

Chapter XI

Cultural Diversity Challenges: Issues for Managing Globally Distributed Knowledge Workers in Software Development

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Abstract

This chapter discusses cultural diversity challenges in globally distributed software development and the implications for educating and managing the future global information technology workforce. It argues that the work practices of global software development are facing a variety of challenges associated with cultural diversity, which are manifested in and can be analyzed from three dimensions: the work environment of global software development, the globally distributed knowledge workers, and the global software development work. It further articulates how cultural diversity is manifested in these three dimensions. Furthermore, it highlights the

importance of developing cultural awareness and cultural diversity understanding as important skills for the future information technology workforce.

Introduction

In this chapter, we explore the cultural diversity challenges of managing globally distributed knowledge workers who engage in global software development work practice. This topic is important to information technology personnel management and knowledge management for three reasons. First, there has been a significant increase in global software development work practices in recent years. Such work practices not only adopt the conventional characteristics of knowledge intensive work, but also generate a set of distinct features, which call special attention to managerial researchers and practitioners. Second, in global software development, the information technology (IT) professionals are globally distributed in the forms of global virtual teams and represent a wide range of nationalities and, thus cultures. Therefore, we should not only acknowledge the existence of cultural diversity of globally distributed knowledge workers, but also explore how such cultural diversity may affect global software development work, and how to explore, assess, and manage this cultural diversity. Third, although cross-cultural issues have been one of the major concerns of the global information systems discipline, there are still on-going debates about how to assess culture and cultural diversity. As a result, different views of culture and cultural diversity will have impacts on the related human resource strategies used in managing global IT personnel. Consequently, evaluation and reflection on those issues in global software development work environments are very important.

As knowledge work is increasingly outsourced globally, we would like to take the opportunity in this book chapter to consider the cultural diversity challenges of managing globally distributed knowledge workers. The objectives of this book chapter are: 1) to propose a framework to address the cross-cultural aspects of managing IT personnel in globally distributed software development work; and 2) to discuss some managerial implications that are derived from this framework. We believe both professionals and academics working in the field of global information technology and information systems (IS) management will benefit from these discussions.

The organization of the book chapter proceeds as follows. In the Background section, we introduce the concepts of global software development and virtual

teamwork. Then we present our research framework, which focuses on articulating how cultural diversity is manifested in global software development workplaces, workers, and work practices. In the following section on recommendations, we discuss how we may address the cultural diversity challenges in managing globally distributed knowledge workers who are engaged in global software development activities, particularly from the perspectives of IS/IT education and organizational human resource management.

Background

Global Software Development

Global software development as one type of information technology offshore outsourcing activities (Lacity & Willocks, 2001), has become an established practice for software and information systems development (Carmel & Agarwal, 2002; Herbsleb & Moitra, 2001). Global software development can be defined as software and information systems development practices that are knowledge intensive and involve the work arrangements between two or more organizations across the national boundaries.

Software and information systems development has been widely conceived as knowledge-intensive work (Henninger, 1997; Swart & Kinnie, 2003) with three characteristics. First, knowledge as intellectual capital is an important input to a software development project, and an important output as well (Swart & Kinnie, 2003; van Solingen, Berghout, Kusters, & Trienekens, 2000). Second, Waterson, Clegg, and Axtell (1997) pointed out that software development work is “knowledge intensive” in the sense that building a complex software system demands selecting and coordinating multiple sources of knowledge (Shukla & Sethi 2004). Drucker (2004) argued that the specialized knowledge in knowledge work indicates that knowledge workers need to access the organization—the collective that brings together a diversity of specialized knowledge workers to achieve a common goal. For example, a software development project may involve a variety of IT personnel such as designer, analyst, programmer, tester, implementer, and manager. Therefore, collaborations of team work are necessary and critical for software development projects. Third, knowledge associated with software development is rapidly changing as the complexity and diversity of the application domain is increasing (Henninger, 1997). Therefore, software development knowledge is not static but, rather, is evolving with the changing needs of the customers and business environments (Henninger, 1997). Drucker (2004) pointed out that knowledge workers not only need formal

education to enable them to engage in knowledge work in the first place, but also need continuous learning opportunities through the work practice to keep the knowledge up-to-date. These three characteristics of software development work usually refer to the work practices within a single organizational domain. As software and information systems development work is increasingly outsourced globally, how to manage the knowledge workers to facilitate effective software development work practice in the cross-cultural context has become a great challenge.

Since the 1990s, software development and IT services have become dominant in global sourcing, which includes application packages, contract programming, and system integration (Lee, Huynh, Kwok, & Pi, 2002). And the global IT outsourcing market is continuously growing (Sahay, Nicholson, & Krishna, 2003; Trauth, Huang, Morgan, Quesenberry, & Yeo, 2005). It was projected that the IT outsourcing revenue would reach \$159.6 billion by 2005 (Laplante, Costello, Singh, Bindiganaville, & Landon, 2004). The U.S. is the primary user of the global software and systems development market, followed by Western European countries such as the UK and Germany (Sahay et al., 2003). Countries such as India, Ireland, and Israel, have dominated the offshore outsourcing supplier market (Gopal, Mukhopadhyay, & Krishnan, 2002). A news release (InformationWeek, June 3, 2004) indicated that India's revenues from exports of software and back-office services is at \$12.5 billion in the latest fiscal year and with growth of 30% compared with \$9.6 billion in the previous year. Another news release (Friedman, 2005) reported that 7 out of 10 top software designers have operations in Ireland.

When compared to the traditional characteristics of software development work, globally distributed software development knowledge work has three additional characteristics. First, it is mainly conducted through a virtual environment that is supported to a great extent by networking technologies. Such virtual space is global by nature and transcends national and organizational boundaries. Second, it is situated within different complex, multi-leveled socio-cultural contexts. Walsham (2000, 2001) argued that the distinct cultures of different local contexts are critical factors in mediating the globalization process in the specific contexts. Therefore, the globally distributed workplace has a global-local duality. Third, the work practices of global software development are facing a variety of challenges associated with the difficulties of temporal and spatial distance, and cultural diversity.

Global Virtual Team

The globally distributed virtual team is the basic unit engaged in software development work. A global virtual team can be defined as a collection of

individuals who are organizationally and globally dispersed, and culturally diverse, and who communicate and coordinate work activity asynchronously or in real time primarily through information and communication technologies (ICTs) (DeSanctis & Poole, 1997; Jarvenpaa & Leidner, 1999).

A variety of strategic and catalytic factors have contributed to the increasing trend of using globally distributed virtual teams for software and information systems development (Carmel, 1999; Herbsleb & Moitra, 2001). These include: 24/7 around-the-clock development activities, the desire to reduce development costs and have access to a global resource pool, and the proximity to the customer. In addition, some authors have further emphasized the contribution of diversity of heterogeneous teams to work performance brought about by globally dispersed team members (Adair, 1986; Harrison, McKinnon, Wu, & Chow, 2000; Hartenian, 2000; Maugain, 2003; Trauth et al., 2005). For example, Maugain (2003) argued that the different thinking modes and dissimilar problem solving methods brought in by diverse team members in multicultural R&D (Research & Design) teams will stimulate novel ideas and creativity. Hartenian (2000) pointed out that diverse groups have a tendency to make higher quality decisions, to be more creatively motivated, and have a higher productivity potential than less diverse groups.

However, research also shows that the absence of regular face-to-face interactions and the breakdown of traditional communication and coordination mechanisms are negatively associated with the effectiveness of globally distributed software development teams (Carmel, 1999; Herbsleb & Mockus, 2003). Systems development tasks, particularly front-end activities, require formal and informal communication and coordination (Audy, Evaristo, & Watson-Manheim, 2004) to facilitate knowledge exchange and learning (Curtis, Krasner, & Iscoe, 1988). According to Herbsleb and Mockus (2003), the change of communication patterns and the lack of effective communication channels (formal or informal) in globally distributed software development teams can lead to delays in global software development projects. The study by Cramton and Webber (2005) shows a negative relationship between geographic dispersion and perceived team performance with respect to complex and interdependent tasks.

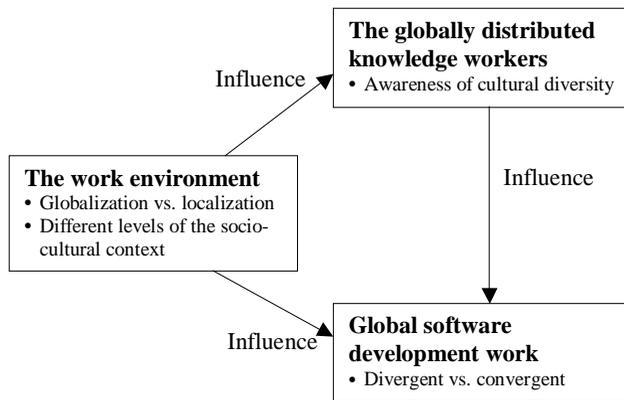
The cultural difference may further exacerbate the communication problems (Herbsleb & Moitra, 2001). Carmel (1999) pointed out that the barriers of time, space, and cultural distances may be detrimental to building trust and achieving team cohesiveness in global virtual teams. Nicholson and Sahay (2004) argued that the barriers of knowledge sharing among knowledge workers in offshore software development are related to the embeddedness of knowledge in the local cultural context, and should be investigated at the interconnected societal, organizational, and individual levels of analysis.

While cultural factors may influence global virtual teams engaged in a variety of activities in general, they are particularly important to software development work for three reasons. First, compared to other activities such as new product developments in manufacturing sectors, the processes of software development are more complexly interdependent and iterative, the products of software development are less tangible, and knowledge perspectives involved in software development are more tacit and fast changing in nature (Sahay et al., 2003). Second, a number of studies have shown that culture is a critical influential factor in global software development work and has impacts on a variety of issues. While some issues are general issues faced by global virtual teams engaged in other activities in general (e.g., managing conflicts—Damian & Zowghi, 2003), building trust (Zolin, Hinds, Fruchter, & Levitt, 2004), some issues are specific to software development, such as managing IT outsourcing relationships (Krishna, Sahay, & Walsham, 2004; Nicholson & Sahay, 2001; Sahay et al., 2003), preference of software development methods (Borchers, 2003; Hanisch, Thanasankit, & Corbitt, 2001), preference of computer supported collaborative technologies (Massey, Hung, Montoya-Weiss, & Ramesh, 2001), knowledge transfer and management related to software development (Baba, Gluesing, Rantner, & Wagner, 2004; Nicholson & Sahay, 2004; Sarker, 2003), and the process and performance of globally distributed software development teams (Carmel, 1999; Olson & Olson, 2003). Third, as more and more countries are now entering the IT outsourcing market, global software development work practices are facing more cultural diversity (Sahay et al., 2003; Trauth et al., 2005). Companies in Japan and Korea join those of the US, Canada and other western European nations in outsourcing their software or information system development and services activities to other countries. Besides the current leading outsourced countries such as India, Ireland, and Israel, Russia and China are now establishing their capabilities as outsourcing providers (Sahay et al., 2003).

Globally distributed software development efforts, thus, must deal with trade-offs between taking advantage of the global resource pool and cultural diversity while managing the cultural and distance barriers to effective communication and coordination in a geographically dispersed environment. How to make sense of cultural diversity and its impact on managing globally distributed knowledge workers who are engaged in global software development work activities are becoming the primary concerns of global IT personnel management and knowledge management.

In the research framework (Figure 1), we propose that cultural diversity is situated and manifested in three interrelated dimensions of global software development activities: the virtual workplace, the workers, and the work (Trauth, 2000). These three main constructs reflect what dimensions of global software

Figure 1. Research framework—Situating cultural diversity in global software development



development may be affected by cultural diversity. And the bullets under each main construct further indicate how cultural diversity is manifested in each of these dimensions. Trauth (2000) studied the information economy development in Ireland and pointed out that culture is one of the major influential factors. More specifically, she addressed the cultural influences from three perspectives: multinational workplaces, knowledge workers, and knowledge work. These three perspectives are interrelated and serve as our analytical lenses to study how the cultural factors influence IT work, and in this chapter, how cultural diversity is manifested in and affects global software development.

The virtual workplace of global software development is situated within a multi-leveled socio-cultural context with the global-local duality characteristic, which constitutes a unique work environment. Being engaged in global software development activities within such a work environment, globally distributed knowledge workers should be aware of the complexity and dynamics of cultural diversity, and constantly make sense of and negotiate meanings of such diversity. Global software development work, which includes both divergent and convergent perspectives is affected by the effectiveness of the sense-making processes and the management of cultural diversity. This framework adopts a situated approach and emphasizes the importance of studying globally distributed knowledge work as socially negotiated work practices by situating it within the both the global and local contexts (Avgerou, 2002; Trauth, 2000; Weisinger & Trauth, 2002, 2003). In the following sections, we discuss in detail how cultural diversity is manifested in each dimension of the framework, respectively.

The Work Environment

Globalization vs. Localization

Globally distributed software development work can be seen as a result of the globalization process—the IT industry is becoming more and more globally interconnected. According to Castells (1996), the globalization process involves the flows of capital, commodities, technology, cultural influences, and human resources across national boundaries, thereby creating a networked society. One stream of sociological and cultural research considers processes of globalization and flows of cultural elements across frontiers as a global “cultural homogenization” (Kellner, 2003; Schuerkens, 2003). Schuerkens (2003) criticized such “cultural homogenization” arguments of globalization by pointing out that they usually ignore the existence and active role of local cultural perspectives. Castells (1996) also pointed out that the globalization process is selective and segmented with many imbalances, and the networked society is both centralized and decentralized, which shows heterogeneous and global-local duality characteristics.

Sahay et al. (2003) argued against the “cultural homogenization” assumption of globalization and proposed that global software development work relationships can be seen as “models of” globalization process and “models for” globalization as well (p. 27). They emphasized the dynamic reciprocal relationships between the local cultural contexts and the globalization processes. Similarly, Walsham (2001) used Giddens’ structuration theory (1990) and Castells’ network society theory (1996) to study global IT development and stressed that the existing socio-cultural context of a country is a critical factor in mediating the globalization process in the specific context and, in turn, will have an impact on the complexity of globalization. They both acknowledge the uniqueness and importance of local contexts to globally distributed software development.

To illustrate the continuous interactions of local cultural elements and global cultural influences, Schuerkens (2003) cited Long’s (1996) discussion: “Local situations are transformed by becoming part of wider global arenas and processes, while global dimensions are made meaningful in relation to specific local conditions and through the understandings and strategies of local actors” (p. 217).

Therefore, the local cultural context is neither a passive recipient of globalization and external cultural influences as indicated by the “global homogenization” argument, nor is it a static and deterministic factor that remains unchanged during the globalization process. The local cultural forms and meanings are constantly reconstructed (Schuerkens, 2003; Walsham, 2001).

We believe that such continuous interactions of globalization and localization processes have three implications for conceptualizing the cultural diversity of global software development work environments. First, global software development work is situated within a complex and dynamic global-local societal context. Second, cultural diversity is inherent in global software development and is a critical influential factor affecting global software development work practices. Third, the emergent nature of both the local cultural context and the globalization process indicates that we should focus on the appropriation and transformation of local cultural elements to address the dynamic perspectives of cultural diversity of the global software development work environment.

Different Levels of the Socio-Cultural Context

Another important feature of the cultural diversity of the virtual workplace of global software development is the multi-levels of analysis ranging from societal (national) to regional, organizational, professional, team. Different cultural factors at different levels coexist, interact with each other, and together produce different work environments of globally distributed software development work practices. However, the influence of different cultural factors at different levels is not equal and varies across work environments. Some cultural factors may be more visible than others and some may seem trivial compared to the predominant factors depending on different cases.

For example, Robey, Gupta, & Rodriguez-Diaz (1988) studied one multinational company's efforts to implement an account system in its subsidiaries in two Latin American countries: Chile and Panama. Their findings showed that cultural and political differences between Chile and Panama could not explain the significant differences in the implementation outcomes. They believed that those differences were due to the organizational cultural differences of the two subsidiaries. This case is an example of the dominance of organizational cultural influences while national and organizational cultural differences coexist. Barrett and Walsham (1995) studied the global software development relationships between a Jamaican insurance company and an Indian software company. They pointed out that although the Indian and Jamaican team members of this joint venture development shared a similar professional culture, there were major differences between the local work culture at the Indian software company and the Jamaican insurance company. This case demonstrates the dominance of national and organizational cultural influences. The case study by Kaiser and Hawk (2004) on a long-term alliance outsourcing relationship between a U.S. company and an Indian company showed that the mutual understanding of ethnic and corporate cultures was an important factor to build stable and trust relationships.

In global IT outsourcing research, the focus tends to be on the national level of analysis. Therefore in most cultural studies of global software development, the national culture is predominant while other factors such as regional, organizational, and team cultures are in the background. This is probably due to the high visibility of cross-national cultural differences. Another reason may be that the cultural elements at different levels interact with each other and somehow diffuse into some inseparable influential factors.

Some studies (Cougar, Adelsberger, Borovits, Zviran, & Motiwalla, 1990; Constantine, 1995) pointed out that while the national culture may show divergent characteristics across national boundaries, the professionalism of the knowledge workers will share certain common cultural elements that constitute the professional culture. As a result, the team culture of the global virtual team may show a different pattern from either the national culture or the organizational or the professional culture. Earley and Gibson (2002) pointed out that through communications and interactions, the highly heterogeneous global team may appear to develop a common identity over the course of a long-term project, which they referred to as the team culture.

The contemporary work environment of global software development is situated within a complex multi-leveled socio-cultural context in which culture and its influences are emergent as the work practices evolve. The emergent perspective of cultural diversity indicates that it cannot be reduced to a set of variables and treated as unchanging inherited properties. In a sense, globally distributed knowledge workers are not passively embedded in their local context. Instead, they continuously and actively engage and negotiate with their work environment in everyday work practices.

The Globally Distributed Knowledge Workers

Brannen, G~mez, Peterson, Romani, Sagiv, and Wu (2004) pointed out that the concept of culture is by no means free of controversy. According to Worsley (1984), there are four ways of conceptualizing culture: the elitist view—culture implies superior power; the holistic view—culture implies the whole way of life; the hegemonic view—culture is a set of behaviors imposed by the majority; the relativist view—culture is localized and may bear different behaviors in different regions or communities from the same society.

There are two general doctrines of conceptualizing culture—the functionalist view and the interpretivist view (Schultz & Hatch, 1996). The functionalist view assumes that culture can be studied from several generalized dimensions and those dimensions are universal. As results, the functionalist studies focus on categorizing cultural dimensions and predicting their influences. Hofstede's (1984) framework of five major national cultural dimensions is one example of

the functionalist doctrine. The interpretivist doctrine, on the other hand, argues that culture may be ambiguous and unstable and should be studied within a specific local context instead of using general frames.

Schultz and Hatch (1996) studied the difference between the functionalist and interpretivist paradigms of cultural research. They proposed that these two paradigms can somehow interact to address the different perspectives of culture. To some extent, the mainstream of each of these doctrines can be integrated to a “multiparadigm” approach. They suggested that for example, to study national cultural patterns, the functionalist view uses predefined categories to provide a clear, generalizable and stable pattern, while the interpretivist view uses interpretation and symbolic representation to describe the ambiguous, situated and instable perspectives of culture. However, this approach may still be problematic since it assumes that there is a line between the stable and unstable elements of culture. In reality, the line itself may be ambiguous and dynamically changing.

The anthropological view of culture is a constructivist view which rejects the idea of culture as having hard and fast boundaries (Avison & Myers, 1995). On the contrary, culture is seen as contestable, temporal, and emergent, and is constantly interpreted and re-interpreted in social relations (Carrithers, 1992). Therefore, the anthropological cultural view rejects the notion of culture as a set of predefined variables peculiar to a certain society. In the information systems discipline, Walsham’s notion of culture mediating the global process in specific local contexts (Walsham, 1993, 2000, 2001), Avegerou’s proposal on relativism (2002), and the situated culture perspective suggested by Weisinger and Trauth (2002, 2003) are three approaches to studying culture through exploration, interpretation, and sense making, which reflect the anthropological perspective of conceptualizing culture.

We argue that when managing global software development practice, the functionalist approach may provide certain general guidance if cautiously adopted. However, it is lacking the capability to provide an in-depth understanding of cultural dynamics. Therefore, we take the following statement as a working definition of culture:

Culture is the sense making of different social structures and relations such as beliefs, values, and norms, attitudes, hierarchies by a group of people within a particular social context.

In this definition, we view culture as the “sense making” which actively strives for interpretation and re-interpretation of the relationships between the self-identity and the surrounding contexts. We believe that viewing culture as dynamic and emergent instead of static and predefined will provide the corre-

sponding cross-cultural management the capability of accounting for the evolving and diversified nature of global software development phenomena.

Child (2002a, b) pointed out that the globalization trend and subsequent interconnectivity of networking technologies have pushed the traditional boundaries between nations and organizations to become somehow “borderless.” At the same time, they enhance the people’s awareness of their own identity and cultural distinctiveness as they have more and more opportunities to interact with a variety of cultural groups during the processes. In a sense, they interpret and reinterpret self-identity and the relationships between the self-identity and the surrounding contexts.

We argue that cultural awareness of globally distributed knowledge workers should have two levels—the self-awareness of their own identity and the mutual awareness of the existence of the cultural diversity and differences in others. Baba, et al. (2004) pointed out that in order for team members of a globally distributed team to bring together and integrate the divergent knowledge, they should first develop the mutual awareness and shared cognition of the divergences. They further stressed (Baba et al., 2004) that the mutual awareness is not simply exchanging declarative or procedural knowledge—it requires: “...suspending our own judgment as we learn the cultural logic and rationality of others’ divergent beliefs and values, while also allowing those others to call our own beliefs and values into question as they learn about us...” (p. 583).

The Global Software Development Work

Studies have shown that while cultural diversity may lead to advantages with respect to the divergent processes of knowledge work, it may also cause problems for the convergent processes (Miroshnik, 2002). Divergent knowledge work processes in software development refer to processes of generating and articulating different viewpoints by different team members, as well as challenging the existing assumptions in requirement analyses and systems designs, which are important for surfacing and exploring alternatives, thus promoting creativity and innovation in software development (Kryssanov, Tamaki, & Kitamura, 2001; Nickerson, 1999). Convergent knowledge work processes refer to processes of developing shared understanding and building common ground among team members with respect to different perspectives of software development, which are important to decision-making and effectiveness of teamwork (Potts & Catledge, 1996).

Knowledge intensive work, such as design and development of new software and information systems is usually characterized as highly ambiguous, uncertain, equivocal, and interdependent (Curtis et al., 1988; Herbsleb & Grinter, 1999;

Hoegl & Proserpio, 2004). The analysis of systems requirements, which is critical task at the front-end of software and information systems development, is highly dynamic, complex, fluctuating, and evolutionary in nature (Audy et al., 2004; Curtis et al., 1988; Mathiassen & Stage, 1990). Cultural diversity may provide benefit to the front-end of software development work by providing different perspectives, ideas, and approaches. Dafoulas and Macaulay (2001) pointed out that cultural diversity may be beneficial to team performance, especially on tasks for which differing perspectives might increase team performance (Trauth et al., 2005). Miroshnik (2002) also argued that cultural diversity can be used as a resource to enhance creativity, flexibility and problem solving skills, all of which are important for knowledge-intensive work.

On the other hand, to bring the divergent perspectives into a convergent development practice, cultural diversity may become a barrier to knowledge sharing and transference since knowledge is contextually dependent and culturally contingent (Nicholson & Sahay, 2004). To a great extent, the convergent processes require both formal and informal communication and coordination mechanisms to exchange diverse knowledge perspectives and facilitate learning (Curtis et al., 1988), to surface conflicts and negotiate differences (Audy et al., 2004; Briggs & Gruenbacher, 2002; Curtis et al., 1988), to build shared understandings and common ground regarding various issues such as how to represent the system requirements and which system development methodologies are more appropriate (Cramton & Webber, 2005; Damian & Zowghi, 2003). During these convergent processes, cultural diversity may create cultural distance and barriers to knowledge sharing and transference. Herbsleb and Moitra (2001) pointed out that while cultural diversity can be seen as an enriching factor by bringing together divergent bodies of knowledge, it can also lead to serious and chronic misunderstandings.

For example, in the case study of distributed software development between England and India, Nicholson and Sahay (2004) identified cultural difference in perceptions of time between India and England. In England, a 9 AM to 5 PM working routine and the separation of working life from personal life are encouraged. In India, the boundaries between working life and home life are less defined (Nicholson & Sahay, 2004). Thus, Indian employees may respond to personal or home needs during regular working hours and may spend extra time working later hours or on weekends (Nicholson & Sahay, 2004). Such cultural differences are implicitly embedded in each local cultural context. Without building corresponding mutual knowledge and awareness about these differences, team members from one site may have misconceptions about the availability of team members from the other site. Saunders, van Slyke, and Vogel (2004) argued that different global virtual team members may have different time visions, which may influence the management and performances of global virtual teams.

The interchange of benefits of cultural diversity and hindrance of cultural distance put forward special challenges of teaching cultural diversity to future IS/IT workforce and managing globally distributed knowledge workers. On one hand, we need to address issues related to bridging cultural distance to encourage knowledge sharing and transference across different cultures. On the other hand, we need to study how to cultivate and integrate cultural diversity in order to develop new organizational capabilities (Baba et al., 2004).

Recommendations for Practice

As suggested by our research framework, it is very challenging to manage such a diverse workforce for global software development for three reasons. First, the culture of the virtual work environment is complex and dynamic. Second, the cultural diversity of globally distributed knowledge workers has the potential for both great accomplishments and great conflicts. Third, the cultural diversity of such a global workforce needs to be proactively managed, and cultivated in order to facilitate both the divergent and convergent perspectives of software development work activities.

To address these challenges, we recommend the following. First, treat cultural awareness and cultural diversity understanding as important and necessary skills for the future IS/IT workforce, provide IS/IT students opportunities to experience cultural diversity, and help them explore and develop a proper mind-set towards diversity. Second, adopt the sense-making approach in human resource practices to motivate and facilitate globally distributed knowledge workers' articulation of their self-identities and the identities of others during the social interactions of teamwork processes. Third, balance the tensions between the values and the conflicts of cultural diversity by encouraging contested, diverse thinking while building the trust and shared understanding among globally distributed team members. Finally, value cultural diversity knowledge as an important part of the organization's intellectual capital and strategic resources for competing in the global market.

IS/IT Education

The gap of critical skills and knowledge required for information technology professionals between academe and industry has been a major concern for IS/IT education (Lee, Trauth, & Farwell, 1995; Miller & Donna, 2002; Swanson, Phillips, & Head, 2003; Trauth, Farwell, & Lee, 1993). Academics and practi-

tioners have called for assessing and expanding IT, IS, and MIS curricula to adapt to the needs of future global IS/IT workforces (Miller & Donna, 2002; Swanson et al., 2003). For example, Swanson, et al. (2003), and Noll and Wilkins (2004) discussed the growing needs for soft skills such as communication skills and teamwork skills in information technology professionals. Larsen and McInerney (2002) simulated the inter-organization virtual teamwork environment in course design to teach students certain skill sets needed in virtual work. However, only a few of these programs specifically target the global IT environment and conceptualize diversity as one of the core elements in the global IT environment. One of those few examples is the online “IT Landscape in Nations” repository initiated by Carmel and Mann (2003) to facilitate students conducting comparative analyses of different nations and developing greater awareness of the global IT environment. Therefore, there is a great gap between current IS/IT education and the increasing demands of the global IS/IT workforce. Educators should focus on designing and implementing corresponded curriculum, renovating and expanding current pedagogical approaches to bridge such gap.

IS/IT Human Resource Management

Along with the focus shifting from capital resources to knowledge resources in modern economic development, the role of knowledge has been fundamentally changed (Drucker, 1994). As a result, the role of human resource management has become more and more important because “*people are the only sustainable asset in modern business*” (Schwarzkopf, Saunders, Jasperson, & Croes, 2004, p. 28). The strategies and implementations of human resource practices directly affect how knowledge workers will be continuously motivated and trained to perform their value creation tasks (Hill & Jones, 1998; Pfeffer, 1994). Trauth, et al. (2005) pointed out that it is critical that researchers and practitioners take an active role in creating HR solutions and it is important to understand diversity issues in the global IT environment.

Kakabadse and Kakabadse (2000) pointed out that organizational outsourcing initiatives have both negative and positive effects on their employees. As more and more IT jobs shift offshore, it may hamper the employment relationship of belonging and dedication when employees feel unsafe with respect to job security (Kakabadse & Kakabadse, 2000). The cultural diversity and the lack of trust and cohesiveness of global virtual teams may influence team members’ working experiences (Carmel, 1999). It is also argued that outsourcing and global software development arrangements may provide career enhancement and learning opportunities for employees and organizations provided that special expertise and skills can be acquired and knowledge can be mutually shared and

transferred across borders (Baba et al., 2004; Carmel, 1999; Kakabadse & Kakabadse, 2000). Therefore, one of the primary concerns of human resource management in global software development practices is how to mitigate the negative impacts and enhance the positive effects.

Given the complexity and dynamics of cultural diversity and its criticality in global software development work practices, it is important to emphasize the sense-making perspective in cultural training and provide employees proper and continuous cross-cultural training. When knowledge workers are involved in different virtual work environments, the stereotypically and culturally specific approach may fail to help them make sense of different cultural nuances from different cultural contexts (Goodall, 2002; Osland & Bird, 2004). Therefore, cross-cultural training should focus on how to develop and improve the cultural sense-making skills of employees.

Foster (2000) studied the cultural training for expatriates of multi-national companies and pointed out that most of those training programs focus on pre-departure training and fail to provide continuous training during the work processes. Krishna, et al. (2004) pointed out that systematic cross-cultural training is less common than informal experience sharing in their case studies of global software development activities. And if in place, that cultural training is usually in one direction: for the outsourced companies to learn the culture of the outsourcing companies (Krishna et al., 2004). Osland and Bird (2004) advocated the sense-making approach for cultural training and stressed that there should be both formal and informal mechanisms for sharing cultural knowledge.

We believe that organizational human resource management together with knowledge management practices should value cultural diversity knowledge as an important part of the organizational intellectual capital and strategic resources for competing in the global IT market in the future. Cross-cultural sense making, understanding, and knowledge sharing are critical to develop a flexible, competitive, and yet sustainable learning organizations (Garvin, 1998). In cross-cultural training and learning practices, we should allow distributed knowledge workers to have opportunities to continuously reflect on their cultural experiences in the course of accomplishing working processes and encourage them to take such reflections as learning opportunities.

Conclusion

To address the cultural diversity challenges of managing globally distributed knowledge workers in global software development, we proposed a research framework to articulate how cultural diversity is manifested in global virtual work

environments and how the cultural diversity of distributed knowledge workers may influence global software development work practices. The main objective of the chapter is to promote the awareness of cultural diversity challenges to managing information technology professionals in the increasingly globalized IT environment. Our analyses show that we should critically examine the global-local context of the cross-cultural issues to overcome the obstacles of cultural diversity in convergent tasks of software development work and maximize its values in divergent tasks of the work activities.

As researchers and educators in academic settings, we believe that cultural awareness and cultural diversity understanding should be viewed as important skills for the future IS/IT workforce. We also believe that organizational human resource practices should adopt the sense-making approach for cross-cultural training and knowledge sharing. In order for organizations to compete in the global market in the future, cultural diversity knowledge should become an important part of the organization's intellectual capital and strategic resources.

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