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Modeling and Analyzing Cultural Influences on Project Team Performance*

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Abstract

Research on international joint ventures (IJV) finds managers experience difficulties in working with cross-cultural teams. Our research aims to understand how cultural differences between Japanese and American firms in IJV projects effect team performance through computational experimentation. We characterize culture and cultural differences using two dimensions: *practices* and *values.* Practices refer to each culture's typical organization style, such as centralization of authority, formalization of communication, and depth of organizational hierarchy. Values refer to workers' preferences in making task execution and coordination decisions. These preferences drive specific micro-level behavior patterns for individual workers. Previous research has documented distinctive *organization styles* and micro-level *behavior patterns* for different nations. We use a computational experimental design that sets *task complexity* at four levels and *team experience* independently at three levels, yielding twelve organizational contexts. We then simulate the four possible combinations of US *vs.* Japanese *organization style* and *individual behavior* in each context to predict *work volume, cost, schedule* and *process quality* outcomes. Simulation results predict that: (1) both Japanese and American teams show better performance across all contexts when each works with its familiar organization style; (2) the Japanese organization style performs better under high task complexity, with low team experience; and (3) process quality risk is not significantly affected by organization styles. In addition, culturally driven behavior patterns have less impact on project outcomes than organization styles. Our simulation results are qualitatively consistent with both organizational and cultural contingency theory, and with limited observations of US-Japanese IJV project teams.

Keywords: cultural differences, practices, values, Japanese, American, Virtual Design Team, team performance, organization design

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1. Introduction

In an era of globalization, projects in the construction industry face unique challenges in coordinating among sponsors, financiers, developers, designers and contractors from different countries. In addition, project teams need to cope with the complexities of both local institutions and physical environments. Research on international joint-venture (IJV) projects reveals significant difficulties in managing cross-cultural teams. According to one study, two out of every five IJV project teams struggle through their projects and show poor performance (Beamish and Delios, 1997). One of key problems is the increased internal complexity caused by pre-existing differences among IJV team members in cultural values, beliefs, norms, and work practices. In order to lead a project successfully, project managers need to comprehend the differences in values, norms and behaviors among their partners, and understand the influence of these cultural differences on team performance. This research attempts to characterize cultural differences that emerge in IJV teams, and to model and analyze cultural effects on team performance through computational "virtual" experimentation.

In this research, we focus on two cultures—Japanese and American—as an example of the minimum dyadic unit of cultural interaction in global construction projects. Many researchers have characterized distinguishing differences between Japanese and American cultures in business situations (e.g., Nakane, 1970; Ouchi, 1981; Aoki, 1992). Their findings help in understanding the internal consistency of Japanese *vs.* American social and organizational principles and their differences from one another. However, very few cross-cultural studies have focused on the construction industry, even though the international construction market alone is worth $106.5 billion.[1]

What is culture? Generally, culture can be defined as a set of shared experiences, understandings, and meanings among members of a group, an organization, a community, or a nation (e.g., Davis, 1984; Hofstede, 1991; Schein, 1989). Through sharing common successes and struggles, groups create their own unique cultures, leading to the development of unique sets of values –i.e., broad tendencies to prefer certain states of affairs over others- and practices–i.e., visible manifestations to an outside observer such as symbols, heroes, and rituals. This research views cultural differences along two dimensions proposed originally by Hofstede (1991): *practice differences* and *value differences*. Hofstede (1991) originally describes national culture in terms of both values and practices. Although our focus of this research is on project organizations rather than national culture, the dimensions of value and practice provide a good starting point for us to study culture and cultural differences in project teams. Our work extends Hofstede's definitions to cover project organizations.

Computer simulation is growing in popularity as a research method for organizational researchers (Dooley, 2002). Computer simulation models, such as the Virtual Design Team (VDT) (Levitt et al., 1994; Jin and Levitt, 1996), can provide a laboratory to address "what-if" questions about project team performance and organization design (Burton, 2003). The VDT model was not originally intended to capture cultural factors, but its rich characterization of both organizational and actor behaviors provide some capability to model cultural phenomena. The long term goal of this research is to extend the representation and reasoning of the extant VDT model to capture the impact of cultural differences in global construction projects. As the first step toward this goal, the current research explores the extent to which the VDT model can be used to model cultural influences on project team performance.

In this research, we take following steps to analyze culture impacts on project team performance. First, we characterize the typical coordination mechanisms of Japanese teams and American teams in terms of their practice differences and value differences, based on literature and our observations. Second, we encode selected cultural factors into the organizational and micro-level behavior parameters of the VDT model. Third, we analyze the effects of practice and value changes on team performance through "Intellective Simulation" using idealized organizations (Burton and Obel, 1995). Finally, the simulated results are qualitatively compared with Hofstede's "Cultural Contingency" propositions for the "preferred coordination mechanism[2]" (Hofstede, 1991).

2. Cultural Differences in Values and Practices

In this research, values and practices are viewed as the basic building blocks of "culture" (Hofstede, 1991). Hofstede describes practices as composed of symbols, heroes, and rituals. This research extends the meaning of "practices" to include cultural norms for adopting specific project management styles and organization structures. Similarly, this research extends the term "values" to refer to the preferences people use to make work-related and communication-related decisions in projects. This research characterizes Japanese and American teams along practice-value dimensions through observations and a literature survey. Specifically, we conducted four case studies using the ethnographic approach (Spradley, 1979) between April and August, 2003. All four projects were joint-venture projects between Japanese and American firms located near the San Francisco Bay Area. Thus, we controlled for the broader legal and political regulative institutional context (Scott, 2001).

In our culture model, *practices* at the project team level are characterized by three attributes: the level of centralization of authority, the level of formalization of communication, and the depth of the organizational hierarchy. Different cultures in different countries have evolved different norms for each of these attributes. Our ethnographies found that Japanese project teams tend to have multiple levels of hierarchy and to be more centralized, while American firms usually adopt a flatter organization hierarchy and decentralized authority. These observations are consistent with existing literature (e.g., Lincoln and Kalleberg, 1990). Table 1 illustrates preferred organization styles of Japanese and American firms.

Table 1. Summary of cultural differences.

		Culture A (American)	Culture J (Japanese)
Practices	Centralization	Decentralized authority	Centralized authority
	Formalization	Medium level of formalization	High level of formalization
	Organizational hierarchy	Flat level of hierarchy	Multiple levels of hierarchy
Values	Decision Making	Individual decision making	Consensual decision making
	Communication	Individually-based	Group-based

Value differences are related to national culture (e.g., Hofstede, 1991). Hofstede's work[3] provides a useful set of dimensions against which value differences can be measured. At the project level, when participants make decisions or coordinate with each other, their behavior is driven by their values. We call these decisions "micro-level behaviors" (Jin and Levitt, 1996), and can observe key elements of micro-level behavior by focusing on decision-making and communication behaviors. In our model, *cultural values* at the project team level are represented by how project participants make work-related and communication-related decisions. Japanese workers, for instance, tend to seek consensus before making decisions, while Americans prefer to decide independently. Japanese and American have distinctly different patterns of micro-level behavior (Table 1).

Table 1 summarizes the two culture dimensions (practice and value), their attributes, and the values of these attributes for Japanese and American cultures. At project level, each nation has its own sets of organizational style and micro-level behavior.

3. Computational Simulation Model

The computational simulation model of this research is developed based on the Virtual Design Team (VDT) model. The VDT[4] model is adopted as a virtual organization laboratory for three reasons: (1) the VDT model was built to design project organizations, the same unit of analysis as this research, (2) the large numbers of organizational and individual level behavioral parameters available in the VDT model can potentially represent cultural differences with some fidelity, and 3) the VDT model has been validated by many previous researchers (e.g., Thomsen et al., 1999). Furthermore, the VDT model fulfills the three key criteria for being used as a "theorem prover" (Burton and Obel, 1995)—reality, content, and structure—to examine hypotheses. Therefore, this research uses the VDT model to analyze the effects of organizational and individual behavioral differences.

This research encodes organization styles driven by differing cultural practices and micro-level behavior patterns driven by differing cultural values, based on observations and a literature survey. In addition, task complexity and team experience are set as idealized context variables. We assume two independent variables that reflect the effects of changes in practices and values: *organization style* (cultural practices), *micro-level behavior of actors* (cultural values), over the full range of our context variables of *task complexity*, and *team experience* (figure 1).

1. *Organization style*, which is linked to *practices*, refers to the organizational parameters within the VDT model that determine the exception handling paths and authority levels of decision makers. Since practices within an organization are the organizing mechanisms that enable the organization to conduct a project, practices are linked to an organization's structure. Specifically, we set three organizational parameters based on our observations: the centralization level, formalization level, and depth of organizational hierarchy. This set of three organizational parameters represents each nation's typical organization style. For instance, the American organization style is set to a low level of centralization (i.e., more decentralized), a medium level of formalization, and includes direct supervision

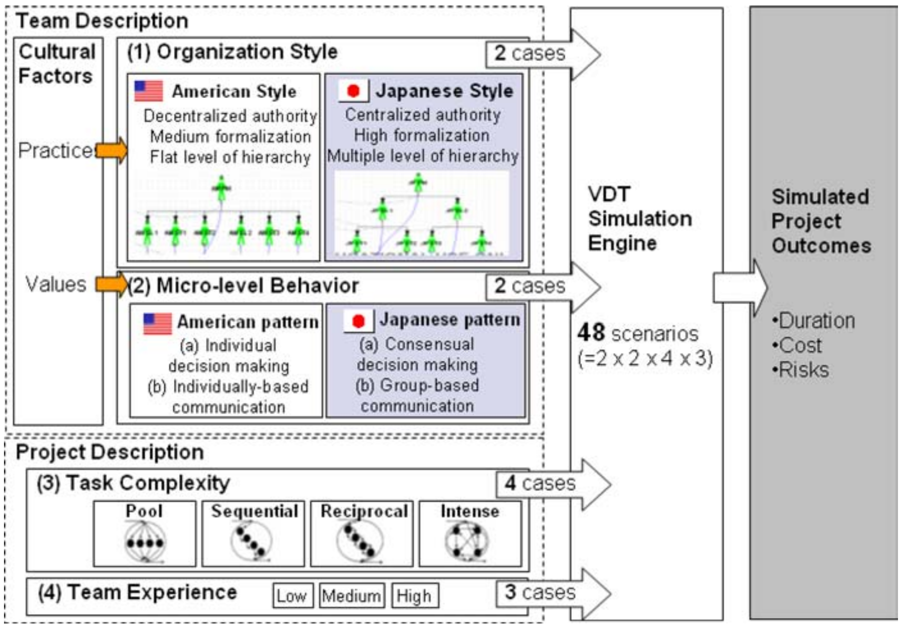

Figure 1. Modeling Framework.

links between the project manager and subordinates. In our analysis, we set two types of typical organization styles to represent the Japanese and American styles (see figure 1).

2. The *micro-level behavior* of actors is related to their *values*, and refers to actors' decisions about how to handle exceptions and how to communicate with others. Since values form the basis of how people behave and how they make decisions, cultural values are linked to micro-level behavior in the VDT model. We assume that the American behavior pattern is the same as the original set of micro-behavior parameters in the VDT model, because the VDT model was developed and calibrated in American firms (e.g., Christensen, 1993; Thomsen, 1999). We create a Japanese behavior pattern by manipulating two micro-behavior parameters that are related to decision-making and communication behaviors respectively, based on our observations and the extant literature (Hofstede, 1991; Lincoln and Kalleberg, 1990; Aoki, 1992). We set two types of micro-behavior patterns to represent Japanese and American styles (figures 1 and 2).
3. In building a model that predicts project performance, we consider one aspect of contingency theory (Galbraith, 1977; Thompson, 1967) to define context: *task complexity.* We examine four different levels of task interdependencies: pooled, sequential, reciprocal, and intensive workflows (Thompson, 1967; Bells and Kozlowski, 2002). These dependencies represent a scale of task complexities, from lowest to highest, respectively (figures 1–3).
4. The level of *team experience* is also taken into consideration as a second context variable in order to explore the effects of the team mutuality[5] on team performance (figures 1–4).

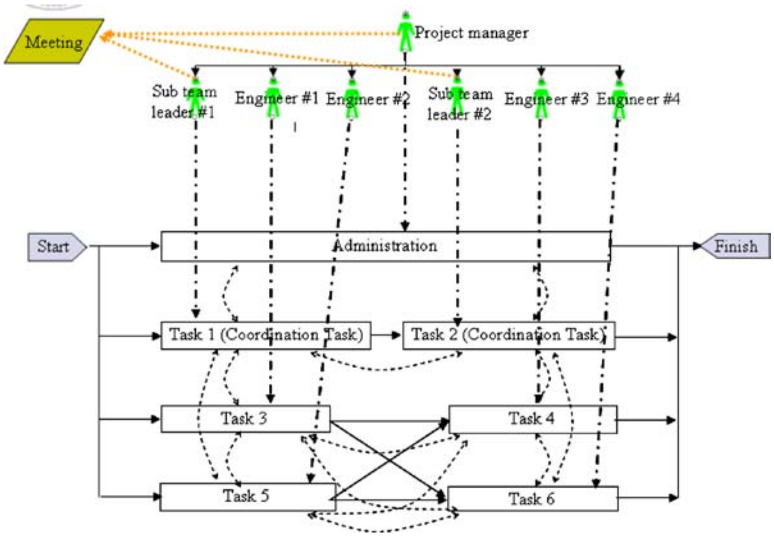

Figure 2. Example of American Organization structure type with intense complexity.

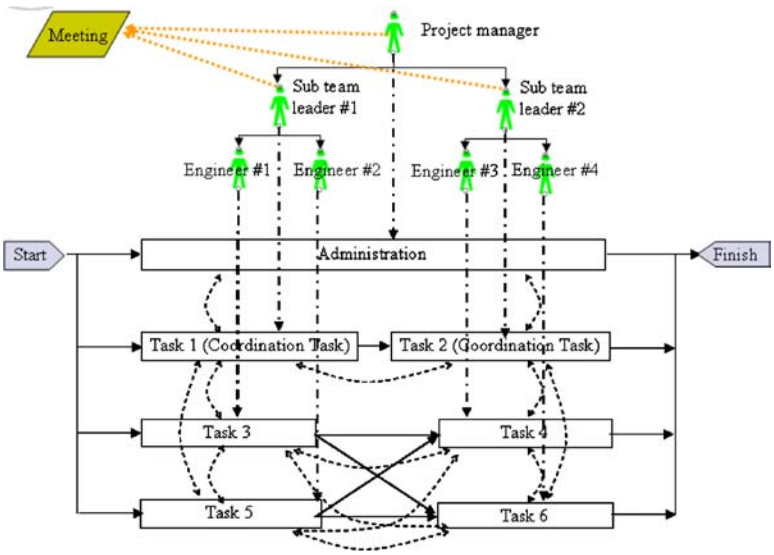

Figure 3. Example of Japanese Organization structure type with intense complexity.

Note: These figures illustrate examples of the *intense* coordination complexity cases. As shown in Figures 2 and 3, both organizations have exactly the same workflow and required work volume for the intense complexity cases. All teams are composed of seven members, including one project manager, two sub-team leaders, and four sub-team members. We change only either the preferred structure types and micro-level behavior patterns of actors.

——► shows precedence links among tasks

····► shows rework and communication links among tasks

– – –► shows work assignment between team members and tasks

4. Design of the Virtual Experiments

As shown in figure 1, we simulated a total of 48 scenarios (2 organization styles × 2 micro-behavior patterns × 4 task complexity levels × 3 team situation levels). For experimental purposes, the actor and task configurations are identical[6] (figures 2 and 3 show examples of the *intense* coordination complexity cases with higher numbers of interdependence links between tasks). The main purposes of the intellective experiments are as follows:

- To study the effects of changes in micro-level behavior patterns
- To study the effects of changes in organization structure styles
- To study the relationships between micro-level behavior patterns and organization structure styles for the full range of possible task complexity and team mutuality contexts.

5. Results: Analysis of the Effects of Cultural Differences on Team Performance

The VDT model is designed to predict duration, cost, and two kinds of process quality risks as measures of team performance, as shown in Table 2. At first glance, there is no significant difference in the project duration between Japanese and American structural styles. However, differences appear in the hidden work volume, cost, and project quality risks. The amount of hidden work volume is a good proxy for both project duration and cost (Levitt and Kunz, 2002), since the amount of direct work remains constant for all scenarios. Even if duration is apparently the same, hidden work volume presents potential risks of increased cost and duration, as they cause non-critical path tasks to take longer, and thus reduce overall project slack. We analyzed three dependent variables, (1) hidden work volume, (2) product quality risks (see Note 3), and (3) project quality risks (see Note 4), to measure the impact of changes in organization styles and micro-level behaviors on team performance.

Based on the cultural model described above, we carried out an analysis of the impact of cultural factors on relationships between organization style, team cultural behavior patterns, task complexity, and team experience.

Figures 4 and 5 illustrate the effects of organization structure styles on process quality metrics. The hidden work volume increases as level of task complexity increases. This implies that the idealized case can appropriately capture a basic proposition of contingency theory: "the greater the uncertainty of the task, the greater the amount of information that has to be processed between decision makers during the execution of the task." (Galbraith, 1974) With medium task complexity, the American style has less hidden work volume[7] than the Japanese organization style. On the other hand, in the case of high task complexity, this tendency reverses. In particular, when team experience is low, the American style has less tolerance for high task complexity than does the Japanese style.

Figures 6 and 7 show the effects of changes in micro-level behavior patterns on hidden work volume. The effect of changes in micro-level behavior patterns is smaller than the effect of organization style. The simulation results confirm Hofstede's proposition that "each culture has its preferred coordination mechanism" (Hofstede, 1991). Specifically,

Table 2. Summary of simulated results.

	Task Complexity Low → High							
	Pooled		Sequential		Reciprocal		Intense	
Structural style	Type J	Type A	Type J	Type A	Type J	Type A	Type J	Type A
	Duration (critical path method)							
Duration (months)	8.0	8.1	29.6	28.8	30.7	29.6	13.5	13.1
Standard deviation	(0.18)	(0.15)	(1.30)	(0.80)	(1.60)	(1.00)	(1.10)	(0.60)
Comparison	Type J = Type A		Type J = Type A		Type J = Type A		Type J = Type A	
	Hidden Work volume							
Hidden Work Volume (Person-Months)	3.54	4.46	14.60	12.57	26.02	21.13	29.19	38.15
Comparison	Type J < Type A		Type J > Type A		Type J > Type A		Type J < Type A	
	Cost							
Cost ($1,000)	281	288	355	343	431	401	446	497
Standard deviation	(2.65)	(2.78)	(27.49)	(17.16)	(47.60)	(33.89)	(33.41)	(56.28)
Comparison	Type J < Type A		Type J > Type A		Type J > Type A		Type J < Type A	
	Functional (Product) quality risks							
Product Quality Risk Index	0.469	0.468	0.466	0.464	0.467	0.461	0.478	0.480
Standard deviation	(0.044)	(0.037)	(0.037)	(0.041)	(0.035)	(0.034)	(0.033)	(0.022)
Comparison	Type J = Type A		Type J = Type A		Type J = Type A		Type J = Type A	
	Project quality risk							
Project Quality Risk Index	a	–	0.267	0.437	0.284	0.467	0.279	0.472
Standard deviation	–	–	(0.044)	(0.067)	(0.037)	(0.046)	(0.031)	(0.033)
Comparison	–	–	Type J < Type A		Type J < Type A		Type J < Type A	

Note:
(1) Total simulated work volume is the sum of production work volume and coordination work volume (Jin and Levitt, 1996, pp175)
Hidden Work Volume = Total Simulated Work Volume–Designed Work Volume.
(2) For each scenario, we run 100 trials and calculate means and standard deviations.
(3) Product quality risk represents the likelihood that components produced by the project have defects based on rework and exception handling (Jin and Levitt 1996, p. 179).
(4) Project quality represents the likelihood that the components produced by the project will not be integrated at the end of the project, or that the integration will have defects based on rework and exception handling (Jin and Levitt, 1996, p. 179).
[a]Since there are no communication or rework relationships between tasks in the context of pooled workflow, project quality risk is always zero, and so is not shown for those scenarios.

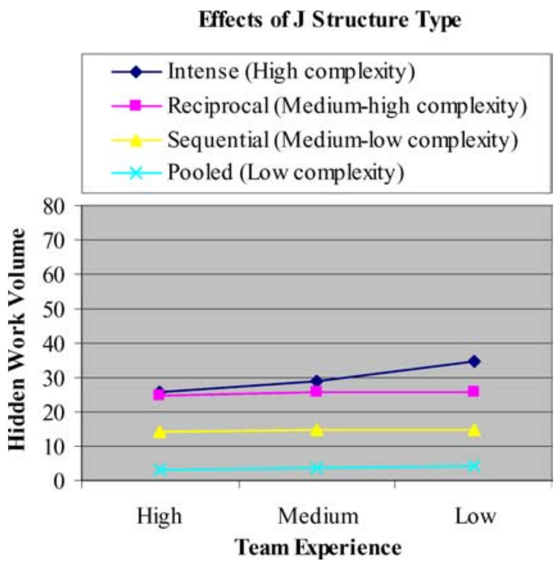

Figure 4. Effects of Japanese Organizational Structure Type.

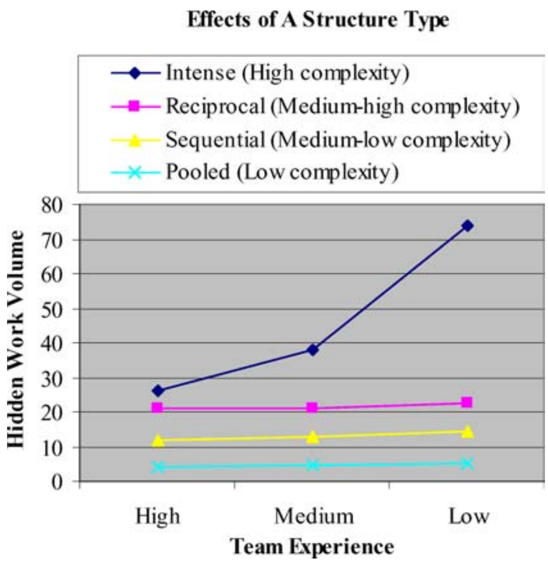

Figure 5. Effects of American Organizational Structure Type.

Note: This figure compares the performance of Japanese *vs.* American organization structure types. The X axis shows the level of team experience. The Y axis shows total hidden work volume in person-months. Task interdependencies such as pooled, sequential, reciprocal, and intense workflow represent a range from low to high task complexity respectively.

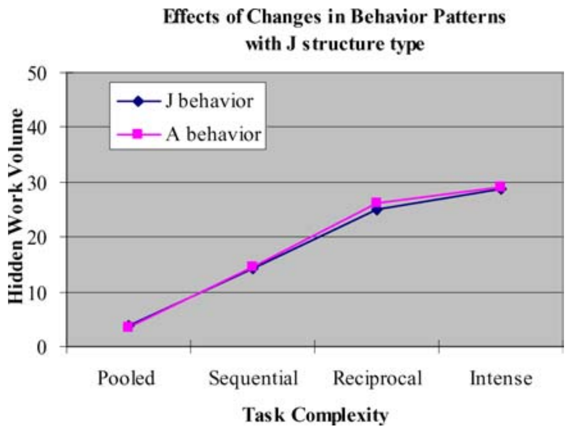

Figure 6. Effects of American vs. Japanese Micro-Level behavior patterns with Japanese Organizational structure type.

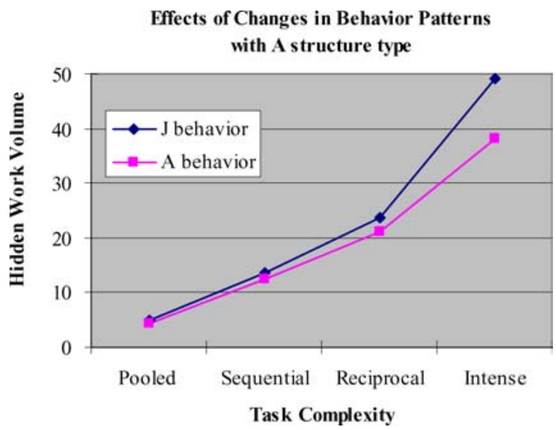

Figure 7. Effects of American vs. Japanese Micro-Level Behavior Patterns with American Organizational structure type.

Note: This compares the performance of Japanese *vs.* American micro-level behavior patterns for each structure type. The X axis shows the level of task workflow such as pooled, sequential, reciprocal, and intense interdependencies. Each workflow represents from low to high task complexity respectively. The Y axis represents total hidden work volume in person-months.

organizational performance of workers who have the culture's preferred micro-level behavior is positively correlated to the use of each culture's typical organization style, in cases of medium to high task complexity. In the case of pooled and sequential workflow, the differences between Japanese and American behavior patterns are relatively small. This implies that increasing task complexity amplifies the impact of cultural practice *vs.* behavior mismatches, as we would expect, since it increases the frequency of exceptions that will arise in executing direct tasks (Galbraith, 1973).

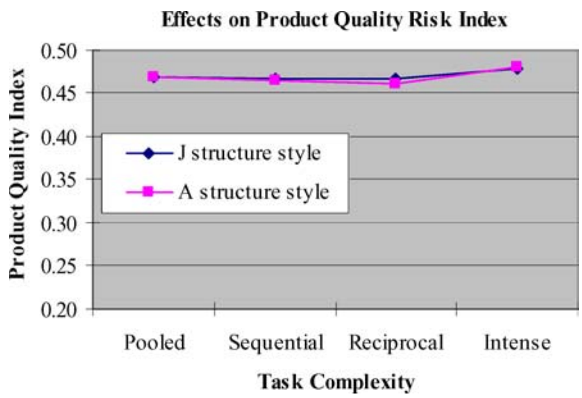

Figure 8. Effects of organizational structure type on product quality risk.

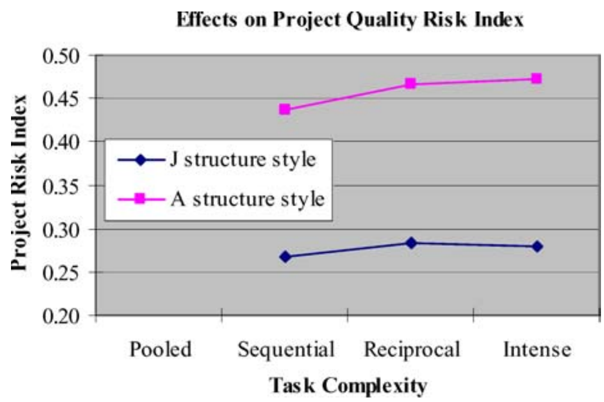

Figure 9. Effects of organizational structure type on project quality risk.

Note: This compares the performance of Japanese *vs.* American micro-level behavior patterns. The X axis shows task complexity ranging from pooled (lowest), through sequential, reciprocal, and intense (highest) interdependencies. The Y axis represents total hidden work volume in person-months.

As shown in figures 8 and 9, there are no significant differences between the Japanese and American styles in terms of predicted product quality (component quality) risks. However, the Japanese organization style tends to have significantly lower project quality (system integration) risks than the American organization style although neither exceeds the 0.5 threshold that we assumed to be barely acceptable in calibrating VDT. The more centralized Japanese structure and close supervision by first level managers with lower spans of control in the deeper Japanese hierarchy imposes tight control on information exchange and exception handling for both Japanese and American workers. So this prediction has good face validity.

In summary, changes in organization style have a larger impact on hidden work volume than changes in behavior patterns.

6. Discussion

In simulation, we examined the effects of changes in organization structure types (cultural practices) and micro-level behavior patterns (cultural values) for the range of possible project situations (task complexity and team mutuality contexts).

As the effects of changes in organization structure styles, each typical organization structure style driven by culture has its own matched project situation in terms of team performance. Specifically, Japanese organization style show better performance in the case of high task complexity cases, while American organization style show better performance in the case of medium task complexity cases. This implies that managers need to set up appropriate organization styles by considering project situations.

As the effects of changes in micro-level behavior, we find support for a proposition of preferred coordination mechanisms (Hofstede, 1991) that team performance is better when management practices are congruent with national cultural values. Hofstede proposes that each culture has a preferred coordination mechanism, implying that workers from each nation show better performance if they use their own preferred management practices (Hofstede, 1991). Our results contribute to the small body of organizational and virtual experimental evidence supporting the importance of congruence between cultural practices and cultural values. We extrapolate from these findings to conclude that each culture's typical organization structure has evolved to match its culturally preferred micro-behavior, in order to maximize efficiency. The impact of mismatches between cultural practices and behavior are contingent upon the characteristics and requirements of a given project.

Moreover, Hofstede (1991) asserts that each culture's preferred organization style can be predicted from two of his national cultural value indices—power distance and uncertainty avoidance. Figure 10 shows a two-by-two power-distance-uncertainty avoidance

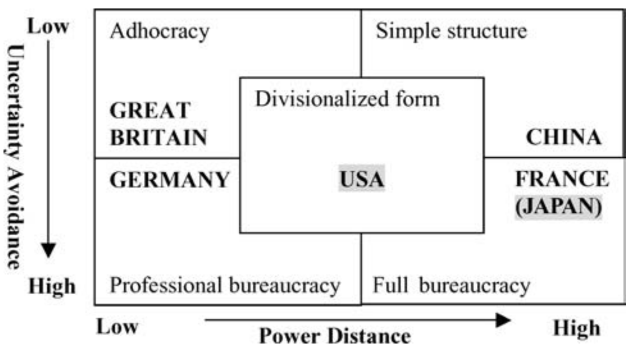

Figure 10. Preferred coordination mechanism (Adapted from Hofstede, 1991, p. 152).

Note: This figure illustrates the typical organization structure predicted by "power distance index" and "uncertainty avoidance index." "Power distance index" refers to the extent to which the less powerful members of organizations and institutions accept and expect that power is distributed unequally. "Uncertainty avoidance index" indicates the extent to which a culture programs its members to feel comfortable in unstructured situations that are unknown, surprising, and different from the usual. Uncertainty-avoiding cultures try to minimize the possibility of such situations by using strict laws and rules, and safety and security measures matrix, with one of Mintzberg's (1983) five archetypal organizational configurations in each corner, and the fifth, the divisionalized structure archetype, as a kind of "compromise structure type" in the center. Based on case studies, the Japanese and American organization structures are close to the preferred mechanism plotted by Hofstede. Specifically, the Japanese organization structure has relatively high centralization, high formalization, and multiple levels of hierarchy. Hofstede also suggests that Japan is categorized with France as having a preference for the "full bureaucracy" configuration, defined as high formalization and well-defined authority hierarchy (e.g., Mintzberg, 1983; Burton and Obel, 2004). Therefore, our experimental results confirm this notion of preferred organization styles for different cultural value dimensions, as proposed by Hofstede (1991).

In considering the relative impacts of organization styles vs. micro-level behavior patterns, changes in behavior patterns had less impact on team performance than changes in organization structure. However, at this stage, there has been an unknown area to analyze quantitatively the absolute magnitude of the relative contributions of the organization systems vs. behavior patterns.

In summary, when organizations assemble joint venture teams with members from different cultures, a project manager should pay attention to three elements: organization style (cultural practices), micro-level behavior (cultural values), and project situations (task complexity and team mutuality). Managers need to change their management practices (organization styles) based on the characteristics and requirements of a given project, because project situations are given at the start of a project, and the micro-level behavior is fixed in the short term (based on national culture), and because organization style is the only variable a project manager can directly manipulate. Careless selection of management practices may cause a worst-case scenario in a project. Computational simulation models can help managers to find the optimal style by finding the organization style that provides the best match to their project's characteristics and their team's micro-behavior.

The existing VDT model has known limitations that constrained us in capturing all of the cultural and broader institutional phenomena that emerge in global projects. We were unable to adequately represent factors such as multiple behavior patterns for different workers in a project, additional exceptions caused by work practice differences, organizational learning, as well as potentially positive impacts of cultural diversity—e.g., increased innovation—that might result from cross-cultural interactions. Our experiment focused only on the impact of different patterns of micro-level behaviors and organization structures.

- The first constraint is that all VDT actors in a single project team must have the same micro-behaviors. Examining cases where multiple behavior patterns can coexist in a project remains an intriguing research focus. We are currently working to extend VDT to permit a modeler to assign different micro-behaviors based on cultural values to each "Actor"—i.e., each individual or sub-team—in the project
- A second constraint was that the current VDT model was not able to parameterize additional exceptions caused by differing values and practices between subgroups of a joint-venture team. In particular, based on our observations, subgroups are likely to have their own standardized low-level work practices rules and criteria. Our ethnographies

provided evidence that such differences generated exceptions between subgroups when selecting design and construction guidelines and standards for a project, such as safety or quality standards.

- Another VDT-imposed limitation of this work is that we had to assume that team members do not adapt their values or practices during the project. However, researchers have increasingly been interested in how people learn cultural values and practices from each other.
- Finally, in the current research, we did not take into consideration potentially positive impacts of cultural interactions, through innovation, creativity, and advanced technology. Several researchers have started exploring sources of, and barriers to, innovation in project-based organizations (Taylor and Levitt, 2004).

7. Conclusion

Research on IJV projects reveals the difficulties of coordinating cross-cultural teams. Our research sheds light on some effects of the increased internal complexity that IJV project teams face when practices and values are misaligned. It makes an initial attempt to predict the impacts of cross-cultural effects on team performance in IJVs through virtual experimentation. We conducted ethnographic interviews to understand and encode cultural values and cultural practices into the parameters of the VDT model and then ran suites of simulations to characterize the performance outcomes that emerge in global projects involving both Japanese and American cultures, represented along cultural value-practice dimensions.

Our results on the effects of changes in micro-level behavior patterns and organizational control styles show interesting correlations between values and practices, and provide initial evidence that these parameters have been encoded correctly, since our model predictions align well qualitatively with extant theory. These findings not only extend the application of the current VDT model to address the case of cross-cultural teams, but also demonstrate a possible framework for modeling distinguishing cultural factors that emerge in global projects. In addition, our work contributes in a small way to using simulation to bridge the gap between cultural-cognitive sociology as micro-level theory and organization science as macro-level theory.

Currently, there are intriguing and unexplored research opportunities in inter-cultural, inter-organizational and inter-institutional settings, such as global projects. We have argued earlier (Levitt et al., 1999) that global projects provide an ideal field setting in which to explore the effects of institutional clashes on the behavior and performance outcomes of organizations. Global projects bring together participants from multiple national, organizational and professional cultures. And all projects have unusually clear goals and metrics compared to most other organizational forms; they have a finite start and end date—often with durations that are less than a typical PhD degree—and clearly defined participation.

Ongoing collaborative research among multiple disciplines is required in order to understand how efficient and effective cross-cultural project teams are created. This research represents an initial step in that direction.

Notice of Previous Presentation

This paper was previously presented at the 2004 North America Association for Computational Social and Organizational Science (NAACSOS) conference at Carnegie Mellon University, and was awarded "best graduate paper" in the Ph.D. Student Research Abstract Competition. This paper is an extended version of the conference paper.

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Notes

1. June 2001 issues of Engineering News Record (ENR) magazine.
2. His proposition implies that members of a given cultural group will show better performance when working within their preferred organization structure.
3. Hofstede proposed using four dimensions to describe cultural differences among 53 countries including Japan and the United States: (1) power distance, (2) individualism vs. collectivism, (3) masculinity vs. femininity, (4) uncertainty avoidance, and (5) long term orientation vs. short term orientation.
4. We use SimVision®, educational version 3.11.1, which was developed by Vité Corporation and is licensed from ePM, LLC, Austin Texas. Please see the website for more information: < http://www.epm.cc/>
5. Team mutuality indicates that a project team has had previous experience working together.
6. Actor and task configurations include the actors' skills, the skills required by tasks, the duration of tasks, the hourly salary of actors, the task responsibility assignment, and the total number of team participants. All teams are composed of seven members, including one project manager, two sub-team leaders, and four sub-team members.
7. Less hidden work volume implies better performance.

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