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Abstract:

This study examines the occupational values of IT professionals across the world. Using the three-way perspective of cultural theory as integrated, differentiated, and fragmented allows for a more comprehensive view of IT Occupational Culture (ITOC). Conducted under the auspices of the World IT Project, survey responses were gathered from more than 10,000 IT workers in 37 different countries. The findings provide global-based support for the ITOC ideology of values: Autonomy in Decision-Making, Structure in the Workplace, Precision in Communication, Innovation in Technology, Reverence for Knowledge, and Enjoyment in the Workplace (abbreviated as ASPIRE). The most important value was Reverence for Knowledge. ITOC is both more homogeneous and, at the same time, more complex than originally thought. While there are surprising global similarities in ITOC around the world, there are also important differences, which may be due to national culture, especially with regard to Structure in the Workplace and Precision in Communication. A better understanding of ITOC around the world should help reduce the amount of cultural clash between IT departments and business management.

Keywords: IT Occupational Culture, the World IT Project, Survey, IT Professionals.

[Department statements, if appropriate, will be added by the editors. Teaching cases and panel reports will have a statement, which is also added by the editors.]

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1 Introduction

The occupational culture of information technology (IT) professionals has become an area of growing importance in information systems (IS) research (e.g., Jacks et al., 2018; Rao & Ramachandran, 2011; Guzman & Stanton, 2009). Whereas organizational culture describes the cultural norms inside an organization, occupational culture addresses the cultural norms within an entire occupation. For example, police officers have an occupational culture based on values derived from the hazards of police work (Paoline, 2003), and healthcare workers have an occupational culture based on shared values derived from a collective work context (Rivard et al., 2011). In the same vein, IT occupational culture (ITOC) is the shared culture of members of the IT profession. Research has shown that IT employees do have their own unique occupational culture (Guzman & Stanton, 2009) and, importantly, that this shared culture is different from traditional business management culture (Jacks et al., 2018).

One of the benefits of studying ITOC is that it helps explain very real business problems that impact most organizations. The unique culture of IT professionals and its friction with business management culture can lead to serious issues of organizational dysfunction, conflict, and misalignment (Nord et al., 2007; Kaarst-Brown & Robey, 1999; Ward & Peppard, 1996). For example, differing communication styles, perceptions of work priorities, and low levels of trust between IT and business managers can all lead to poor organizational outcomes (Rao & Ramachandran, 2011). To state the problem bluntly, IS failures frequently arise from cultural conflict in the workplace (Leidner & Kayworth, 2006). Part of the problem is that the occupational culture of IT professionals is fundamentally different from that of business management (Jacks et al., 2018).

At the same time, there is a conceptual challenge with the ITOC explanation when traversing international boundaries. The original theory of Occupational Culture (Trice, 1993) asserts that occupational culture spans across organizational boundaries. In other words, it posits that there are more similarities among IT professionals from one organization to the next than there are differences. However, previous research in ITOC has been primarily conducted in U.S.-based firms. Thus, the logical questions that researchers may ask: does ITOC remain relatively constant among different countries or just within the U.S.? Can IT managers of multinational corporations rely on the findings of previous U.S.-centered studies when considering ITOC in their international subsidiaries? Or can national differences override a shared occupational culture? To date, no one has attempted to answer these critical questions because doing so requires an extremely large data set of IT professionals from around the world. This is the gap in our knowledge that this study seeks to fill by using data collected as part of the World IT Project.

The World IT Project is a mega-project to collect data about IT professionals around the world which has recently completed data collection. Data was collected from 37 different countries from all major regions of the globe resulting in a sample size of more than 10,000 responses. The primary purpose of the World IT Project is to overcome the limitation of much of IS research that is based in the context of the U.S. or of Western countries and create a truly global view of the state of IT (Palvia et al., 2017). Among many other elements, the World IT Project questionnaire included items for measuring ITOC in order to examine the level of variance among many countries with regard to occupational culture. Of the many research objectives of the World IT Project, an important one was to discover whether the phenomenon of ITOC could be broadened to account for occupational preferences of the IT profession around the world and thus to widen the theoretical lens from a U.S.-centric context to a truly global perspective.

The overarching research objective for this study is focused on determining whether ITOC is really homogeneous around the world or more heterogeneous when examined globally. Addressing such concerns can provide both researchers and practitioners a more nuanced perspective of the context of IT professionals across the world. In order to achieve this objective, this study uses the three-way perspective of culture as a path towards that goal. The three-way perspective asserts that any culture can be understood as 1) integrated, 2) differentiated, and 3) fragmented (Martin, 2002), as explained further in the literature review section. While the integrated perspective exemplifies the traditional view of shared culture as homogeneous, there may be important differences in different parts of the world which are captured by the differentiated and fragmented views. Our research agenda answers several calls for research. For example, a) Cultural research tends to focus solely on U.S. and Western cultures with small sample sizes (Zhang & Lowry, 2008), b) Additional cultural research in IS is needed in less developed countries (Chu & Chen, 2019), c) Cultural research needs to look at culture that manifests across, not just within, firms and the socio-cultural embeddedness of organizations within larger cultures (Giorgi et al.,

2015), d) Research based on the three-way view of culture has been called for in IS (Jackson, 2011; Kappos & Rivard, 2008), and e) IT occupational culture, in particular, still needs to be examined in international settings (Guzman & Stanton, 2009).

The remaining sections of this paper will review the relevant literature, outline the research methods, present the findings, and then discuss the results and their implications as well as limitations and conclusions of this study.

2 Literature Review

Culture remains an enduring topic of interest in IS research (Kummer & Schmiedel, 2016). Studying culture in the workplace is more important than ever and understanding the effects of culture in the workplace continues to offer rich examples of what drives employee behavior. For example, culture in the context of organizations is evolving due to social media and other new forms of technology which bring both new skills and new assumptions about the nature of work (Schein, 2015). As more and more workers become remote teleworkers, culture may be the most important thing linking employees together in the absence of a shared office building (Jacks, 2021). Culture focuses on the shared values, meanings, practices, and norms of a group (Gallivan & Srite, 2005). A commonly applied definition of culture in IS research is that culture is primarily a manifestation of core value patterns shared by members of a collective group (Geeling et al., 2019; Karahanna et al., 2005; Srite et al., 2003; Straub et al., 2002). Values are defined as enduring beliefs that specific modes of conduct are socially preferable on a continuum of relative importance (Straub et al., 2002; Rokeach, 1973). This values-based view of culture continues to be popular because values can be easier to recognize and measure in quantitative research than other cultural artifacts such as practices (Chu & Chen, 2019; Geeling et al., 2016). Cultural values are typically acquired early in life through socialization and education and are slow to change over time (Karahannaet al., 2005; Gallivan & Srite, 2005).

Embedded in this idea of shared values is an underlying emphasis on what is common or similar within a culture. However, to assume that everyone within a cultural group shares the exact same values to the same degree of importance, simply by virtue of their membership in the group, is to commit an “ecological fallacy” (Straub et al., 2002). In order to avoid this fallacy, it is important to query individuals about their espoused cultural values and measure them instead of assuming that all members think the same way. Hence, while homogeneity is a key element of any culture, it cannot be assumed. Culture must be measured at the individual level and then aggregated since culture is a group-level phenomenon by definition (Straub et al., 2002). One of the most successful uses of the shared values approach in cultural research is Hofstede’s value dimensions of national culture.

Hofstede defined culture as “the collective programming of the human mind that distinguishes the members of one human group from those of another” (Hofstede, 1980, p. 24). The original Hofstede study was primarily concerned with examining differences among countries along four dimensions (later five, then six). For example, Hofstede recognized that while not everyone from a certain country scores the same for the Power Distance Index (PDI; a belief that power should not be distributed equally in society), the PDI scores in aggregate tend to be higher in Arabic countries such as Saudi Arabia than in Western countries such as Canada. Many IS cultural studies still use these dimensions at a national level even though national culture can be very heterogeneous (Geeling et al., 2016; Gallivan & Srite, 2005). According to a landmark study investigating trends in cultural research in IS (Leidner & Kayworth, 2006), Hofstede’s value dimensions were used in about 60% of IS research. But more recently, that number has declined to 38% (Chu & Chen, 2019). This is due, in part, to an evolving interest in other levels of cultural analysis because, as many studies have discovered, culture refers to much more than just national culture. Because Hofstede’s original study in 1980 gathered data from IBM staff around the world, it is unclear which values were related to the organizational culture of IBM, which ones were related to the high-tech occupation, and which ones were due to national cultural differences. Nevertheless, this study launched an ongoing stream of research on the importance of understanding cultural values in the workplace.

While research on cultural values has seen growth in popularity, it is not without its critics. There are a number of danger zones to avoid. One is assuming that country and culture are equivalent. For example, Malaysia is a combination of at least three different cultures – Malay, Chinese, and Indian (Suri & Abbott, 2013). Ethnic groups in South Africa (Indian, Black, and Caucasian) can score significantly differently on espoused cultural values (Urban et al., 2008). And India is home to a diversity of languages, religions,

geographies, and economic levels such that a cohesive national level culture is difficult to articulate (D'Mello & Eriksen, 2010; Ravishankar, 2014). Even so, these studies are still able to identify a sense of Indianness and typical Indian values (D'Mello & Eriksen, 2010; Ravishankar, 2014) yet we should avoid any notion that all members of a group are necessarily the same. Moreover, examining only one type of culture at a time runs the risk of missing or masking other important elements that may be influencing group behavior (Yammarino & Dansereau, 2011; Gelfand et al., 2006). Cultural research is a complex endeavor.

Another danger is in viewing culture as a static rather than dynamic phenomenon (Signorini et al., 2009). Culture can be described as negotiated, emergent, and even contested (Suri & Abbott, 2013). Values at different levels are not mutually exclusive but highly overlapping and intertwined (Suri & Abbott, 2013). For example, D'Mello & Eriksen (2010) identified four levels of culture simultaneously at play including corporate, IT work, national, and primordial culture which lent itself to viewing culture as an emergent and dynamic phenomenon. Ethnographic studies may lend themselves more readily to this type of approach of culture as emerging over time (e.g., Ravishankar, 2014; Suri & Abbott, 2013; D'Mello & Eriksen, 2010) than quantitative research on values. Rather than looking for identical sets of values, it makes more sense to look for 'family resemblances' within and between diverse groups of people (Signorini et al., 2009). Despite these criticisms, values should be considered an important (albeit not the only) cultural antecedent of behavior (Suri & Abbott, 2013; Karahanna et al., 2005) and therefore group values remain a useful area as a starting point for better understanding group behavior.

Group behavior can be influenced by different levels of culture. A frequently employed model in IS research, called the "virtual onion" model, serves as a useful overarching framework for identifying the different layers of culture (Kummer & Schmiedel, 2016; Karahanna et al., 2005). Cultural groups can be examined at various layers (like in an onion) of analysis including national (Hofstede, 1980; House et al., 2004), organizational (Schein, 2010; Cameron & Quinn, 2011), and occupational (Trice, 1993; Guzman & Stanton, 2009) (see Figure 1). While the layers of national and organizational culture continue to receive much attention in IS literature (e.g., Schmiedel et al., 2020; Chu et al., 2019; Crossler et al., 2019), very few scholars have examined the occupational layer. Occupational behavior, i.e., workplace behavior, should be examined within the context of the most relevant layer which is, arguably, the occupational layer. IS research has speculated that occupational culture is more likely to shape workplace behavior than cultures existing at other layers (Gallivan & Srite, 2005; Karahanna et al., 2005).

The onion model is a useful way of presenting different levels of culture, but it should be emphasized that all levels are typically in play simultaneously (Karahanna et al., 2005; Yammarino & Dansereau, 2011). We advocate the spinning top as another useful metaphor. Signori et al. (2009) make the compelling assertion that "the concept of layers, which metaphorically can be represented as separate coats one wears and takes off one by one, may not be adequate and instead one's multicultural being is better symbolized as a single knitted coat with different types of thread" (p. 258). But before we can examine how the different layers or threads interact with one another, we must first identify the most relevant levels of inquiry. Behaviors with a strong task component or involving competence values or practices are likely more heavily influenced by the professional or occupational level of culture than other levels (Karahanna et al., 2005).

Figure 1. The Virtual Onion Model (adapted from Gallivan & Srite, 2005)

Occupational culture is a more recent area of cultural research and may be more relevant to understanding workplace behavior than organizational or national culture (Schein, 2015). Occupational cultures are distinctive clusters of values, beliefs, cultural forms, and practices that emerge within an occupation (Trice, 1993). An occupational culture arises from shared experiences including educational backgrounds, workplace duties, language, and history (Trice, 1993). Unlike organizational cultures, occupational cultures are supra-organizational (as in the virtual onion model) and typically extend across the boundaries of many organizations (Guzman et al., 2008; Trice, 1993). However, it is not clear from the existing literature whether occupational cultures extend across national boundaries.

According to the theory of occupational culture, an occupation has its own distinct culture if it displays evidence of seven characteristics including: (1) Esoteric knowledge and expertise, (2) Extreme or unusual demands, (3) Consciousness of kind, (4) Pervasiveness, (5) Favorable self-image and social value in tasks, (6) Primary reference group, and (7) Abundance of cultural forms (Trice, 1993). The IT occupation has attributes consistent with all seven characteristics above and hence its members have their own recognizable culture (Kaarst-Brown & Guzman, 2010; Guzman et al., 2008; Ramachandran & Rao, 2006). Particularly, ITOC meets these criteria – it can be characterized as (1) placing a high value on knowledge and expertise (about technology and emerging trends); (2) extreme and unusual demands (long hours, dealing with unsatisfied users, or need for constant self-re-education); (3) consciousness of kind (geek and nerd labels); (4) high pervasiveness in non-work contexts (the use of IT in leisure time); (5) favorable self-image (feelings of superiority relative to the IT user community); (6) the desire for their work to be judged by their peers rather than management; and (7) frequent use of technical jargon (Kaarst-Brown & Guzman, 2010; Guzman & Stanton, 2009; Guzman et al., 2008).

Members of the IT occupation can be defined as “the workers who design, build, and manage application systems, who introduce them and other related IT into organizational environments, who operate, maintain, extend, and manage the IT, and who provide training, documentation, and support for the organizational context in which these systems are embedded” (Niederman et al., 2016, p. 29). ITOC is broadly defined as the basic assumptions, cultural forms, ideologies, and behaviors that grow uniquely in the context of the IT occupation (Guzman et al., 2008; Guzman & Stanton, 2009). More precisely, ITOC is composed of the shared values, artifacts, and tacit assumptions within the IT occupation (Jacks et al., 2018). Note that it is critical to distinguish ITOC from other terms used in IS research such as “IT Culture” (Walsh et al., 2010) which refers to the types of end-users and “Culture in IT” (Pliskin et al., 1993) which pertains to cultural values embedded in a particular technology or implementation. In contrast, the term ITOC refers to an instantiation of occupational culture and is an important construct to include in IS and related research.

An important implication of ITOC is that cultural differences between occupations can be a significant source of conflict within organizations (Jacks et al., 2018). Hence, various studies have sought to identify how ITOC differs from the culture of non-IT management, where differences are more pronounced, and how they can lead to negative organizational outcomes. A common view is that the business sees IT as too focused on technology instead of the interests of the entire organization, while IT sees business users as “technologically inept and insufficiently aware of the importance and complexity of IT” (van den Hooff & de Winter, 2011, p. 255). Conflict emerges when the technology-centric culture of IT personnel clashes with the people-centric culture of non-IT business managers (Rao & Ramachandran, 2011). Conflict can manifest in at least four areas including 1) the role of IT in the organization (primary vs. support), 2) the use of technical jargon vs. business language, 3) lack of trust between IT and end users, and 4) differing preferences for organizational structure (flat vs. hierarchy) (Rao & Ramachandran, 2011). Examples of such conflict can range from the friction of simple misunderstandings to outright hostility between IT and business users. Business users may require extensive technical support but IT workers perceive this as annoying baby-sitting (Guzman, 2008). IT workers may see business managers as not sufficiently competent technically which is perceived by managers as arrogance (Rao & Ramachandran, 2011). Project managers may dictate aggressive deadlines to IT developers who see them as unrealistic expectations (D’Mello & Eriksen, 2010). Business users can view IT workers as geeky and egotistical yet still expect them to know everything about a wide range of technologies that are constantly changing (Rao & Ramachandran, 2011). IT workers tend to require a lot of technical detail when communicating about project scope and deliverables whereas business managers can be vague on business requirements (Jacks et al., 2018). Such negative issues only serve as obstacles to a true sense of partnership.

On the other hand, more positive interactions between IT workers and business managers can lead to higher rates of project success (Iivari & Huisman, 2007; Leidner & Kayworth, 2006) and better

organizational outcomes (Jin & Rounds, 2011). Misalignment between IT departments and business strategy remains an ongoing challenge for senior managers (Kappelman et al., 2020). In sharp contrast, it would be difficult to find research on the accounting occupation or the marketing occupation being "out of alignment" with the overall organizational strategy. Two themes are recurrent in the IS literature: one, that cultural clashes can be barriers to business process and two, that cultural commonalities can be enablers of business processes (Kummer & Schmiedel, 2016).

Part of an underlying cultural friction can be attributed to a conflict in fundamental values (Jacks et al., 2018). Values are broad tendencies towards certain states of affairs that address what is evil versus good, forbidden versus permitted, and abnormal versus normal (Hofstede & Hofstede, 2005). Values have a strong influence on individual choices and behavior (Schein, 2010). Cultures are typically founded on collectively held values (Trice, 1993; Hofstede, 1980; Kluckhohn, 1951) that differentiate one culture from another. IT workers have a cohesive set of occupational values – a shared "occupational ideology" – that unites them and sets them apart from their business colleagues (Jacks et al., 2018). Differences in values between IT workers and non-IT managers can lead to negative outcomes if not appropriately understood and managed.

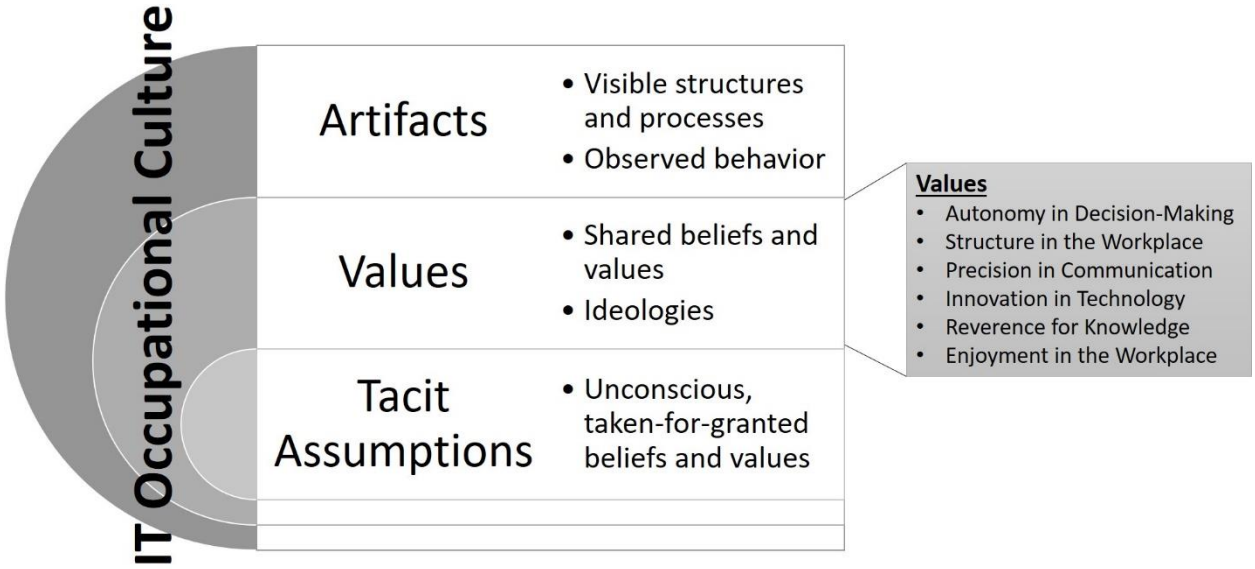

Figure 2, Elements of IT Occupational Culture (adapted from Jacks et al. 2018)

Figure 2 shows a comprehensive theoretical framework of ITOC (based on Jacks et al. (2018)) that guides the current study. There are three major elements to ITOC including Artifacts, Values, and Tacit Assumptions. Values are considered the core of any culture. The six values in the ITOC ideology are: 1) Autonomy in Decision-Making, 2) Structure in the Workplace, 3) Precision in Communication, 4) Innovation in Technology, 5) Reverence for Knowledge, and 6) Enjoyment in the Workplace (abbreviated with the acronym ASPIRE). Table 1 presents definitions of each value. The theory of ITOC does not assert that these are the only values that are important to IT professionals but that these are the typical ones shared by the occupation. These cultural values identify what is considered good, permitted, and normal for IT workers. Artifacts and Tacit Assumptions, while important, are out of the scope of the current study on values.

Table 1. Core Values in IT Occupational Culture (Jacks et al., 2018)

Value	Definition
Autonomy in Decision-Making	Level to which members of an occupation believe that they should be empowered with decision-making for the organization, access to tools, and access to data.
Structure in the Environment	Level to which members of an occupation believe that orderliness, process, and role definition are needed in the work environment.
Precision in Communication	Level to which members of an occupation believe that communication about work tasks must be detailed, accurate, and exact.
Innovation in Technology	Level to which members of an occupation believe that technological improvement, novelty, and creativity are important.
Reverence for Technical Knowledge	Level to which members of an occupation believe that intelligence and increasing technical knowledge are what determines respect and admiration.
Enjoyment at the Workplace	Level to which members of an occupation believe that their work should include play, fun, and socializing.

These six dimensions, operationalized with the six-dimensional ASPIRE instrument, have been successfully used to demonstrate the presence of ITOC and that there is fairly strong evidence for homogeneity in IT workers across the U.S. (Jacks et al., 2018; Jacks & Palvia, 2014). At the same time, the ASPIRE instrument has only been used in a few U.S.-based studies and one study in New Zealand (Cranefield et al., 2022) which limits its generalizability. Moreover, the instrument itself has undergone further refinement. Some of the specific challenges in measuring ITOC have included 1) low reliability for Autonomy in Decision-Making, 2) low number of items for Reverence for Knowledge, and 3) cross-loading of Structure in the Workplace and Precision in Communication (see Jacks et al., 2018). Thus, more empirical testing is required to further refine the instrument.

All of the illustrations of cultural studies at different levels (i.e., national, organizational, occupational) offered so far are typical examples of the shared values view of culture. However, there has been some criticism of the shared values view as the only way to study culture (Morgan & Ogbonna, 2008; Kappos & Rivard, 2008). Assumptions of shared values can overemphasize homogeneity and underemphasize heterogeneity. Especially when looking at a global data set, one would expect differing perceptions of work values in different countries. For example, national culture can account for different attitudes of employees in Japan, China, and Taiwan with regard to job satisfaction of IT workers (Yeo et al., 2021). One way of avoiding an over-simplification of culture is to use the three-way view of culture (Kappos & Rivard, 2008; Martin, 2002). In the three-way view, cultures do not exist solely as patterns of shared or integrated values (the first perspective): they are also composed of differentiated (the second perspective) and fragmented (the third perspective) elements (Morgan & Ogbonna, 2008). These three views are complementary and can co-exist simultaneously. They are simply three different ways of examining the same phenomenon.

The integrated perspective is the shared view as described earlier and implied in much of the literature. It is the most commonly applied lens of analysis which typically views the cultural group as something static and monolithic (Morgan & Ogbonna, 2008). The differentiation view, in contrast, acknowledges that values can be contested within a culture and result in conflict (Kappos & Rivard, 2008). The fragmentation view is the more difficult one to conceptualize and operationalize (Martin, 2002) but it sees the cultural group as being in a state of flux where values may be perceived as ambiguous or even contradictory. At the same time, examining all three lenses simultaneously is a way to obtain a deeper understanding and a wider range of insights than limiting ourselves to only one view (Martin, 2002; Kappos & Rivard, 2008). Each lens can offer different insights.

The first of the three views, the integrative view, focuses on similarity around shared values (Schein, 2004). There is typically consensus across a collective (Martin, 2002). Integration assumes that all members interpret the manifested patterns of values the same way consistently without ambiguity (Kappos & Rivard, 2008). There is an implied assumption of homogeneity when culture is studied based on mean values of its various dimensions (Hoftede, 1980; House et al., 1990) and the idea of differing views within the culture is ignored. Beliefs held in common are assumed to be more important than any differences that may exist among the members (Meyerson & Martin, 1987). The integrative view assumes that membership in a cultural group is exclusive rather than acknowledging the possibility of multiple

memberships in multiple layers of culture. One example of multiple culture memberships might be a woman who was born in Japan, educated in the UK, and who now works in Germany (Gallivan & Srite, 2005). Despite these shortcomings of the integrative view, it is still helpful, prima facie, for business managers to be able to make some kind of generalization based on similarities. It still makes sense to talk about "how German people are" or "what IBM culture is like." Thus, our first research question is:

RQ1: Is there evidence to support an integrative view of ITOC that spans across countries around the world?

The second of the three views, the differentiated view, focuses on differences in shared values between sub-groups within the overall group. Cultures are not only homogeneous (Deal & Kennedy, 1982) but also heterogeneous (Martin, 2002). While this is typically said of organizational cultures (Morgan & Ogbonna, 2008), the same line of reasoning may apply to occupational cultures and one would expect to see some variation in the espoused values of occupational culture. This could potentially be based on differences in education, experience, age, gender, social class, etc., but for the purposes of this study, we are primarily interested in differences between countries. The main benefit of the differentiated view is that it avoids the assumption of culture being monolithic and acknowledges that culture can be much more nuanced due to membership in multiple cultural groups (Martin, 2002). Perceptions of the importance of occupational values or even interpretations of those values may differ in significant ways for people in different contexts (Kappos & Rivard, 2008). While most IS studies implicitly agree on the integrative view, there are some works in IS that explicitly support a differentiated view, but only at the organizational level of analysis (e.g., Prasad, 1993; Gopal & Prasad, 2000). Therefore, the second research question is:

RQ2: Is there evidence to support a differentiated view of ITOC between countries around the world?

The third of the three views, the fragmented view, focuses on a lack of consensus of any shared values. Cultural patterns may seem ambiguous or unclear with irreconcilable interpretations (Richter & Koch, 2004). Other fragmented findings can be paradoxical, ironic, or simply inconsistent (Jackson, 2011). Members may agree that they are all members of the same group but cannot agree on their beliefs or interpretations of their shared experiences (Meyerson, 1991). They may not also agree on the boundaries of the group because these are considered porous and dynamic (Martin, 2002). For example, does an IT manager have more in common with ITOC or with traditional management culture? One can imagine a scenario where an IT manager has come up through the ranks and still highly values her technical knowledge but at the same time is expected to let go of certain technical tasks to her team resulting in conflict. Such discrepancies should not be ignored (as in the integrative view) or chalked up to differences between sub-groups (as in the differentiated view) but viewed as important hallmarks of the culture that are worth investigating (Meyerson, 1991; Martin, 2002). Thus, the third research question in this study is:

RQ3: Is there evidence to support a fragmented view of ITOC within certain groups around the world?

This three-way view of culture has been successfully used at the organizational level of analysis (Rivard et al., 2011; Richter & Koch, 2004; Martin, 2002) but to date, not at the occupational level of analysis. It has been applied in IS research to help explain patterns of IT adoption (Jackson, 2011), development, and use (Kappos & Rivard, 2008) at the individual and organizational levels of analysis, but not at the occupational one. There are drawbacks to each of the views when considered individually (i.e., the assumption that culture is unified, the assumption that subgroups are clearly defined, or the assumption that cultural ambiguity is difficult to conceptualize) (Jackson, 2011) but when all three are analyzed, there is a greater likelihood of achieving deeper understanding of the phenomenon.

To summarize what we know so far, recent research on ITOC asserts that: 1) the IT occupation has its own unique culture shared by members of the occupation; 2) this culture differs from that of people in other occupations, specifically business management resulting in friction and conflict; 3) cultural friction can be caused by differences in values which are the core of any culture; 4) there are six shared value dimensions for ITOC in addition to the artifacts and tacit assumptions in the theoretical framework; and 5) in the U.S., ITOC is relatively homogeneous and is supra-organizational. What has not been explored in the literature is the presence of ITOC outside of the U.S. We expect to find variation by country based on historical, social, technological, economic development, and even infrastructure differences. Martin's (2002) theory of culture asserts that any culture can be viewed through the three-way lens of integration/differentiation/fragmentation with useful results. The novelty of the present study is in applying this theory at the occupational level of analysis. In order to answer the call for more cultural research

outside of the U.S. and Western context (Chu & Chen, 2019; Guzman & Stanton, 2009), a global dataset of more than 10,000 responses from IT professionals worldwide was analyzed. The results have important implications for ITOC by extending the framework to a truly global context.

3 Methods

Data for this research was collected as part of the World IT Project (see Palvia et al., 2021a; 2021b). The World IT Project is a multi-year, multi-country mega investigation involving more than 80 researchers from all over the world. The World IT Project was created to address a fundamental problem in IS research, namely, that the majority of research in the IS field has been dominated by a U.S.-centric or a Western-centric perspective (Palvia et al., 2018; Palvia et al., 2017). Research paradigms and models developed for the U.S. have been applied to non-U.S. contexts, sometimes inappropriately, such as developing countries, emerging economies, transitional economies, Asian, and Middle Eastern countries (Palvia, 2013). The World IT Project is designed to examine important issues confronting IT employees around the world. For a complete description of the methodology of the World IT Project and the challenges of collecting data on a global level, see Palvia et al. (2018; 2017).

In order to collect data on a large scale, country investigators (CIs) were carefully selected to lead the data collection effort and assist in navigating local cultural concerns. In some cases, it was necessary for the CIs to translate the survey into the local language[1] with an additional step of back-translation to English for validation. In most cases, the survey was delivered electronically with some countries opting for paper-based surveys. The survey used previously validated items for the constructs of interest measured on a Likert-type scale. CIs worked to ensure that the country sample came from a variety of IT roles, industries, and organizations that were representative of the overall population. In all, data has been collected from 37 countries (from 2015 to 2017) resulting in a dataset of more than 10,000 responses. Table 2 lists all of the countries represented in this study.

Table 2. Countries Represented in The World IT Project

Argentina	Iran	Portugal
Bangladesh	Italy	Romania
Brazil	Japan	Russia
Canada	Jordan	South Africa
China	Lithuania	South Korea
Egypt	Macedonia	Taiwan
Finland	Malaysia	Thailand
France	Mexico	Turkey
Germany	New Zealand	U.K.
Ghana	Nigeria	USA
Greece	Pakistan	Vietnam
Hungary	Peru	
India	Poland	

Before the analysis began, the data had to be cleansed. Cleansing included the following procedures: eliminating responses where the respondent was not in an IT role, ensuring that all responses were in the correct numeric range, eliminating responses that had been “straight-lined” (i.e., the respondent got tired and started answering the same value for multiple questions in a row), and responses that were less than 50% completed. This cleansing resulted in 10,386 useable responses. The analysis was conducted in a series of steps. First, for each country individually, factor analysis was performed along with commensurate reliability, convergent validity, discriminant reliability, and measurement invariance tests to ensure that the instrument was measuring the intended constructs of interest. Second, an index for each ITOC value was created by averaging scores for a particular value into an overall mean for each country. Third, an ANOVA test was conducted to see whether the means for each value dimension were

[1] The instrument has been translated and back-translated for the following languages: Chinese, French, Italian, Japanese, Korean, Malay, Polish, Portuguese, Russian, Spanish, Thai and Turkish.

significantly different by country. Fourth, a post-hoc pairwise comparison test was performed to see exactly how each country differed. Last, a rank ordering of cultural patterns was performed as a valid method of examining differences between groups (Straub et al., 2002; Kluckhohn & Strodbeck, 1961).

4 Analysis and Results

The respondents represent a broad variety of backgrounds (see Table 3). The sample demographics are broadly representative of the IT occupation with the typical profile being a young (under 40) male with at least a college degree and about 10 years of experience working in the IT sector. Based on a list of 19 pre-defined roles or one open-ended option, the most common IT roles include a programmer, an analyst, a project manager, and a system administrator.

Table 3. Sample Demographics

Age	n	%	**Highest level of education**	n	%
Under 18	4	0.0	High School or less	793	7.6
18-20	316	3.0	Associate degree (2 year degree) or some college	1,342	12.9
21-29	3,371	32.5	Bachelor's degree	4,998	48.1
30-39	3,344	32.2	Master's degree	2,988	28.8
40-49	2,106	20.3	Ph.D.	250	2.4
50-59	1,013	9.8	Subtotal	10,371	99.9
60 +	227	2.2	Missing	15	0.1
Subtotal	10,381	100.0	Total	10,386	100.0
Missing	5	0.0	**Years of all work experience (IT as well as non-IT work):**		
Total	10,386	100.0	0-4	2,392	23.0
Type of IT role			5-9	2,487	23.9
programming	1,857	17.9	10-19	2,843	27.4
analysis & design	1,009	9.7	20-29	1,726	16.6
maintenance	503	4.8	30 +	907	8.7
operations	662	6.4	Subtotal	10,355	99.7
integration	224	2.2	Missing	31	0.3
testing	356	3.4	Total	10,386	100.0
database administration	383	3.7	**Years of IT experience**		
system administrator	703	6.8	0-4	2,975	28.6
telecommunications	368	3.5	5-9	2,717	26.2
management and strategy	795	7.7	10-19	2,789	26.9
email/messaging systems	211	2.0	20-29	1,398	13.5
consulting	473	4.6	30 +	500	4.8
help desk	350	3.4	Subtotal	10,379	99.9
user liaison	119	1.1	Missing	7	0.1
training	209	2.0	Total	10,386	100.0
project management	741	7.1	**Reporting relationship**		
security	212	2.0	IT Department Employee	6,576	63.3
financial	408	3.9	IT Worker in a Non-IT Department	1,269	12.2
application support	307	3.0	Contract Employee	1,123	10.8
other	403	3.9	Consultant	906	8.7
Subtotal	10,293	99.1	Vendor Employee	357	3.4

Missing	93	0.9		Other	130	1.2
Total	10,386	100.0		Subtotal	10,361	99.8
Gender				Missing	25	0.2
Male	7,509	72.3		Total	10,386	100.0
Female	2,801	27.0				
Subtotal	10,310	99.3				
Missing	76	0.7				
Total	10,386	100.0				

Factor analysis was conducted on the entire dataset and for each country to determine construct validity of the six ASPIRE dimensions such that items were loading on their respective constructs. The results of the factor analysis in Table 4 show six dimensions corresponding to the ASPIRE values after low-loading items were dropped. Appendix A presents the full instrument with all items used in the analysis. Several improvements were seen in the variables compared to the version published in Jacks et al. (2018) resulting in further purification of the instrument. First, the items for Structure and Precision loaded on their respective constructs and did not have to be merged as in prior studies. Second, four items for Reverence for Knowledge were able to be kept (which was an improvement over the prior limitation of only keeping two items). Last, construct reliability was improved for all six dimensions compared to the previous version of the instrument (see Table 5). Because of these refinements, we are labeling this improved measurement instrument as ASPIRE 2.0.

Table 4. Results of Factor Analysis for ASPIRE 2.0

Item	Autonomy	Structure	Precision	Innovation	Reverence for Knowledge	Enjoyment
AUT1	**0.770**	0.271	0.285	0.241	0.282	0.227
AUT2	**0.822**	0.358	0.365	0.305	0.383	0.256
AUT3	**0.669**	0.259	0.240	0.194	0.230	0.197
STR1	0.305	**0.765**	0.404	0.335	0.440	0.232
STR2	0.274	**0.786**	0.316	0.252	0.343	0.170
STR3	0.317	**0.814**	0.377	0.271	0.415	0.208
STR4	0.303	**0.681**	0.370	0.259	0.393	0.229
PRE1	0.273	0.318	**0.688**	0.346	0.428	0.310
PRE2	0.312	0.374	**0.814**	0.412	0.528	0.362
PRE3	0.349	0.424	**0.840**	0.436	0.580	0.350
PRE4	0.311	0.397	**0.777**	0.421	0.607	0.333
INN1	0.209	0.231	0.359	**0.724**	0.340	0.424
INN2	0.248	0.288	0.414	**0.790**	0.404	0.426
INN3	0.294	0.269	0.368	**0.771**	0.380	0.414
INN3	0.263	0.335	0.446	**0.790**	0.456	0.492
REV1	0.294	0.374	0.555	0.439	**0.785**	0.354
REV2	0.318	0.389	0.523	0.362	**0.753**	0.279
REV3	0.306	0.414	0.505	0.375	**0.731**	0.327
REV4	0.330	0.454	0.541	0.413	**0.800**	0.339
ENJ1	0.239	0.207	0.309	0.372	0.296	**0.664**
ENJ2	0.211	0.165	0.259	0.329	0.246	**0.650**
ENJ3	0.253	0.257	0.379	0.483	0.383	**0.789**
ENJ4	0.150	0.141	0.241	0.397	0.234	**0.705**

ENJ5	0.215	0.205	0.331	0.442	0.323	**0.761**

Note: Autonomy in Decision-Making (AUT); Structure in the Environment (STR); Precision in Communication (PRE); Innovation in Technology (INN); Reverence for Technical Knowledge (REV); Enjoyment at the Workplace (ENJ)

Table 5 shows the reliability scores for all six dimensions in the ASPIRE 2.0 model. Based on Cronbach Alphas, Composite Reliability scores, and Average Variance Extracted (AVE) scores, there is evidence of acceptable reliability of the measurement model. It should be noted that although Autonomy in Decision-Making had a low Cronbach Alpha of 0.63, the Composite Reliability was 0.79 (which can be interpreted similarly to an Alpha score), and AVE exceeded 0.5. Therefore, Autonomy in Decision-Making was kept in the analysis due to its theoretical merit based on this and prior ITOC studies.

Table 5. Reliability Analysis Results

	Cronbach's Alpha	**Composite Reliability (CR)**	**Average Variance Extracted (AVE)**
Autonomy in Decision-Making	0.631	0.799	0.572
Structure in the Environment	0.761	0.847	0.582
Precision in Communication	0.788	0.862	0.611
Innovation in Technology	0.773	0.853	0.592
Reverence for Technical Knowledge	0.769	0.852	0.589
Enjoyment at the Workplace	0.762	0.839	0.512

Discriminant validity was demonstrated by examining the heterotrait-monotrait ratio of correlations (HTMT) (Henseler et al., 2015). This test ensures that a reflective construct has the strongest relationships with its own indicators in comparison with other constructs, and hence are measuring separate constructs. If the HTMT value is below 0.90, there is sufficient support for discriminant validity (Henseler et al., 2015) (see Table 6). Note that some moderate correlations between cultural constructs are unavoidable due to the nature of the phenomenon of interest.

Table 6. Heterotrait-Monotrait Analysis Results

	Autonomy	**Enjoyment**	**Innovation**	**Precision**	**Reverence for Knowledge**
Enjoyment	0.427				
Innovation	0.460	0.733			
Precision	0.553	0.549	0.656		
Reverence for Knowledge	0.567	0.540	0.662	0.880	
Structure	0.558	0.352	0.469	0.617	0.684

Measurement invariance (MI) testing is important for demonstrating equivalent measurement across groups because it enables direct comparisons of means which can be useful for both managerial decision making (Doll et al., 2004; Hilton et al., 2004) and theoretical inferences (Nam et al., 2016). MI is especially important in cross-cultural studies to ensure consistent measurement when different countries are being compared (Fisher, 2004; Rutkowski & Svetina, 2014). We used multiple group confirmatory factor analysis in SPSS AMOS (per Doll et al., 2004; Kim et al., 2017; Hilton et al., 2004) for our MI tests. MI was assessed for three groups of countries. There are disadvantages in testing more than two or three groups because the number of pairwise comparisons across groups increases exponentially (Rutkowski & Svetina, 2014; Putnick & Bornstein, 2016; Kim et al., 2017). Therefore, we adopted the approach of dividing the countries into three groups by economic development status for MI testing (Nam et al.,2016). We used High-income, Upper-Middle income, and Lower-Middle income designations from the 2018-19 World Bank classification scheme (WBDB, 2019).[2] It was important to use economic development as the grouping variable for three reasons. First, constructs that are developed in one context (e.g., developed countries) may lack validity in less developed countries (Nam et al., 2016). Second, using the same grouping variable as in other World IT studies lends additional rigor across the whole project (see Ghosh

[2] We attempted MI testing under different groupings of the 37 countries by culture and by geography but with similar results to the economic grouping.

et al., 2022). Third, given that the ASPIRE values were originally created in a developed country (i.e., the U.A.), and given that the mission of the World IT Project was to ensure that IS research does not inappropriately apply the results of IS research from highly developed countries to less developed countries, it made sense to ensure that we were not doing the same thing – that is, assuming that the ASPIRE values (valid in the U.S.) were applicable to lesser developed countries. MI across the three groups was tested incrementally in the typical three-step approach of testing configural, metric, and scalar invariance (based on Kim et al., 2017; Putnick & Bornstein, 2016; Hu et al., 2011; and Doll et al., 2004).

We tested configural invariance by investigating a baseline model with no constrained parameters across groups. The baseline model showed acceptable model fit with a CFI of 0.91 and RMSEA of 0.052. Configural invariance provides evidence of a consistent set of latent variables with the same pattern of factor loadings, intercepts, and measurement errors (Rutkowski & Svetina, 2014). Since configural invariance was supported, we proceeded with the stronger test of metric invariance. Metric invariance was tested by fixing the regression weight in SPSS AMOS to a value of 1 for one of the latent variables' items and then fixing the remaining items to be the same across two groups at time (Putnick & Bornstein, 2016). As shown in Table 7, we compared Group 1 (High economic development) to Group 2 (Mid economic development), Group 2 to Group 3 (Low economic development) and Group 3 to Group 1. Because of the chi square test of model fit's sensitivity to large sample sizes, Rutkowski & Svetina (2014) suggest the alternative measures of change in CFI of greater than -0.02 and a change in RMSEA of less than -0.03 as evidence of metric invariance. The change in CFI and RMSEA when comparing pairs of groups did not meet these cutoffs. Therefore, there is no evidence of metric invariance. Because of the lack of evidence for metric invariance, there was no need to go to the third step of scalar invariance testing and most international studies do not perform scalar invariance testing (Putnick & Bornstein, 2016). Table 7 shows results of our configural and metric invariance tests.

Table 7. Measurement Invariance Test Results

	Model comparison	**Overall fit indexes (unconstrained)**				**Overall fit indexes (constrained)**				**Changes of fit indexes**		
Invariance level		χ^2	df	CFI	RMSEA	χ^2	df	CFI	RMSEA	Δ CFI	Δ RMSEA	p value
Configural invariance	base model	6861.2	237	0.913	0.052							
Metric invariance	Group 1 vs. Group 2	5704.8	474	0.893	0.044	6055.9	492	0.89	0.044	-0.01	0.000	1E-05
	Group 2 vs. Group 3	6282.9	474	0.912	0.037	6509.8	492	0.91	0.037	-0	0.000	1E-05
	Group 3 vs. Group 1	6060.2	474	0.871	0.044	6496.1	492	0.86	0.045	-0.01	0.001	1E-05

Note: Group 1 = High economic development; Group 2 = Medium economic development; 3 = Low economic development per source.

Measurement invariance is rarely achieved in cross-cultural studies. While additional testing can always be pursued in an attempt to achieve "partial" invariance by releasing constraints on one or more loadings at a time (Putnick & Bornstein, 2016; Steenkamp & Baumgartner, 1998), it made more sense to simply acknowledge the invariance of our measures especially since it is such a common occurrence in cross-cultural values research (Kim et al., 2017; Nam et al., 2016; Stankov, 2015; Niranjan, et al., 2013; Hu et al., 2011; Urban et al., 2008; Wasti et al., 2007; Byrne & Watkins, 2003). It is even possible to assert a priori that measurement invariance was not to be expected in a survey of this magnitude (Putnick & Bornstein, 2016; Stankov, 2015; Steenkamp & Baumgartner, 1998). Noninvariance of measures across diverse groups implies that direct comparison of means between groups may not yield reliable results. On the other hand, metric invariance can have a negligible effect on mean differences of latent factors (Putnick & Bornstein, 2016). When factor loadings are unequal across groups, it suggests that scores may be systematically biased upward or downward in different countries (for example, a score of "3" may mean "neutral" in one country, but "high" in another and "low" in yet another (Niranjan et al., 2013). Rank-order comparison between countries, on the other hand, does not have the same problem because it is a relative and not an absolute measure (Babbie, 1992) and this approach has been used with meaningful

results in similar multi-cultural research (Palvia et al., 2021). For example, a variable's rank score of 1 in country A and rank score of 2 in country B would logically mean that the variable is more important (relatively speaking) in country A than B (assuming a rank of 1 is the most important). So while we do report our means scores below as expected for this type of survey-based research, we also shifted the focus of our analysis from means comparison to rank-order comparison. Table 8 shows the mean scores and standard deviations for each of the six ASPIRE 2.0 dimensions by country. Globally, Reverence for Knowledge was rated as the most important value (1.89) followed by Innovation (1.96), Precision (2.02), Enjoyment (2.18), and a tie between Autonomy and Structure (2.22) (note that because of the nature of our rating scale where 1 represents most importance and 5 represents no importance, smaller mean values represent higher importance). All the means were lower than the mid-point of 3.0, suggesting that all dimensions were considered important worldwide.

Table 8. Means for the ASPIRE 2.0 Values by Country

Country	Autonomy Mean (Std Dev)	Structure Mean (Std Dev)	Precision Mean (Std Dev)	Innovation Mean (Std Dev)	Reverence Mean (Std Dev)	Enjoyment Mean (Std Dev)
Argentina (n=309)	2.15 (0.52)	2.19 (0.57)	1.74 (0.46)	1.72 (0.53)	1.57 (0.48)	1.88 (0.65)
Bangladesh (n=284)	2.27 (0.84)	2.19 (0.72)	1.92 (0.70)	2.00 (0.72)	1.92 (0.71)	2.34 (0.79)
Brazil (n=348)	2.06 (0.57)	2.08 (0.59)	1.92 (0.62)	1.91 (0.58)	1.66 (0.54)	2.22 (0.72)
Canada (n=311)	2.28 (0.60)	2.42 (0.61)	2.17 (0.61)	2.22 (0.63)	2.05 (0.63)	2.34 (0.70)
China (n=297)	2.21 (0.71)	2.20 (0.65)	1.94 (0.68)	2.14 (0.74)	2.15 (0.79)	2.27 (0.71)
Egypt (n=175)	1.84 (0.52)	1.62 (0.45)	1.65 (0.50)	1.55 (0.46)	1.55 (0.44)	1.97 (0.52)
Finland (n=143)	2.04 (0.51)	2.87 (0.57)	2.54 (0.55)	2.02 (0.54)	1.87 (0.42)	2.06 (0.53)
France (n=293)	2.30 (0.63)	2.20 (0.45)	1.87 (0.51)	1.96 (0.45)	1.80 (0.48)	2.03 (0.60)
Germany (n=308)	2.21 (0.53)	2.68 (0.62)	2.23 (0.60)	2.08 (0.56)	1.91 (0.51)	2.05 (0.61)
Ghana (n=304)	2.28 (0.70)	1.99 (0.7)	1.92 (0.75)	1.92 (0.89)	1.87 (0.83)	2.65 (0.66)
Greece (n=106)	2.18 (0.62)	2.21 (0.55)	1.95 (0.74)	1.96 (0.78)	1.83 (0.74)	2.25 (0.77)
Hungary (n=273)	2.18 (0.62)	2.18 (0.54)	1.74 (0.54)	1.92 (0.54)	1.91 (0.51)	2.13 (0.61)
India (n=350)	1.76 (0.58)	1.81 (0.49)	2.18 (0.59)	1.48 (0.44)	1.36 (0.49)	1.72 (0.58)
Iran (n=357)	2.59 (0.74)	2.52 (0.49)	2.88 (0.53)	2.58 (0.61)	2.56 (0.48)	2.71 (0.73)
Italy (n=310)	2.14 (0.71)	2.57 (0.86)	2.22 (0.88)	1.80 (0.53)	1.70 (0.60)	2.18 (0.82)
Japan (n=310)	2.09 (0.49)	2.08 (0.42)	1.95 (0.39)	2.00 (0.46)	1.93 (0.37)	2.10 (0.51)
Jordan (n=253)	2.22 (0.68)	1.86 (0.65)	2.03 (0.70)	2.05 (0.76)	2.03 (0.72)	2.36 (0.80)
Lithuania (n=146)	2.29 (0.65)	2.14 (0.60)	2.26 (0.64)	1.89 (0.65)	1.75 (0.57)	2.18 (0.78)
Macedonia (n=294)	2.15 (0.53)	2.42 (0.56)	1.97 (0.61)	1.80 (0.58)	1.76 (0.56)	2.09 (0.61)
Malaysia (n=283)	2.43 (0.64)	2.31 (0.66)	2.11 (0.67)	2.04 (0.67)	2.02 (0.67)	2.28 (0.70)
Mexico (n=331)	2.06 (0.60)	2.07 (0.59)	1.71 (0.54)	1.87 (0.58)	1.76 (0.57)	2.08 (0.67)
New Zealand (n=516)	2.22 (0.53)	2.62 (0.61)	2.21 (0.61)	2.09 (0.53)	1.91 (0.49)	2.15 (0.63)
Nigeria (n=90)	2.26 (0.61)	2.41 (0.59)	2.31 (0.59)	2.21 (0.66)	2.20 (0.59)	2.12 (0.50)
Pakistan (n=301)	2.18 (0.74)	2.10 (0.73)	1.87 (0.58)	1.88 (0.74)	1.88 (0.73)	2.24 (0.72)
Peru (n=159)	1.82 (0.58)	1.71 (0.56)	1.65 (0.58)	1.71 (0.54)	1.66 (0.58)	2.03 (0.67)
Poland (n=300)	2.42 (0.89)	2.02 (0.66)	1.96 (0.74)	1.98 (0.74)	1.95 (0.72)	2.56 (0.80)
Portugal (n=224)	2.26 (0.53)	2.23 (0.56)	1.88 (0.55)	1.89 (0.51)	1.78 (0.50)	2.20 (0.64)
Romania (n=328)	2.07 (0.64)	1.84 (0.57)	1.64 (0.61)	1.81 (0.62)	1.84 (0.67)	1.96 (0.61)
Russia (n=148)	2.58 (0.66)	2.36 (0.72)	2.25 (0.71)	2.08 (0.75)	1.96 (0.71)	2.48 (0.86)
South Africa (n=298)	2.18 (0.52)	2.21 (0.66)	1.91 (0.59)	1.77 (0.55)	1.70 (0.51)	2.10 (0.62)
South Korea	2.43 (0.49)	2.41 (0.56)	2.11 (0.60)	2.08 (0.52)	2.06 (0.53)	2.23 (0.62)

(n=301)						
Taiwan (n=303)	2.28 (0.49)	2.11 (0.44)	1.91 (0.49)	1.93 (0.48)	2.02 (0.53)	2.16 (0.52)
Thailand (n=634)	2.33 (0.56)	2.13 (0.55)	1.78 (0.59)	1.78 (0.59)	1.82 (0.58)	1.94 (0.61)
Turkey (n=287)	2.19 (0.63)	2.20 (0.60)	2.12 (0.70)	2.14 (0.81)	2.07 (0.69)	2.17 (0.80)
U.K. (n=96)	2.28 (0.57)	2.58 (0.63)	2.24 (0.63)	2.13 (0.59)	2.06 (0.51)	2.15 (0.59)
U.S.A. (n=309)	2.29 (0.52)	2.27 (0.56)	2.02 (0.55)	2.04 (0.56)	1.76 (0.50)	2.14 (0.64)
Vietnam (n=298)	2.52 (0.69)	2.44 (0.67)	2.47 (0.65)	2.43 (0.65)	2.32 (0.68)	2.52 (0.67)
Total (n=10,377)	**2.22 (0.64)**	**2.22 (0.65)**	**2.02 (0.66)**	**1.96 (0.65)**	**1.89 (0.63)**	**2.18 (0.70)**

ANOVA tests were run to determine if there were significant differences. Table 9 shows that there are statistically significant differences between countries for each of the ASPIRE values. This provides some initial evidence for the heterogeneity of ITOC globally.

Table 9 – ANOVA Results between Countries

ANOVA						
		Sum of Squares	**Df**	**Mean Square**	**F**	**Sig.**
Autonomy	Between Groups	316.34	36	8.79	22.93	.000
	Within Groups	3,962.84	10,340	.38		
	Total	4,279.19	10,376			
Structure	Between Groups	655.37	36	18.21	50.52	.000
	Within Groups	3,726.05	10,340	.36		
	Total	4,381.42	10,376			
Precision	Between Groups	705.30	36	19.59	52.21	.000
	Within Groups	3,879.38	10,338	.38		
	Total	4,584.68	10,374			
Innovation	Between Groups	476.86	36	13.25	35.28	.000
	Within Groups	3,879.23	10,331	.38		
	Total	4,356.09	10,367			
Reverence for Knowledge	Between Groups	518.03	36	14.39	41.11	.000
	Within Groups	3,615.81	10,329	.35		
	Total	4,133.84	10,365			
Enjoyment	Between Groups	481.65	36	13.38	29.94	.000
	Within Groups	4,613.46	10,329	.45		
	Total	5,095.11	10,365			

Additional post hoc analysis was needed to test where these differences exist. Countries were sorted by each ASPIRE value mean to look for patterns. The results are shown in Table 10 (only showing the top ten and bottom ten by rank). As can be seen in the tables, India tends to score items high and Iran tends to score items low. The U.S. is not at the top of each list, nor is it the case that Western cultures or developed economies consistently rate the ASPIRE values the highest of all countries. The U.S. appears in the middle, but it is difficult to see any conspicuous patterns or logical groupings.

Table 10. ASPIRE Values Ranked by Country (top 10 and bottom 10)

	Autonomy		**Structure**		**Precision**		**Innovation**		**Reverence for Knowledge**		**Enjoyment**	
Rank	**Country**	**Mean**	**Country**	**Mean**	**Country**	**Mean**	**Country**	**Mean**	**Country**	**Mean**	**Country**	**Mean**
1	India	1.76	Egypt	1.62	Romania	1.64	India	1.48	India	1.36	India	1.72
2	Peru	1.82	Peru	1.71	Peru	1.65	Egypt	1.55	Egypt	1.55	Argentina	1.88
3	Egypt	1.84	India	1.81	Egypt	1.65	Peru	1.71	Argentina	1.57	Thailand	1.94
4	Finland	2.04	Romania	1.84	Mexico	1.71	Argentina	1.72	Brazil	1.66	Romania	1.96
5	Brazil	2.06	Jordan	1.86	Argentina	1.74	South Africa	1.77	Peru	1.66	Egypt	1.97
6	Mexico	2.06	Ghana	1.99	Hungary	1.74	Thailand	1.78	South Africa	1.70	France	2.03
7	Romania	2.07	Poland	2.02	Thailand	1.78	Italy	1.80	Italy	1.70	Peru	2.03
8	Japan	2.09	Mexico	2.07	France	1.87	Macedonia	1.80	Lithuania	1.75	Germany	2.05

9	Italy	2.14	Japan	2.08	Pakistan	1.87	Romania	1.81	Macedonia	1.76	Finland	2.06
10	Argentina	2.15	Brazil	2.08	Portugal	1.88	Mexico	1.87	U.S.A.	1.76	Mexico	2.08
28	U.S.A.	2.29	South Korea	2.41	New Zealand	2.21	Russia	2.08	Taiwan	2.02	China	2.27
29	Lithuania	2.29	Macedonia	2.42	Italy	2.22	South Korea	2.08	Jordan	2.03	Malaysia	2.28
30	France	2.30	Canada	2.42	Germany	2.23	New Zealand	2.09	Canada	2.05	Canada	2.34
31	Thailand	2.33	Vietnam	2.44	U.K.	2.24	U.K.	2.13	U.K.	2.06	Bangladesh	2.34
32	Poland	2.42	Iran	2.52	Russia	2.25	China	2.14	South Korea	2.06	Jordan	2.36
33	S. Korea	2.43	Italy	2.57	Lithuania	2.26	Turkey	2.14	Turkey	2.07	Russia	2.48
34	Malaysia	2.43	U.K.	2.58	Nigeria	2.31	Nigeria	2.21	China	2.15	Vietnam	2.52
35	Vietnam	2.52	New Zealand	2.62	Vietnam	2.47	Canada	2.22	Nigeria	2.20	Poland	2.56
36	Russia	2.58	Germany	2.68	Finland	2.54	Vietnam	2.43	Vietnam	2.32	Ghana	2.65
37	Iran	2.59	Finland	2.87	Iran	2.88	Iran	2.58	Iran	2.56	Iran	2.71

In order to determine which countries differ along which dimensions, a Scheffe Post-Hoc pairwise test was performed. This was not done comparing the U.S. with each country, but rather all countries paired with all countries for a truly global perspective and to avoid any ethnocentrism for the U.S. The Scheffe test shows that out of 3,996 possible pairings (666 country pairs x 6 dimensions), 21% of those pairings were significantly different while 79% of them showed no difference (see Table 11). If India (which tends to rate very high) and Iran (which tends to rate very low) are removed as possible outliers from the Scheffe analysis, the picture changes to only 16% of the pairings being statistically different and 84% showing no difference.

Table 11. Scheffe Post-Hoc Pairwise Test of all Country Pairs

Total number of pairs	3,996	**Percent**
Pairs that are significantly different (less than or equal to 0.05)	825	21
Pairs that are not significantly different	3,171	79

Next, if the Scheffe test is performed on each value dimension (for all countries including India and Iran), a picture starts to emerge of where the differences are. Of the six ASPIRE values, four – Autonomy, Innovation, Reverence for Knowledge, and Enjoyment – exhibit 80% (or higher) similarity when analyzing pairs of countries. The only two dimensions with a value below 80% are Structure (68%) and Precision (75%) (see Table 12). This reveals a more nuanced view of the differences in ITOC around the world.

Table 12. Scheffe Post-Hoc Pairwise Test by Value

Autonomy in Decision-Making		**Percent**
Total number of pairs	666	
Pairs that are significantly different	89	13
Pairs that are not significantly different	577	**87**
Structure in the Workplace		
Total number of pairs	666	
Pairs that are significantly different	213	32
Pairs that are not significantly different	453	**68**
Precision in Communication		
Total number of pairs	666	

Pairs that are significantly different	165	25
Pairs that are not significantly different	501	**75**
Innovation in Technology		
Total number of pairs	666	
Pairs that are significantly different	165	17
Pairs that are not significantly different	501	**83**
Reverence for Knowledge		
Total number of pairs	666	
Pairs that are significantly different	130	20
Pairs that are not significantly different	536	**80**
Enjoyment at the Workplace		
Total number of pairs	666	
Pairs that are significantly different	112	17
Pairs that are not significantly different	554	**83**

Because of countries such as India and Iran that consistently rank items high or low, rank-order analysis is a method of examining patterns that preserves the relative order of values regardless of the rating number. Each country's mean ratings for the six dimensions were changed to ranks of 1 through 6. The dimension with the lowest mean rating was given a rank of 1 and the highest mean rating was assigned a rank of 6. Thus, a rank of 1 represents the most important dimension and the rank of 6 means the least important dimension of the 6 ASPIRE values. The combinations of the rankings showed some interesting patterns emerging (see Table 13). Each pattern was given a profile name to describe the pattern of relative ordering of the rankings. The most common pattern was that Reverence for Knowledge was ranked first with Innovation or Precision in either the second or third spot and the rest ranked as four through six. This was labeled the "Typical" profile, and 17 of the 37 countries fit this profile. The next most common pattern was where the top three values were the same but in a different order: Precision was ranked first with either Innovation and Reverence for Knowledge in the second or third spot. This was labeled the "Engineering" profile and 7 countries fit this profile. Another pattern was for countries where Structure was ranked as three or higher (i.e., Structure was ranked in the top half rather than the bottom half as in the first two profiles). This was labeled the "Rule-followers" profile and six countries were included here. The next pattern was for countries where Enjoyment was ranked in the top half along with Reverence for Knowledge and Innovation. This was labeled the "Creative" profile and five countries were included. The remaining countries of Finland and Italy were put in an "Atypical" profile where Autonomy was ranked in the top half along with Reverence for Knowledge and Innovation. Note that all of the other countries ranked Autonomy as four, five, or six. Table 14 summarizes the discussion above.

Table 13. Rank-Order Analysis by Value

Country	Profile name	Rank					
		Reverence for Knowledge	Precision	Innovation	Structure	Enjoyment	Autonomy
Argentina	**Typical**	1	3	2	6	4	5
Bangladesh	**Typical**	1	2	3	4	6	5
Brazil	**Typical**	1	3	2	5	6	4
Canada	**Typical**	1	2	3	6	5	4
France	**Typical**	1	2	3	5	4	6
Ghana	**Typical**	1	3	2	4	6	5
Greece	**Typical**	1	2	3	5	6	4
Japan	**Typical**	1	2	3	4	6	5
Macedonia	**Typical**	1	3	2	6	4	5
Malaysia	**Typical**	1	3	2	5	4	6

Poland	**Typical**	1	2	3	4	6	5
Portugal	**Typical**	1	2	3	5	4	6
Russia	**Typical**	1	3	2	4	5	6
South Africa	**Typical**	1	3	2	6	4	5
South Korea	**Typical**	1	3	2	5	4	6
Turkey	**Typical**	1	2	3	6	4	5
U.S.A.	**Typical**	1	2	3	5	4	6
China	**Engineering**	3	1	2	4	6	5
Hungary	**Engineering**	2	1	3	6	4	5
Mexico	**Engineering**	2	1	3	5	6	4
Pakistan	**Engineering**	3	1	2	4	6	5
Romania	**Engineering**	3	1	2	4	5	6
Taiwan	**Engineering**	3	1	2	4	5	6
Thailand	**Engineering**	3	1	2	5	4	6
Egypt	**Rule-followers**	2	4	1	3	6	5
Iran	**Rule-followers**	2	6	3	1	5	4
Jordan	**Rule-followers**	3	2	4	1	6	5
Lithuania	**Rule-followers**	1	5	2	3	4	6
Peru	**Rule-followers**	2	1	4	3	6	5
Vietnam	**Rule-followers**	1	4	2	3	5	6
Germany	**Creative**	1	5	3	6	2	4
India	**Creative**	1	6	2	5	3	4
New Zealand	**Creative**	1	4	2	6	3	5
Nigeria	**Creative**	2	5	3	6	1	4
U.K.	**Creative**	1	4	2	6	3	5
Finland	**Atypical**	1	5	2	6	4	3
Italy	**Atypical**	1	5	2	6	4	3

Table 14. Rank-Order Analysis by Value – Summary

No. of Countries in Each Profile	Profile Name	Profile Description
17 (46%)	Typical	Reverence for Knowledge is ranked #1 with Innovation and Precision in either #2 or #3 slot and the rest as 4-5-6.
7 (19%)	Engineering	Precision is ranked #1 with Innovation and Reverence for Knowledge in either #2 or #3 slot.
6 (16%)	Rule-followers	Structure is ranked #3 or higher.
5 (14%)	Creative	Enjoyment is ranked #3 or higher.
2 (5%)	Atypical	Autonomy is ranked #3 or higher and more important than Precision.

While there are some discernable patterns in the rank-order analysis, they are difficult to explain. The results reveal some ambiguity because the profiles are not based on anything obvious such as geographic region, national culture, or economic development. For example, all Eastern countries did not fit the same profile, and nor did all Western countries. The fragmentation perspective is difficult to operationalize but, at a minimum, this perspective can point out areas for further research into why these particular patterns are emerging.

In summary, there were more similarities (79%) than differences, providing support for the integrative perspective of shared values within the IT Occupation around the world. At the same time, we avoided the pitfall of viewing ITOC as completely homogeneous because of substantial differences (21%) which provides support for the differentiation perspective. We further found five different profiles of ITOC based on recurring patterns of the ASPIRE values where 46% of the countries could be grouped into a Typical profile. Finally, there was evidence of the fragmentation perspective because the profile patterns did not align with any obvious geographic region or economic status. See Table 15 for a summary of the findings mapped to the research questions.

Table 15. Summary of Findings

Research Question	Finding
RQ1 – Integrative perspective?	Yes. ITOC is somewhat homogeneous around the world in terms of having shared values. 79% are similar.
RQ2 – Differentiation perspective?	Yes. There are significant differences between countries around the world, especially for the values of Structure and Precision. 21% are dissimilar. Five different profile patterns were found.
RQ3 – Fragmentation perspective?	Yes. There is some evidence of ambiguous findings that are not easily explained, i.e., no easy groupings by geographic region, national culture, or economic development.

5 Discussion

This study provided an unparalleled opportunity to examine ITOC across 37 countries and answer fundamental questions about cultural similarities and differences around the world. The primary mission of the World IT Project has been to avoid a U.S. or Western-centric point of view in IS research and to examine important differences around the world. Overall, this study was successful in extending the three-way perspective on culture to 1) the occupational level of analysis, and 2) a much-needed global point of view. Empirical evidence was found for all three perspectives of culture: 1) integrative, 2) differentiation, and 3) fragmentation (see Table 15). Our study built on a cumulative tradition of cultural research in IS by providing support for prior studies on IT occupational culture. It also offered a refined instrument for measuring the ITOC values with better reliability scores, stronger separation between the constructs of Structure and Precision, and more items for measuring Reverence for Knowledge. The new measurement model helped solidify the ideological framework of values in ITOC. These changes are substantial enough that the model can be referred to as ASPIRE 2.0 and the items in Appendix A are the items that we recommend researchers use going forward to measure ITOC. Based on the improved instrument and our data from 37 countries, there are a number of interesting findings, and the story is more complicated than originally surmised.

The integrative view makes the traditional assumption that culture is what binds us together and makes a certain group of people similar to each other. Homogeneity is the keyword for the integrative view. If homogeneity implies that a group of people shares the same values, then from this perspective, the ITOC values should have been ranked very similarly around the world. The assumption in earlier works was that ITOC is fairly homogeneous, at least in the U.S (see Jacks et al., 2018). However, when zooming out to look at different countries, the differences became more pronounced. One might have expected to see more radical differences based on national cultural differences alone. However, there are more similarities than differences – almost 80% – in the pairwise analysis. Furthermore, there was a recurring pattern in the rankings across countries that was labeled the Typical profile. The Typical profile was a specific configuration of values where Reverence for Knowledge was the top ranked, and either Innovation or Precision were in the second or third rank and the rest of the values ranked as four through six. The Engineering profile had the same top three values only in a slightly different order. Together, these two profiles accounted for a majority (65%) of the countries in the study.

Viewed from the integrative perspective, there is empirical evidence that ITOC can be viewed, even at the global level, as somewhat homogeneous. There are more similarities within ITOC around the world than differences which provides some justification for continuing to use the traditional "shared values" view of culture that is seen in so much of IS research (Straub et al., 2002). Even though there are problems with the integrative view (i.e., the ecological fallacy), it is still a useful point of view. That said, every culture has sub-groups and variation based on its membership, and ITOC is no different.

The differentiation perspective aligned closely with the mission of the World IT Project to find differences between countries by gathering data outside of the U.S. We expected to find variation by country based on historical, social, technological, economic development, and even infrastructure differences. The initial ANOVA analysis bore this out and showed significant differences between countries. This result agrees broadly with an earlier study that also found differences in other important elements of IT occupational culture (geek labels, technical jargon, normative commitment, etc.) between five countries (Guzman et al., 2006). But further post-hoc analysis highlighted that the differences were coming mostly from the value dimensions of Structure in the Workplace (68% similarity) and Precision (75% similarity) whereas the other value dimensions exhibited greater than 80% similarity. This may point to national culture playing more of a role. The notions of Structure in the Workplace (which represents orderliness, rigorous process, and role clarity) and Precision in Communication (emphasizing a high level of detail without error) may have strong correlations with Hofstede's Uncertainty Avoidance Index (UAI). UAI refers to a cultural predisposition to reduce risk and unpredictability. UAI also indicates a need to be in more or less control of the environment. Where members of the IT occupation typically place a high value on Structure in the Workplace (i.e., clearly defined roles and responsibilities), this value may come into conflict with national cultures that rate UAI lower. While there seems to be some evidence that national culture can impact occupational culture, it is important to remember that occupational culture is only one of seven layers in the virtual onion model (see Figure 1) and that all layers are interacting simultaneously. Future research that can examine the intersection of values at more levels should bear useful fruit. Such a particularistic point of view may require a more qualitative/ethnographic approach to unpacking the layers and identifying additional variables of interest.

Including the differentiation view offset some of the shortcomings of the integrative view by not falling prey to the assumption that everyone in a cultural group is the same. It provides both a more balanced and a more nuanced view of occupational culture. One revealing difference was that the U.S. was not the measuring stick for the rest of the world. While the U.S. fit our "typical" profile, it did not appear in the uppermost of any of the tables of ratings. One might have expected such a result since the occupation largely originated in the U.S. in Silicon Valley (Rogers & Larsen, 1984). Based on the data, the U.S. did not rate the ASPIRE values higher than other countries and in fact the U.S. typically fell in the lower half when sorted by country means. The more complicated analysis of pairwise comparison of all country scores was an effort to avoid any ethnocentrism that might have taken place if the analysis had taken the simpler approach of examining pairwise differences with the U.S. alone. If there is a country that seems to place high in the ideology the most, based on the ratings data, that would be India. This may make some sense given India's strong investment in IT and the sheer amount of IT outsourcing that the country has been able to service due to its human capital. Iran, on the other hand, showed the lowest level of support for the ITOC ideology (although still ranking all the values as important). Iran has historically been a conservative culture where religion has a dominant influence on all aspects of society including the business and IT world. Thus, Iran may be a prime example where the influence of a global occupational culture is the weakest and that of national culture is the strongest. Iran may also be unique in the sense that it is a strongly Muslim country based on Persian culture and not on Arab culture (Alhashemi & Weistroffer, 2017).

The fragmentation lens is the most challenging one to look through and the most perplexing. It was not surprising to find differences between countries. What was surprising is that the differences did not appear to be based on obvious groupings such as geographic region or shared national culture (due to historic or colonial relationships between countries) and this is an especially compelling result. The groupings of the rank-order analysis into differing profile patterns are difficult to explain on the surface. All we can do is let the data speak for itself at this point because many mysteries remain. For example, why would Finland and Italy have similar rankings? Why would Germany, India, New Zealand, Nigeria, and the U.K. rank Enjoyment higher than the rest of the world? Why are Egypt, Iran, Jordan (in the Middle East), Lithuania (in Europe), Peru (in Latin America), and Vietnam (in the Far East) more inclined to be "rule-followers"? These are, in many instances, counter-intuitive results based on national stereotypes. Additional analysis

will be required in the future to tease out whether differences in occupational values may be influenced by level of education, age, gender, work experience, industry, job function, and more.

While we were unable to demonstrate full metric invariance, managing cross-cultural response patterns is one of the most challenging issues in cross-cultural survey research (Fisher, 2004). Putnick & Bornstein (2016) make a strong appeal that a failure to demonstrate invariance should not necessarily preclude all further analyses of group differences:

> "Noninvariance can be informative and may lead researchers to important conclusions about how different groups interpret the same construct... The concern is that potentially important comparative research will never see the light of print if full invariance cannot be achieved…We see rejecting all noninvariant models as premature. Instead, we encourage researchers to test invariance, report their results and interpret any deviations from invariance in the context of the construct, test group differences if it makes sense to do so, and report any limitations of the tests." (Putnick & Bornstein, 2016, p. 87).

Our results support the idea that noninvariance is to be expected in such large data sets in cross-cultural research. Nevertheless, we were able to establish configural invariance across groups which does make an important contribution to research. The ASPIRE values may be used in future research as acceptable measures of occupational cultural values across a variety of different countries in different contexts.

Overall, the three-way perspective was valuable in providing additional insights that limiting our investigation to only one perspective might have missed. These three views complemented each other and led to a more comprehensive view of culture. Based on the findings from our three-way analysis and interpretation, we offer the following propositions that extend ITOC to a global context for future researchers:

1. The ASPIRE 2.0 shared values are important to members of the IT occupation across the world with Reverence for Knowledge being the most important.
2. ITOC is not rigidly homogeneous across the world especially with regard to Structure in the Workplace and Precision in Communication.
3. Countries in the same region cannot be assumed to be similar for occupational cultural analysis. Differences in ITOC are not necessarily attributed to geographic region or economic levels.

6 Contributions, Limitations, and Future Research

There are several contributions to both research and practice from this study. For research, it provides both validation of the core values of ITOC as well as extension of its application to a truly global context. ITOC is no longer limited to the U.S. Important evidence of homogeneity of ITOC was provided as well as important differences. While some occupational values remain relatively constant across countries, others seem to be impacted by national culture and other variables. The updated and refined instrument for ASPIRE 2.0 will be of value for further research and is provided in Appendix A. Furthermore, this study answered calls in the literature for more work on occupational culture, global differences, and the three-way perspective, and builds on a cumulative tradition in IS research. The three-way analysis culminated in propositions to help guide the work of future researchers. Ultimately, the contribution to research is an expanded theory of occupational culture with a global perspective using the three-way view of culture which has not been addressed in the IS literature.

The contribution to practice centers around a better understanding of the unique culture of IT professionals. Because this culture is frequently at odds with business management culture, the resulting conflict can lead to negative organizational outcomes. Cultural differences tend to lead to culture clash. The implication is that anything managers can do to reduce this conflict should lead to more positive outcomes such as successful IT project implementation as well as delivery of ongoing IT services. Managers, both IT and non-IT, who can find ways to appeal to the ITOC values in their workers should see increases in employee retention and decreases in organizational friction between IT and other business departments. The number one area that management should focus on is Reverence for Knowledge. Recognition of technical expertise and opportunities to increase technical knowledge are paramount for success. There is also practical value in understanding subtle differences in emphasis on occupational values as multinational organizations expand around the world, especially for those countries

outside of our “typical” profile. Above all, assuming that all IT employees in a geographic region or in the developed or developing world are the same will likely lead to misunderstandings.

This type of cross-sectional survey research may err on the side of breadth over depth. We deliberately wanted to pursue the unexplored aspects of one particular type of culture, namely occupational but around the world including non-Western countries. While this was done at the expense of attempting to address all aspects of culture simultaneously for a wider view, a qualitative ethnographic study is more conducive to uncovering the complex interactions between occupational culture, national culture, and organizational culture. Because of the complexity of interactions between the different levels of culture that are in play simultaneously, we call for more research in this area to differentiate them further. Much survey-based research typically identifies sample size as a limitation. However, with a sample size exceeding 10,000 responses representing a broad variety of demographic elements, that is not the case with the present study. While there is much additional information that we wish we could have collected, the overall survey was already 160 questions long. Because of the daunting scope of this project, replication of the study will be challenging. An important limitation of survey research is the nature of cross-sectional studies in that it represents one snapshot in time and cannot easily account for long-term socio-economic-political trends in each country.

The lack of measurement invariance in the data is a limitation of this research but not a surprising one. Cross-cultural research, especially with regard to cultural values, typically has experienced problems with even achieving the metric level of invariance (Kim et al., 2017; Nam et al., 2016; Stankov, 2015; Niranjan, et al., 2013; Hu et al., 2011; Urban et al., 2008; Wasti et al., 2007; Byrne & Watkins, 2003). The tendency to use or avoid extreme responses can often be culturally variant (Niranjan et al., 2013). We attempted to offset this limitation by doing rank-order analysis which compares relative rather than absolute weight among values. Our country investigators also did translation and back-translation of the survey instrument (for countries that could not use the English version) in order to reduce any chance of misinterpretation and/or mismeasurement (Byrne & Watkins, 2003). So the invariance we saw may be attributable to unobserved variables that influenced the ASPIRE values but which were not accounted for by the study with regard to data collection. This study calls for more research in ITOC to find fresh insights that may help explain similarities and differences across cultural groups. This could include differences by gender, age, economic level, IT role, and more. IT role, in particular, may account for some differences if one divides the IT occupation into groups such as Hardware Support, Software Development, and Systems Analysis/Project Management. There may be important clusters of attributes that segment out ITOC into more meaningful ways. The most intriguing ideas are around the interplay of national culture and occupational culture and the other layers of the virtual onion which all deserve further investigation. For example, there are potential relationships between the GLOBE study’s Performance Orientation (defined as the degree to which a cultural group encourages and rewards group members for performance improvement and excellence, see House et al., 2004) and the ASPIRE values that would present an intriguing line of inquiry. In particular, using Performance Orientation as a grouping variable in addition to economic status would add additional robustness to the findings.[3] We see this as a logical next step in our research.

7 Conclusion

This study examined the occupational values of IT professionals around the world. Conducted under the auspices of the World IT Project, responses were gathered from more than 10,000 IT workers in 37 different countries. The findings included support for a refined version of the ASPIRE values in IT occupational culture, referred to as ASPIRE 2.0. The most important value was Reverence for Knowledge. While there is about 80% global similarity in ITOC around the world, there are also important differences which may be due to national culture, especially for the value of Structure in the Workplace and Precision in Communication. This provided evidence for the differentiation view of culture. Finally, some of the differences between countries and how countries were grouped together into similar profiles were not easily accounted for by geographic proximity or economic level and provided evidence of the fragmentation view of culture. Overall, the three-way view of culture offered additional insights into the nature of occupational culture. Further research into ITOC is necessary in order to continue to reduce the amount of cultural conflict between IT departments and business management and increase IT success in the workplace around the world.

[3] We thank our Associate Editor who suggested this relevant relationship.

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Appendix A: Final Survey Items Used – ASPIRE 2.0

Rate each item on a 5-point scale where 1 is of most importance and 5 is of no importance.

Autonomy	AUT1	Having less bureaucracy for getting approval to take action is
Autonomy	AUT2	Having a high level of freedom in order to do my job well is
Autonomy	AUT3	Having a "flatter" organizational structure (i.e., fewer layers of management) is
Structure	STR1	Having everyone consistently adhere to hardware and software standards is
Structure	STR2	Sticking to the original project plan (instead of making last minute change requests) is
Structure	STR3	Clearly defined job roles and responsibilities are
Structure	STR4	Enforcing rules is
Structure	STR5	Orderliness is
Precision in Communication	PRE1	Using exactly the right words when speaking is
Precision in Communication	PRE2	Precision in communication is
Precision in Communication	PRE3	Communicating specific expectations, instead of general expectations, is
Precision in Communication	PRE4	Communication of precise project timelines is
Innovation	INN1	Playing with the latest and even unproven technology is
Innovation	INN2	Embracing new technology is
Innovation	INN3	Building clever new solutions is
Innovation	INN4	Showing creativity is
Innovation	INN5	Figuring out a better way to do things is
Reverence for Knowledge	REV1	Technical problem-solving skills are
Reverence for Knowledge	REV2	Critical thinking skills are
Reverence for Knowledge	REV3	Learning new skills every day is
Reverence for Knowledge	REV4	Being motivated to learn new skills on your own is
Enjoyment	ENJ1	Having fun at work is
Enjoyment	ENJ2	Laughing and joking with others at work is
Enjoyment	ENJ3	Having a sense of humor is
Enjoyment	ENJ4	Variety in my daily tasks is

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