.080	0.080
Use History (γ_{30})		0.182**	0.180**	0.179**
Education (γ_{40})		0.028	0.030	0.030
Job Tenure (γ_{50})		0.006	0.006	0.006
PU (γ_{60})		0.523**	0.424**	0.422**
Step 3: Individual Level Main Predictor				
PEOU (γ_{70})			0.190**	
Step 4: Random Slope Test				
PEOU (γ_{70})				0.187**
Model Statistics				
Deviance (-2 log-likelihood)	4492.769	4189.679	4162.102	4161.345
Increase in Model Fit (ΔX^2)		303.09**	27.577**	0.757

[a] PU: Perceived Usefulness PEOU: Perceived Ease of Use BI: Behavioral Intention
[b] * p<0.05; ** p<0.01

H3: the link between perceived ease of use and perceived usefulness

The results for the moderating effect on the PEOU-PU relationship are shown in Table 7. The random slope test (in step 4) revealed significant improvement in model fit ($\Delta\chi^2(2)=14.314$, $p<0.01$), suggesting that this link had significant variance across nations. After controlling all of the two-way interaction terms, we further detected a significant three-way interaction effect (γ_{67} = -0.135, $p<0.01$) together with a significant improvement in model fit ($\Delta\chi^2(1)=10.136$, $p<0.01$).

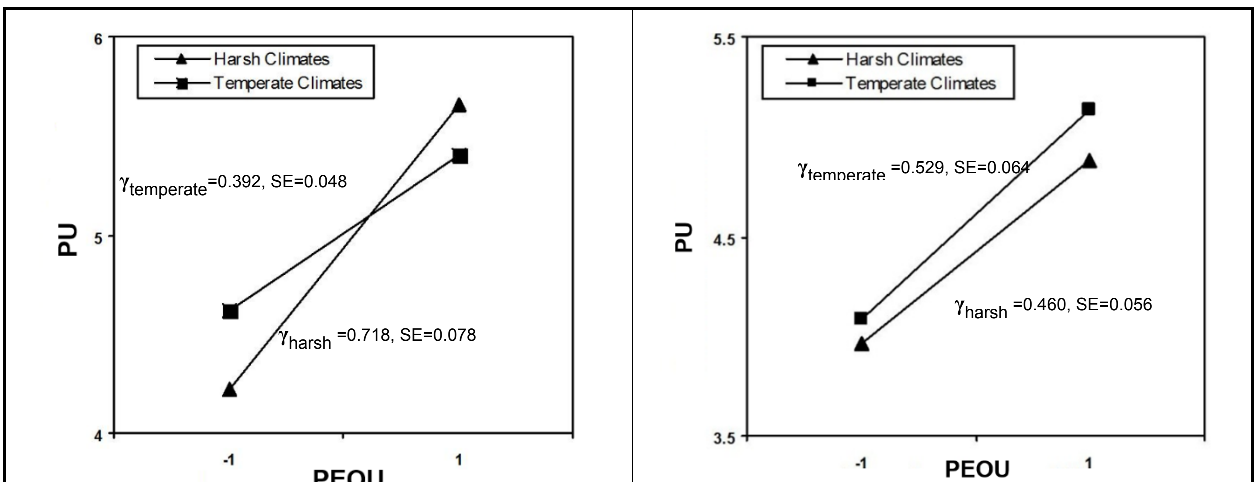
The interaction plots are shown in Figure 3. In lower income countries (Figure 3a), the coefficients of the PU-BI link were 0.718 ($p<0.01$) and 0.392 ($p<0.01$) for harsh and temperate climates, respectively. In higher income countries (Figure 3b), the coefficients were 0.460 ($p<0.01$) and 0.529 ($p<0.01$) for harsh and temperate climates, respectively. Also, using the approach by Dawson and Richter (2006), we compared the coefficients between harsh-poor and temperate-poor and between harsh-rich and temperate-rich nations and found that while the

Table 7. Results of Hierarchical Linear Modeling (PEOU→PU)								
	Step 1	**Step 2**	**Step 3**	**Step 4**	**Step 5**	**Step 6**	**Step 7**	**Step 8**
Step 1:								
Constant (γ_{00})	5.338**	4.61**	4.823**	4.796**	4.768**	4.753**	4.775**	4.757**
Step 2: Individual Level Control Variable								
Age (γ_{10})		0.002	0.001	0.002	0.003	0.003	0.004	0.003
Gender (γ_{20})		0.045	0.005	0.011	0.011	0.007	0.006	0.008
Use History (γ_{30})		0.177**	0.125**	0.132**	0.131**	0.132**	0.132**	0.129**
Education (γ_{40})		0.067*	0.056*	0.052*	0.047	0.046	0.049*	0.05*
Job Tenure (γ_{50})		0.006	0.004	0.003	0.002	0.002	0.002	0.002
Step 3: Individual Level Main Predictor								
PEOU (γ_{60})			0.502**					
Step 4: Random Slope Test								
PEOU (γ_{60})				0.492**	0.489**	0.490**	0.490**	0.556**
Step 5: National Level Control Variable								
UA (γ_{01})					-0.012	-0.007	-0.006	-0.012
PD (γ_{02})					0.07	0.000	-0.017	-0.009
IC (γ_{03})					-0.146	-0.056	0.03	-0.015
MF (γ_{04})					0.073	0.065	0.046	0.061
Step 6: National Level Main Effect								
C (γ_{05})						-0.045	-0.096	-0.076
W (γ_{06})						-0.193*	-0.272*	-0.224*
Step 7: 2-way Interactions								
UA*PEOU (γ_{61})							0.029	0.049
PD*PEOU (γ_{62})							0.022	-0.011
IC*PEOU (γ_{63})							-0.061	0.063
MF*PEOU (γ_{64})							-0.024	-0.059*
C*W (γ_{07})							-0.091	-0.028
C*PEOU (γ_{65})							0.078	0.014
W*PEOU (γ_{66})							0.045	-0.068
Step 8: 3-Way Interaction								
C*W*PEOU (γ_{67})								-0.135**
Model Statistics								
Deviance (-2 log-likelihood)	3824.18	3783.939	3367.207	3352.893	3344.277	3338.802	3331.551	3321.415
Increase in Model Fit (ΔX^2)		40.241**	416.732**	14.314**	8.616	5.473	7.251	10.136**

[a] PU: Perceived Usefulness; PEOU: Perceived Ease of Use; UA: Uncertainty Avoidance; PD: Power Distance; IC: Individualism/Collectivism; MF: Masculinity/Femininity; C: Climate Harshness; W: National Wealth

[b] * p<0.05; ** p<0.01

1



3a. Lower Income Countries | **3b. Higher Income Countries**

Figure 3. Interaction Diagrams—From Perceived Ease of Use to Perceived Usefulness

PEOU-PU link varied significantly across harsh-poor and temperate-poor nations (t=3.35, p<0.01), it did not differ between harsh-rich and temperate-rich nations (t= -0.94, p>0.1). Thus, H_3 is also supported.

Additional Analysis I: Sample Representativeness

The rejection of H_2 may be attributable to the representativeness of the 30 nations sampled. To attenuate this potential bias, we excluded countries whose standardized values of climate harshness and national wealth are closest to the group mean so that the remaining samples can better represent the four climato-economic situations. This approach is in spirit similar to the suggestion by Aiken and West (1991) to remove samples nearby the mean values of the predictors so as to enhance the chance of detecting the theorized interaction effect, if any exists.

Table 8. Results of Hierarchical Linear Modeling with Data from 25 Nations (PEOU→BI)

	Step 1	Step 2	Step 3	Step 4
Step 1:				
Constant (γ_{00})	5.284**	5.007**	4.996*	5.014**
Step 2: Individual Level Control Variable				
Age (γ_{10})		-0.008	-0.008	-0.008
Gender (γ_{20})		0.106	0.097	0.096
Use History (γ_{30})		0.167**	0.167**	0.164**
Education (γ_{40})		0.022	0.025	0.025
Job Tenure (γ_{50})		0.011	0.011	0.011
PU (γ_{60})		0.535**	0.448**	0.446**
Step 3: Individual Level Main Predictor				
PEOU (γ_{70})			0.165**	
Step 4: Random Slope Test				
PEOU (γ_{70})				0.161**
Model Statistics				
Deviance (-2 log-likelihood)	3879.713	3607.515	3589.674	3588.567
Increase in Model Fit (ΔX^2)		272.198**	17.841**	1.107

[a] PU: Perceived Usefulness PEOU: Perceived Ease of Use BI: Behavioral Intention
[b] * p<0.05; ** p<0.01

Since multilevel analysis typically requires at least 25 high-level units for analysis (Kreft & De Leeuw, 1998), we excluded five countries (New Zealand, Italy, Spain, Taiwan, and Japan) with the closest Euclidean distance to the group mean values (climate harshness and national wealth) (see Figure B in Appendix B). With samples from the remaining 25 countries, we performed additional analyses by following a procedure similar to that of the main analysis. The results (Table 8), again, suggest that the PEOU-BI relation had no significant variance across nations, which are highly consistent with the results using the data from the 30 countries (Table 6). These evidences, as a whole, suggest that our results are quite robust even after addressing the potential concern of sample representativeness.

Additional Analysis II: Effect of Subsidiary Centrality

A competing explanation argues that the observed cross-national differences might be a function of the subsidiary network centrality. That is, employees at peripheral locations (who are more likely to be located in low-income countries) may face greater difficulties in accessing organizational knowledge and may have longer search paths compared to their counterparts at headquarter locations (who are more likely to be located in high-income countries) (Singh *et al*, 2010). Hence, the centrality of a MNC subsidiary may affect accessibility to knowledge resources and hence employees' dependence on the EKR. In other words, the more central the location in which a subsidiary is located, the more likely the employees of this subsidiary have knowledge access other than EKR, thereby leading to less continued EKR use.

To address this concern, we gathered data from 22 countries we sampled earlier about the transportation volume (i.e., the 20-foot equivalent unit (TEU)) the subsidiaries in each nation handle on a yearly basis. In a multinational logistic company, the transportation volume reflects the intensity of the business activity. Subsidiaries with large transportation volume bring more revenue and assume higher importance to the company. In other words, the higher the TEU associated with a subsidiary, the more business activities this subsidiary is engaged, and the more central the subsidiary would be. Hence we used this variable to operationalize the importance of the subsidiary in each nation so as to assess the extent to which it is central/peripheral to the company's global operation. In particular, we first tested the correlation among TEU, national wealth, climate harshness, and aggregated BI. We then added the main effect and associated moderating effects of TEU into our model as additional national level control variables in order to rule out this alternative explanation.

The results suggest that TEU was not significantly correlated with national wealth (γ=0.067, p>0.05), climate harshness (γ=0.177, p>0.05), or aggregated behavioral intentions (γ=0.172, p>0.05). In addition, while the direct and moderating effects of TEU are both not significant for either the PU-BI path ($\gamma_{(TEU)}$=0.023, p>0.05; $\gamma_{(TEU*PU)}$=0.022, p>0.05) or the PEOU-PU path ($\gamma_{(TEU)}$=0.028, p>0.05; $\gamma_{(TEU*PEOU)}$= -0.008, p>0.05), the hypothesized three-way interactions (PU→BI: $\gamma_{(C*W*PU)}$= -0.127, p<0.01; PEOU→PU: $\gamma_{(C*W*PEOU)}$= -0.147, p<0.01) remained significant for these two paths. Hence, our results are robust against the effect of subsidiary network centrality.

Additional Analysis III: Effect of Individual Income

In addition to national wealth (i.e., collective income), household income and individual income may also influence an individual's endorsement of instrumentality in his/her behaviors, suggesting an effect over and above the climato-economic explanation. Because prior literature indicates that individual income tends to correlate highly with education level (e.g., Bornstein and Bradley, 2003), we used one's education attainment as a proxy of individual income to safeguard this alternative explanation. In particular, we added the two-way and three-way interactions among climate harshness, education, and the main predictors into our model and replicated the analyses. We found that the hypothesized three-way interactions remained qualitatively unchanged for the link between PU to BI ($\gamma_{(C*W*PU)}$= -0.121, p<0.01) and for the link between PEOU and PU ($\gamma_{(C*W*PEOU)}$= -0.141, p<0.01). Over and above the interaction of climate harshness and national wealth, the interaction between individual income and climate harshness exhibited a significant main effect on BI ($\gamma_{(C*EDU)}$= -0.077, $p<0.05$), but not on PU ($\gamma_{(C*EDU)}$=0.025, $p>0.05$).

DISCUSSION

Results Summary

The results reveal interesting cross-national differences in the PU-BI and PEOU-PU relationships across different climato-economic nations. Two of the three proposed hypotheses were supported by the empirical evidence. In Table 9, we summarize our findings for each path in the research model and discuss the results for each hypothesis in more detail.

Table 9. Summary of Results

Results of Hypothesis Testing	Findings
Wealth×Climate ↓ PU → Intention H1:($\gamma_{poor, harsh}$ - $\gamma_{poor, temperate}$) > ($\gamma_{rich, harsh}$ - $\gamma_{rich, temperate}$) SUPPORTED (√)	The difference in the strength of the PU-BI relationship between poor-harsh and poor-temperate nations was greater than the difference between rich-harsh and rich-temperate nations.
Wealth×Climate ↓ PEOU → Intention H2:($\gamma_{poor, harsh}$ - $\gamma_{poor, temperate}$) > ($\gamma_{rich, harsh}$ - $\gamma_{rich, temperate}$) REJECTED (×)	The strength of the PEOU-BI relationship did not show cross-national differences.
Wealth×Climate ↓ PEOU → PU H3:($\gamma_{poor, harsh}$ - $\gamma_{poor, temperate}$) > ($\gamma_{rich, harsh}$ - $\gamma_{rich, temperate}$) SUPPORTED (√)	The difference in the strength of the PEOU-PU relationship between poor-harsh and poor-temperate nations was greater than the difference between rich-harsh and rich-temperate nations.

Perceived usefulness and behavioral intentions to continue seeking knowledge from EKR

As expected, the results reveal that the strength of the relationship between PU and intention to continue seeking knowledge from EKR was subject to the interaction between national wealth and thermal climate harshness. In lower income countries, the impact of PU on individuals' intentions to continue using EKR to seek knowledge was significantly weaker for employees in poor-temperate nations than those in poor-harsh nations. However, in higher income countries, employees in harsh climates and temperate climates showed less obvious discrepancy in their behavioral reactions toward the usefulness of EKR.

Interestingly, we detected a positive interaction effect between PU and power distance (PD) on behavioral intention, which is different from the findings of McCoy *et al* (2007), who observed an insignificant PU-BI link in high PD cultures but a significant link in low PD cultures among student users of online teaching technologies. The dissimilar findings between the current study and that by McCoy *et al* (2007) may be explained by the different contexts of investigation (e.g., student vs. employee subjects and learning-related vs. task-oriented technologies). In our investigative context, it is possible that employees' intentions to continue using the EKR system can be motivated by its usefulness, especially when the knowledge available in EKR helps employees accomplish instrumental goals desired or set by authorities/management.

Perceived ease of use and behavioral intentions to continue seeking knowledge from EKR

Next, while the results show that PEOU directly influences individuals' intentions to continue seeking knowledge from EKR, we found no support for the moderating effect of national wealth and climate harshness on this link. One plausible explanation of this unsupported result is that besides the effort-saving mechanism that we rely on to characterize this path, PEOU may also affect behavioral intentions via the self-efficacy mechanism (Davis, 1989; Pavlou & Fygenson, 2006); that is, an easy-to-use system could enhance users' self-efficacy by making them feel that they can carry out the actions needed to operate the system (Deci, 1975; Bandura, 1982), thereby forming higher intentions to continue using the system. In other words, the effect of PEOU on individuals' intentions to search for knowledge via EKR does not purely arise out of utilitarian concerns. The mixed effects of these two mechanisms (i.e., effort-saving and self-efficacy mechanisms) may have diluted the significance of our results.

Perceived ease of use and perceived usefulness

Finally, our findings show that the PEOU-PU link does in fact vary significantly across nations. Specifically, the difference in the strength of the PEOU-PU relationship between employees in poor-harsh and poor-temperate nations was more dramatic than between employees in rich-harsh and rich-temperate nations. By conceiving the PEOU-PU link as an efficiency-enhancement instrumental mechanism, our results reveal, for the first time, the existence of meaningful cross-national differences in the strength of this relationship.

Contributions to Research

This study makes important contributions to theory development as well as research methodology in the IS field. First, this study contributes to IS theory building by synthesizing EKR knowledge-seeking behaviors, the technology acceptance model (TAM), and the climato-economic theory (CET) with a particular focus on instrumentality. Our results demonstrate how the strength of the relationships between perceived usefulness (PU) and behavioral intention (BI) and between perceived ease of use (PEOU) and PU varies across nations according to the extent to which instrumentality is differentially emphasized in different climato-economic conditions. To the best of our knowledge, this is one of the first studies that specifically theorizes about and successfully identifies the moderating effect of national-level factors on the individual-level relation between PEOU and PU. By emphasizing the instrumental nature of employees' IS use in general and of EKR knowledge-seeking behaviors in particular, our work sheds light on a promising direction for future cross-national IS research. For instance, PU is typically viewed as the dominant extrinsic motivator for IS use, and PU could be shaped by utilitarian factors, such as image, result demonstrability, job relevancy, and output quality (Venkatesh & Davis, 2000). It would be interesting to investigate if these instrumental factors predict PU differentially across nations.

Importantly, this research also demonstrates the value of the climato-economic theory as a useful lens for understanding cross-national behavioral differences. Implicitly assuming that culture and behavioral patterns are conceptually separable, most prior studies typically apply the national culture values proposed by Hofstede to account for any observed cross-national or cross-cultural behavioral differences (e.g., Straub *et al*, 1997; Srite & Karahanna, 2006; McCoy *et al*, 2007). However, as cautioned by some scholars, if behavioral patterns are actually manifestations of cultural values and if they are mutually influential, it would be difficult to distinguish the cause from the effect (Peter & Olson, 1998; Luna & Gupta, 2001; House *et al*, 2004). Toward this end, the climato-economic theory extends this stream of research by identifying two macro-level factors (i.e., climate harshness and national wealth), which go beyond culture, to serve as an alternative explanation for cross-national behavioral differences. Our application of CET for explaining cross-national behavioral differences, thus, opens a whole new window for cross-national IS research. We strongly encourage interested researchers to scrutinize the culturally construed nature of IS-usage behavioral patterns and incorporate the climato-economic perspective to achieve a more holistic understanding with regard to behavioral differences across national boundaries.

This study also pushes the envelope of the climato-economic theory in several aspects. Since its inception, CET has been applied to explain differences in psychological and behavioral patterns across nations (Van de Vliert, 2009). Ample empirical evidence strongly suggests that instrumental psychological and behavioral patterns are shaped by climato-economic environments (Van de Vliert, 2007a); recent developments in the climato-economic theory indicate that such differential patterns can be observed not only in people's familial and social lives but also in their workplaces (Van de Vliert *et al*, 2009). For example, this spillover effect has been illustrated by cross-national differences in child labor practices and in employees' attitudes toward wages (Van de Vliert *et al*, 2008). Our study further affirms this spillover effect by investigating cross-national differences in the behavioral model of knowledge-seeking via EKR, as this behavior represents a typical survival-coping strategy in modern organizations (Kock *et al*, 2008). With this knowledge-seeking focus, this study also contributes to the KM literature as prior empirical KM studies focused more on knowledge-contribution behaviors (e.g., Constant *et al*, 1996; Jarvenpaa & Staples, 2001; Wasko & Faraj, 2000) than on knowledge-seeking behaviors.

Finally, this study advances the research methodology for cross-national IS research. To the best of our knowledge, this work is one of the few IS studies that includes as many as 30 countries in a single study. This multinational research design enables us to address common challenges encountered by prior studies. To understand the impact of environmental factors at the macro level on the technology acceptance model at the individual level, hierarchical learning modeling (HLM) is an ideal technique to conduct multilevel analyses statistically. However, HLM requires the dataset to cover at least 25 units at the higher level (e.g., national level) (Kreft & De Leeuw, 1998). Since it is difficult in practice to collect primary data from so many countries, most cross-national IS studies, if not all, have been restricted to primary data from only three to four countries (Straub, 1994; Straub *et al*, 1997; Keil *et al*, 1995; Keil *et al*, 2000). As a result, these studies typically rely on cross-group comparison techniques for analysis. As indicated by Aiken and West (1991), relative to the interaction approach, cross-group comparison techniques are weaker in their power to detect between-group differences. In addition, having data from only three to four countries may also cause scholars to underestimate cross-national effects, as this type of research design does not representatively include most countries that are major players in the global economy. Toward this end, the multinational design of this research addresses the above concerns by collecting data from a wider array of countries, which also allows for analyzing the data with advanced multilevel techniques like HLM, thereby achieving a more holistic and in-depth understanding of the phenomenon of interest.

Implications for Practice

Our study also holds important implications for managerial practices. The findings suggest that to encourage employees in different nations to use deployed global EKR more fully, organizations should understand the core mechanism underlying employees' EKR knowledge-seeking behaviors and, more importantly, how this mechanism is jointly affected by national wealth and climate harshness. In this study, we have shown that instrumentality is the key mechanism that underlies users' continued EKR usage model and that this behavioral orientation varies across nations. Managers in multinational organizations should pay particular attention to this differential behavioral orientation and tailor their EKR-implementation strategies to the climato- economic conditions of interest.

For instance, in lower income countries with harsh climates, seeking knowledge through EKR is predominantly stimulated by employees' evaluations of system functionality. Hence, managers could execute interventions that enhance the instrumental values of EKR. They could provide high quality knowledge via EKR to support accomplishing tasks, or they could design easy-to-use interfaces that facilitate work efficiency. In addition, companies should also create opportunities to help employees recognize the utilitarian value of EKR. Such opportunities include proactively communicate with employees about the practical benefits of using EKR or offer incentives for successfully applying knowledge retrieved from EKR. In sum, by intensifying the match between employees' needs and system functions, employees in poor-harsh regions would react more favorably and be more motivated to use EKR.

As another example, our findings suggest that in lower income countries with temperate climates where instrumentalism is emphasized less, employees will have weaker intentions to continue using EKR even when they realize the usefulness of it. Toward this end, managers should realize that employees' weaker intentions might not be caused by the system's usefulness or by its operating ease but that these intentions are caused by the users' nature of being less instrumental-oriented. To better motivate employees to use EKR to seek knowledge, managers could attempt to strengthen the instrumental culture in organizational practices.

The last situation lies in higher income countries with either harsh or temperate climates. Plenty of resources enable employees in this region to better appreciate the values of a useful system and be less constrained by its complexity. Moreover, since an instrumental focus of EKR may not be the dominant reason driving employees' knowledge-seeking behavior in these contexts, managerial interventions may consider other drivers for knowledge-seeking, including collaborative norms and personal knowledge growth.

Limitations and Future Research

Like all empirical research, this study has some limitations, which also shed light on a number of directions for future studies. First, although global EKR management is important, research regarding this subject on a global scale remains limited. While our findings offer insights into cross-national differences in employees' continued EKR knowledge-seeking behavioral patterns, our data was only gathered from one multinational firm in the logistic industry. As such, caution should be exercised when generalizing these findings to other industries. We believe the observed behavioral patterns are especially generalizable to industries with fierce competition, as instrumentality is more likely to be valued and exaggerated in these industrial settings. Interested scholars are encouraged to examine the model in other contexts by collecting data from global firm(s), different industries, or a broader range of nations.

Second, although the results of Harman's one-factor analysis suggested some evidence of CMB, which did not compromise the relationships among the three TAM factors as shown in the results of the common method variance factor test. Nevertheless, we encourage future research to measure the independent and dependent variables using different methods, sources, and scale formats to further minimize the threat of CMB.

Third, climate harshness was measured using the same approach used in prior climato-economic studies (e.g., Van de Vliert 2007a, 2009; Van de Vliert *et al* 2004, 2008, 2009). On the one hand, employing a consistent measure allows scholars to compare findings across studies (Asher *et al* 2004). On the other hand, our current measure may not have fully captured climatic variations in countries with large geographical coverage, thereby downward estimating the effect of climate harshness. Although we still found support for the theorized cross-national climatic effects with this conservative approach, we encourage interested scholars to extend this line of research by looking into the regional segmentations of large countries and investigating climato-economic impacts across regions.

Fourth, the cross-sectional design of this study assumes that climates, national economic statuses, and individual orientations are stable across time. However, it is possible that climate and national wealth change over a long period of time. Thus, individual emphasis on instrumentality is not necessarily static. For example, it has been found that the transition from an agrarian society to an industrial society, which brings about dramatic economic development, is closely linked to a decrease in societal emphasis on materialism and instrumentality (Inglehart & Welzel, 2005). By contrast, as humans are increasingly challenged by threats like global warming and financial crisis, habitants who were initially less utilitarian may have to adapt to a more demanding environment with stronger propensities toward instrumentality. For instance, when the economic systems collapsed in the Soviet Union in the early 1990s, the habitants had to adapt to placing increasing emphasis on instrumentality (Inglehart & Baker, 2000). Thus, we encourage a longitudinal research design that can better trace climate harshness and national wealth so as to investigate their long-term impacts on humans' psychological and behavioral adaptation. Data from both the individual level and the national level covering a longer time period will provide insights into how changes in climate and national wealth affect technology acceptance, knowledge-seeking, and other instrumental behaviors in organizations.

REFERENCES

AGARWAL R and PRASAD J (1997) The role of innovation characteristics, and perceived voluntariness in the acceptance of information technologies. *Decision Sciences* 28 (3), 557-582.

AIKEN LS and WEST SG (1991) Multiple Regression: Testing and Interpreting Interactions. Sage, Newbury Park, CA.

ANDERSON JC and GERBING DW (1988) Structural equation modeling in practice: a review and recommended two-step approach. *Psychological Bulletin* 103 (3), 411-423.

ASHER M, OLIVEIRA ESD and SACHSER N (2004) Social System and Spatial Organization of Wild Guinea Pigs (Cavia Aperea) in a Natural Population. *Journal of Mammalogy* 85(4), 788-796.

BANDURA A (1982) Self-efficacy mechanism in human agency. *American Psychologist* 37 (2), 122-147.

BOCK GW, KANKANHALLI A and SHARMA S (2006) Are norms enough? The role of collaborative norms in promoting organizational knowledge seeking. *European Journal of Information Systems* 15 (4), 357-367.

BORNSTEIN MH and BRADLEY RH (2003) Socioeconomic Status, Parenting, and Child Development. Erlbaum, Mahwah, NJ.

BURTON-JONES A and HUBONA GS (2005) Individual differences and usage behavior:

revisiting a technology acceptance model assumption. *Database for Advances in Information Systems* 36 (2), 58-77.

CHEUNG MWL and AU K (2005): Applications of multilevel structural equation modeling to cross-cultural research. *Structural Equation Modeling* 12 (4), 598-619.

CHEUNG GW and RENSVOLD RB (2002) Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling* 9 (2), 233-255.

CONSTANT D, SPROULL L and KIESLER S (1996) The kindness of strangers: The usefulness of electronic weak ties for technical advice. *Organization science* 7 (2), 119-135.

CROUTER AC (1984) Spillover from family to work: the neglected side of the work-family interface. *Human Relations* 37 (6), 425-442.

DAVENPORT TH and PRUSAK L (1998) Working Knowledge: How Organizations Manage What They Know. Harvard Business School Press, Boston, MA.

DAVIS FD (1989) Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly* 13 (3), 319-340.

DAVIS FD, Bagozzi RP and Warshaw PR (1989) User acceptance of computer technology: a comparison of two theoretical models. *Management Science* 35 (8), 982-1003.

DAVIS FD Bagozzi RP and Warshaw PR (1992) Extrinsic and intrinsic motivation to use computers in the workplace. *Journal of Applied Social psychology* 22 (14), 1111 -1132.

DAWSON JF and RICHTER AW (2006) Probing three-way interactions in moderated multiple regression: development and application of a slope difference test. *Journal of Applied Psychology* 91 (4), 917-926.

DECI EL (1975) Intrinsic Motivation. Plenum Press, New York.

DOLL WJ HENDRICKSON A and DENG X (1998) Using Davis's perceived usefulness and ease-of-use instruments for decision making: a confirmatory and multigroup invariance analysis. *Decision Sciences* 29 (4), 839-869.

FORNELL C and LARCKER DF (1981) Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research* 18 (1), 39 -50.

GEERTZ C (1973) The Interpretation of Cultures: Selected Essays. Basic Books, New York.

GOLDSTEIN H, RASBASH J, PLEWIS I, DRAPER D, BROWNE W, YANG M, WOODHOUSE G and HEALY MA (1998) A User's Guide to MLwiN. University of London.

GRAY PH and DURCIKOVA A (2005) The role of knowledge repositories in technical support environments: speed versus learning in user performance. *Journal of Management Information Systems* 22 (3), 159-190.

GRAY PH and MEISTER DB (2004) Knowledge sourcing effectiveness. *Management Science* 50 (6), 821-834.

HAIR JF, ANDERSON RE, TATHAM R and BLACK WC (1998) Multivariate Data Analysis with Readings (5th ed.). Macmillan, New York.

HE W and WEI KK (2009) What drives continued knowledge sharing? An investigation of knowledge-contribution and -seeking beliefs. *Decision Support Systems* 46(4), 826-838.

HOFSTEDE G (1980) Culture's Consequences: International Differences in Work-Related Values. Sage, Beverly Hills, CA.

HOFSTEDE G (1991) Cultures and Organizations: Software of the Mind. McGraw-Hill, London.

HOFSTEDE G (2001) Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations across Nations (2^{th} ed.). Sage, Thousand Oaks, CA.

HOFSTEDE G and BOND MH (1988) The Confucius connection: from cultural roots to economic growth. *Organizational Dynamics* 16 (4), 5-21.

HONG S, THONG JY and TAM KY (2006) Understanding continued information technology usage behavior: A comparison of three models in the context of mobile internet. *Decision Support Systems 42* (3), 1819-1834.

HOUSE RJ, HANGES PJ, JAVIDAN M, DORFMAN PW and GUPTA V (2004) Culture, Leadership, and Organizations: the GLOBE Study of 62 Societies. Sage, Thousand Oaks, CA.

HOX JJ (2010). Multilevel Analysis: Techniques and Applications. Taylor & Francis.

HOX JJ and MAAS CJM (2001). The accuracy of multilevel structural equation modeling with pseudobalanced groups and small samples. *Structural Equation Modeling* 8, 157-174.

HSIEH PA, RAI A and KEIL M (2008) Understanding digital inequality: comparing continued use behavior models of the socio-economically advantaged and disadvantaged. *MIS Quarterly* 32 (1), 97-126.

INGLEHART R and BAKER WE (2000) Modernization, cultural change, and the persistence of traditional values. *American Sociological Review* 65 (1), 19-51.

INGLEHART R and WELZEL C (2005) Modernization, Cultural Change, and Democracy: The Human Development Sequence. Cambridge University Press, New York.

JARVENPAA S and STAPLES DS (2001) Exploring perceptions of organizational ownership of information and expertise. *Journal of Management Information Systems 18* (1), 151-184.

KANFER R, ACKERMAN PL, MURTHA TC, DUGDALE B and NELSON L (1994) Goal setting, conditions of practice, and task performance: a resource allocation perspective. *Journal of Applied Psychology* 79 (6), 826-835.

KANKANHALLI A, TAN BC and WEI KK (2005a) Understanding seeking from electronic knowledge repositories: An empirical study. *Journal of the American Society for Information Science and Technology* 56 (11), 1156-1166.

KANKANHALLI A, TAN BC and WEI KK (2005b). Contributing knowledge to electronic knowledge repositories: An empirical investigation. *MIS Quarterly* 29 (1), 113-143.

KANTER RM (1977) Work and Family in the United States: A Critical Review and Agenda for Research and Policy. Russell Sage Foundation, New York.

KAPLAN S (1992) Environmental preference in a knowledge-seeking, knowledge-using organism, in The Adapted Mind. (Barkow JH, Cosmides L and Tooby J, Eds), pp 581-598, Oxford University Press, New York.

KATZ J and ASPDEN P (1997) Motivations for and barriers to Internet usage: results of a national public opinion survey. *Internet Research: Electronic Networking Applications and Policy* 7(3), 170-188.

KEIL M, BERANEK PM and KONSYNSKI BR (1995) Usefulness and ease of use: field study evidence regarding task considerations. *Decision Support Systems* 13 (1), 75-91.

KEIL M, TAN BCY, WEI KK, SAARINEN T, TUUNAINEN V, and WASSENAAR A (2000) A cross-cultural study on escalation of commitment behavior in software projects. *MIS Quarterly* 24 (2), 299-325.

KPMG, *Knowledge Management Research Report 2000* (accessible from http://kpmg.interact.nl/home/images/kmreport.pdf).

KOCK N, HANTULA DA, HAYNE SC, SAAD G, TODD PM and WATSON RT (2008) Introduction to Darwinian perspectives on electronic communication. *IEEE Transactions on Professional Communication* 51 (2), 133-146.

KREFT I and DE LEEUW J (1998) Introducing Multilevel Modeling. Sage, London.

LACHMAN R (1983) Modernity change of core and peripheral values of factory workers. *Human Relations* 36 (6), 563-580.

LAWRENCE P and NOHRIA N (2002) Driven: How Human Nature Shapes Our Choices. Jossey Bass, New York.

LAWTON G (2001) Knowledge management: ready for prime time? *Computer* 34 (2), 12-14.

LEPPER MR (1985) Microcomputers in education: motivational and social issues. *American Psychologist* 40 (1), 1-18.

LUNA D and GUPTA SF (2001) An integrative framework for cross-cultural consumer behavior. *Cross-Cultural Consumer Behavior* 18 (1), 45-69.

MARKUS ML (2001) Toward a theory of knowledge reuse: types of knowledge reuse situations and factors in reuse success. *Journal of Management Information Systems* 18 (1), 57-93.

MCCOY S, GALLETTA DF and KING WR (2005) Integrating national culture into IS research: the need for current individual-level measures. *Communications of AIS* 15 (1), 211-224.

MCCOY S, GALLETTA DF and KING WR (2007) Applying TAM across cultures: the need for caution. *European Journal of Information Systems* 16 (1), 81-90.

MEULEMAN B and BILLIET J (2009) A monte carlo sample size study: How many countries are needed for accurate multilevel SEM? *Survey research methods* 3(1), 45-58.

MONTESQUIEU CS (1748) The Spirit of the Laws. Cambridge University Press, Cambridge.

MORRIS MG, VENKATESH V and ACKERMAN PL (2005) Gender and age differences in employee decisions about new technology: an extension to the theory of planned behavior. *IEEE Transactions on Engineering Management* 52 (1), 69-84.

NASIF EG, AL-DAEAJ H, EBRAHIMI B and THIBODEAUX MS (1991) Methodological problems in cross-cultural research: An updated review. *Management International Review* 31 (1), 79-91.

NUNNALLY J (1978) Psychometric Theory. McGraw-Hill, New York, NY.

PARKER PM (1997) National cultures of the world: A statistical reference. Westport, CT: Greenwood.

PARKER PM (2000) Physioeconomics: The Basis for Long-Run Economic Growth. MIT Press, Cambridge, MA.

PAVLOU PA and FYGENSON M (2006) Understanding and prediction electronic commerce adoption: an extension of the theory of planned behavior. *MIS Quarterly* 30 (1), 115-143.

PETER JP and OLSON JC (1998) *Consumer Behavior and Marketing Strategy.* McGraw-Hill, Boston, MA.

PODSAKOFF PM and DW ORGAN (1986) Self-reports in organizational research: Problems and prospects. *Journal of Management* 12 (4), 531-544.

PODSAKOFF P, MACKENZIE S, LEE J and PODSAKOFF N (2003) Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of Applied Psychology* 88 (5), 879-903.

RAUDENBUSH SW and BRYK AS (2002) Hierarchical Linear Models: Applications and Data Analysis Methods. Sage, Newbury Park, CA.

RICHERSON PJ and BOYD R (2005) Not by Genes Alone: How Culture Transformed Human Evolution. University of Chicago Press, Chicago.

ROSE G and STRAUB DW (1998) Predicting general IT use: applying TAM to the Arabic world. *Journal of Global Information Management* 6 (3), 39-46.

SACKMANN SA (1992) Culture and subcultures: an analysis of organizational knowledge. *Administrative Science Quarterly* 37 (1), 140-161.

SEGARS AH (1997) Assessing the unidimensionality of measurement: a paradigm and illustration within the context of information systems research. *Omega* 25 (1), 107 -121.

SEKARAN U (1983) Methodological and theoretical issues and advancements in cross-cultural research. *Journal of International Business Studies* 14, 61-73.

SINGH J, HANSEN MT and PODOLNY JM (2010). The world is not small for everyone: inequity in searching for knowledge in organizations, *Management Science* 56 (9), 1415 -1438.

SNIJDERS TAB and BOSKER RJ (1999) Multilevel Analysis: An Introduction to Basic and Advanced Multilevel Modeling. Sage, London.

SRITE M and KARAHANNA E (2006) The role of espoused national cultural values in technology acceptance. *MIS Quarterly* 30 (3), 679-704.

STEENKAMP JBEM and BAUMGARTNER H (1998) Assessing measurement invariance in cross-national consumer research. *Journal of Consumer Research* 25 (1), 78-107.

STRAUB D, KEIL M and BRENNER W (1997) Testing the technology acceptance model across cultures: a three country study. *Information and Management* 33 (1), 1-11.

STRAUB D, LOCH K, EVARISTO R, KARAHANNA E and SRITE M (2002) Toward a theory-based measurement of culture. *Journal of Global Information Management* 10 (1), 13-23.

STRAUB D (1994) The effect of culture on IT diffusion: e-mail and fax in Japan and the U.S.

Information Systems Research 5 (1), 23-47.

SZAJNA B (1996) Empirical evaluation of the revised technology acceptance model. *Management Science* 42(1), 85-92.

TAYLOR S and TODD PA (1995) Assessing IT usage: the role of prior experience. *MIS Quarterly,* 19 (4), 561-570.

THOMPSON RL, HIGGINS CA, and HOWELL JM (1994) Influence of experience on personal computer utilization: testing a conceptual model. *Journal of Management Information Systems* 11 (1), 167-187.

TODD P, and BENBASAT I (1991) An experimental investigation of the impact of computer based decision aids on decision making strategies. *Information Systems Research* 2 (2), 87-115.

TROMPENAARS F (1993) Riding the Waves of Culture: Understanding Cultural Diversity in Business. Nicholas Brealey, London, UK.

VAN DE VLIERT E (2006) Autocratic leadership around the globe: do climate and wealth drive leadership culture? *Journal of Cross-Cultural Psychology* 37 (1), 42-59.

VAN DE VLIERT E (2007a) Climates create cultures. *Social and Personality Psychology Compass* 1 (1), 53-67.

VAN DE VLIERT E (2007b) Climato-economic Roots of survival versus self-expression cultures. *Journal of Cross-Cultural Psychology* 38 (2), 156-172.

VAN DE VLIERT E (2009) Climate, Affluence, and Culture. Cambridge University Press, Cambridge.

VAN DE VLIERT E and EINARSEN S (2008) Cultural construals of destructive versus constructive leadership in major world niches. *International Journal of Cross Cultural Management* 8 (3), 275-295.

VAN DE VLIERT E, HUANG X and PARKER PM (2004) Do colder and hotter climates make richer societies more, but poorer societies less, happy and altruistic? *Journal of Environmental Psychology* 24 (1), 17-30.

VAN DE VLIERT E, VAN DER VEGT GS and JANSSEN O (2009) Prosocial to egoistic enculturation of our children: a climato-economic contextualization. *Negotiation and Conflict Management Research* 2 (2), 123-137.

VAN DE VLIERT E, VAN YPEREN NW, and THIERRY H (2008) Are wages more important for employees in poorer countries with harsher climates? *Journal of Organizational Behavior* 29 (1), 79-94.

VAN SLYKE C, LOU H, BÉLANGER F and SRIDHAR V (2010) The influence of culture on consumer-oriented electronic commerce adoption. *Journal of Electronic Commerce Research* 11 (1), 30-40.

VENKATESH V and DAVIS FD (2000) A theoretical extension of the technology acceptance model: four longitudinal field studies. *Management Science* 46 (2), 186-204.

VENKATESH V, MORRIS MG, DAVIS GB and DAVIS FD (2003) User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly* 27 (3), 425-478.

WILLIAMS DR (1990) Socioeconomic differentials in health: a review and redirection. *Social Psychology Quarterly* 53 (2), 81-99.

WASKO MM and FARAJ S (2005) Why should I share? Examining social capital and knowledge contribution in electronic networks of practice. *MIS Quarterly* 29 (1), 35-57.

YOON C (2009) The effects of national culture values on consumer acceptance of e-commerce: online shoppers in China. *Information and Management* 46 (5), 294-301.

ZHANG P (2008) Motivational affordances: the fundamental reasons for ICT design and use. *Communications of the ACM* 51 (11), 145-147.

APPENDIX A: SURVEY INSTRUMENT

Please read each item carefully and indicate the degree to which you agree or disagree with the statement:

1	2	3	4	5	6	7
Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree

1. How do you perceive the usefulness of using the EKR system?

• Using the EKR system improves my job performance.	1	2	3	4	5	6	7
• Using the EKR system in my job increases my productivity.	1	2	3	4	5	6	7
• Using the EKR system enhances my effectiveness in my job.	1	2	3	4	5	6	7
• I find the EKR system useful in my job.	1	2	3	4	5	6	7

2. How do you perceive the effort required to use the EKR system?

• Learning to use the EKR system is easy for me.	1	2	3	4	5	6	7
• I find it easy to use the EKR system to do what I want to.	1	2	3	4	5	6	7
• It is clear and easy to understand how to use the EKR system.	1	2	3	4	5	6	7
• I find the EKR system easy to use.	1	2	3	4	5	6	7

3. What is your intention to use the EKR system in the future?

• I intend to use the EKR system in the next two months.	1	2	3	4	5	6	7
• I intend to use the EKR system for my work during the next two months.	1	2	3	4	5	6	7
• I intend to use the EKR system frequently during the next two months.	1	2	3	4	5	6	7

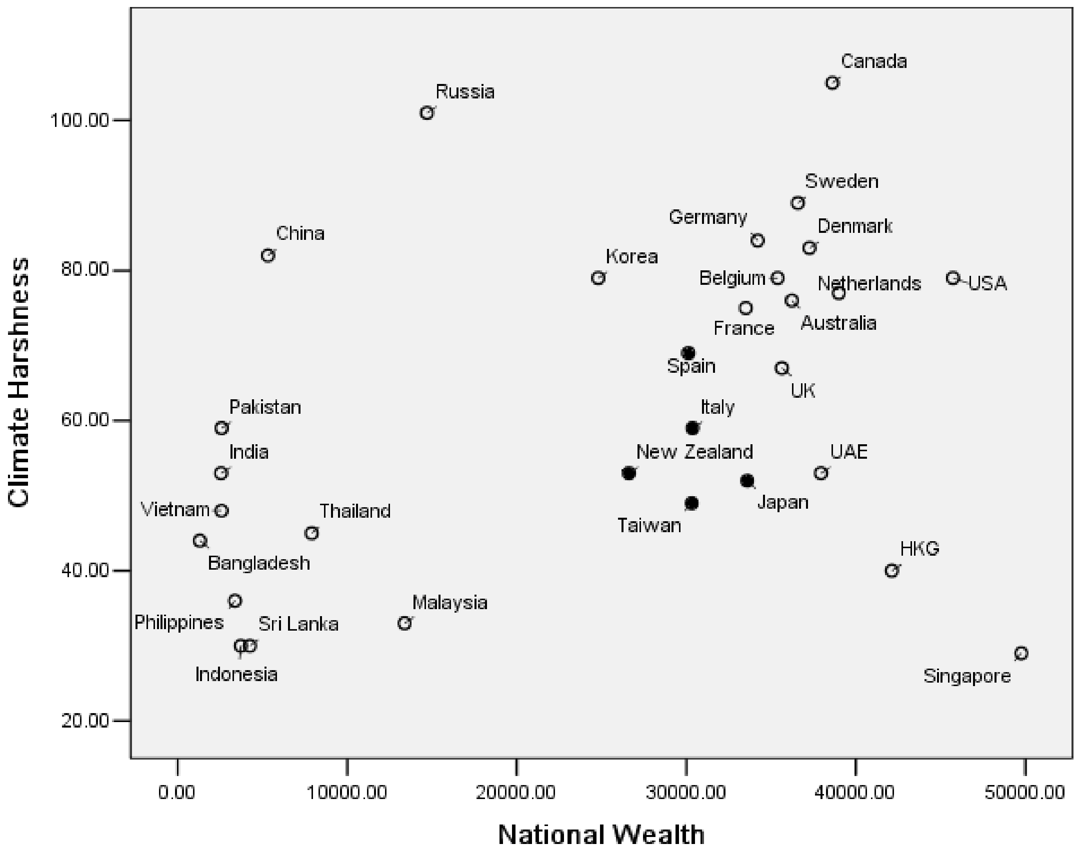
4. How long have your been using the EKR system?

□ Less than 6 months □ More than 6 months but less than 12 months □ More than 12 months

Please provide the information below:

5. Age: ____________
6. Gender: □ Male □ Female
7. Education:
   □ High School □ College □ University □ Post-graduate
   □ Other (Please specify):_____________
8. How long have you been working in your current position? _______ [months]

APPENDIX B: DISTRIBUTION OF NATIONAL WEALTH AND CLIMATE HARSHNESS OF THE SAMPLED NATIONS



Note:

- All of the points (solid or not) represent the countries included in the 30-country analysis.
- The solid points represent the countries that are excluded from the 25-country additional analysis.

Figure B. Distribution of National Wealth and Climate Harshness of the Sampled Nations

APPENDIX C: MEASUREMENT INVARIANCE ANALYSIS FOR GROUP COMPARISON

To evaluate the appropriateness of comparing path coefficients across sub-groups, we applied multi-group measurement invariance analyses, including tests for configural invariance and metric invariance (Doll *et al*, 1998; Steenkamp and Baumgartner 1998). Configural invariance denotes that the patterns of item loadings are congeneric across groups (Doll *et al*, 1998; Steenkamp and Baumgartner 1998). No restrictions are imposed on the metrics across groups when modeling configural invariance (Doll *et al*, 1998). Next, metric invariance determines whether items have equal loadings between groups. Item loadings are set to be equivalent across groups when modeling metric invariance. If the change in CFI between these two nested (configural and metric) models is smaller than the suggested threshold of 0.01 (Cheung and Rensvold 2002), then metric invariance is supported, permitting the path coefficient comparison between groups.

Following the procedures by Hsieh, Rai, and Keil (2008), we performed the configural and metric invariance analyses with AMOS 7.0 to evaluate if the measurement models are invariant across the six pairs of groups: (1) countries with harsh climates and temperate climates, (2) countries with higher incomes and lower incomes, (3) countries with high uncertainty avoidance and low uncertainty avoidance culture, (4) countries with high power-distance and low power-distance cultures, (5) countries with high individualism and high collectivism, and (6) countries with high masculinity and high femininity. Due to sample-size and model-complexity constraints, we performed these analyses separately for each pair of groups.

As can be seen in Table C, the results of the configural invariance analysis show acceptable measurement model fit and reveal that the patterns of item loadings were congeneric across the sub-groups. From configural to metric invariance, the decrease in CFI for pairs 1, 2, 3, 4, 5, and 6 were 0.002, 0.002, 0.001, 0.000, 0.003, and 0.002, respectively. Given that the changes in the CFI of the nested models were all smaller than the recommended 0.01 (Cheung and Rensvold 2002), metric invariance was established, providing support for meaningful path coefficient comparison across the different sub-groups.

Table C. Change in CFI for Multi-Group Invariance Analysis

Group	Configural Model	Metric Model	ΔCFI
1. Harsh Climates vs. Temperate Climates	0.966	0.964	-0.002
2. High Income vs. Low Income	0.967	0.965	-0.002
3. High UA vs. Low UA	0.965	0.964	-0.001
4. High PD vs. Low PD	0.964	0.964	0.000
5. Individualism vs. Collectivism	0.966	0.963	-0.003
6. Masculinity vs. Femininity	0.965	0.963	-0.002

APPENDIX D: COMMON METHOD BIAS TESTING

Table D1. Harmon's One Factor Test: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative%	Total	% of Variance	Cumulative%	Total	% of Variance	Cumulative%
1	5.955	54.137	54.137	5.955	54.137	54.137	3.324	30.216	30.216
2	1.903	17.297	71.434	1.903	17.297	71.434	3.238	29.438	59.654
3	1.313	11.938	83.372	1.313	11.938	83.372	2.609	23.717	83.372
4	0.358	3.253	86.624						
5	0.333	3.023	89.648						
6	0.300	2.730	92.378						
7	0.244	2.222	94.600						
8	0.221	2.006	96.608						
9	0.159	1.441	98.049						
10	0.119	1.084	99.134						
11	0.095	0.866	100.000						

[a] Extraction Method: Principal Component Analysis

Table D2. Single Factor Test: Rotated Component Matrix

	Component		
	1	**2**	**3**
PEOU4	**0.900**	0.252	0.112
PEOU3	**0.884**	0.250	0.091
PEOU1	**0.833**	0.227	0.150
PEOU2	**0.830**	0.305	0.163
PU2	0.268	**0.868**	0.151
PU1	0.246	**0.863**	0.189
PU3	0.303	**0.856**	0.159
PU4	0.257	**0.772**	0.267
BI1	0.108	0.113	**0.937**
BI2	0.108	0.187	**0.936**
BI3	0.195	0.306	**0.794**

[a] Extraction Method: Principal Component Analysis.
[b] Rotation Method: Varimax with Kaiser Normalization.
[c] Rotation Converged in 5 iterations.

Table D3. Common Method Variance Factor Test Results

Construct	Indicator	Factor Loading/Path Coefficient	
		Measurement Model	Measurement Model with Common Method Variable
Perceived usefulness	PU1	0.914	0.915
	PU2	0.917	0.917
	PU3	0.922	0.922
	PU4	0.858	0.858
Perceived ease of use	PEOU1	0.877	0.876
	PEOU2	0.904	0.901
	PEOU3	0.918	0.920
	PEOU4	0.937	0.939
Behavioral intention	BI1	0.928	0.924
	BI2	0.884	0.890
	BI3	0.939	0.936
PU→BI		0.207**	0.208**
PEOU→BI		0.292**	0.291**
PEOU→PU		0.578**	0.577**

[a] * p<0.05, ** p<0.01