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Abstract

Outsourcing of skills is fast becoming a reality in the computing world. Countries like the Caribbean, India, Ireland, and China export systems development skills to other nations. The Pacific Rim is emerging as a computing power, critical to the welfare of the global computing community. Yet research investigating the cultural values of their IS professionals is negligible. This study examines the technical, economic, and socio-political values of IS professionals in Singapore and Taiwan. Technical values deal with various aspects of the data and computer systems. Economic values deal with cost and profit issues. Socio-political values deal with the relationships among individuals. The survey instrument was adapted from Kumar (1984). It has been used to compare Canadian and Danish IS designers (Kumar and Bjorn-Andersen 1990). There were significant differences between Singapore and Taiwan IS professionals. On a global context, results from all 4 countries reveal significant differences in the values of IS professionals. These findings suggest that the cultural factor is critical to research involving IS professionals and should be further examined.

1 Introduction

Outsourcing has become a growing trend in the 1980s. The Caribbean, India, Ireland, China, and Eastern European nations have provided skilled labor for the information systems (IS) industry in the United States. Although the United States have employed a vast number of IS professionals from a variety of countries, knowledge on how their disparate cultural values could affect the productivity of systems development is lacking.

A widely accepted theory of culture within the technology context has yet to emerge. Controversies between convergent and divergent views of culture remains unresolved (Child and Kieser 1979; Farmer and Richman 1965; Gallie 1978; Haire et al. 1966; Negandhi 1979). Proponents of the convergent view claim that differences between more and less industrialized countries would decrease over time because of modern technology. As countries prosper, all organizations tend to have a democratic form of management, thus reducing cultural differences. Similarities in managerial practices would emerge. Similar demands for technology would take precedence over differences in human beliefs and value orientations. Conversely, proponents of the divergent view argue that even when organizations with similar structures face similar contingencies, they would handle the situations differently because of deep-rooted cultural differences. The ability to exploit modern technology could be arrived at via a variety of functionally equivalent paths (Cole 1973). Different countries could reach comparable levels of efficiency with different approaches to technology management (Lynn 1990).

A central issue of contention between both perspectives is whether different countries could reach an advanced stage of economic and technological development while retaining their distinct cultural identities. In the area of systems development, this issue translates into a research question: Would the IS professionals from two comparably developed nations share a common set of cultural values? The convergent perspective would argue for the affirmative while the divergent perspective would disclaim such an observation. This study compares the cultural values of IS professionals in Singapore and Taiwan, two technologically developed nations.

2. Background

This study is motivated by conflicting research findings on the significance of cross-cultural differences among IS professionals to systems development. Researchers have indicated that such cross-cultural differences deserve more thorough investigation (Ives and Jarvenpaa 1991; Jenkins et al. 1990). Cross-cultural research in IS could be conducted at 4 levels: individual, group, organizational, and societal. At the individual level, culture adds a new dimension to models of information processing and decision making. At the group level, culture moderates and alters group dynamics. At the organizational level, culture delineates management practices

and dictates the types of IS applications implemented within organizations. At the societal level, culture influences values systems and key objectives. Some societies focus on interpersonal harmony while others stress objectivity and rationality.

Empirical studies have reported cultural differences among IS professionals from different nations (Couger et al. 1990; Couger et al. 1991a; Couger et al. 1991b; Harrison and Farn 1990; Kumar and Bjorn-Andersen 1990; Palvia et al. 1992). Conditions conducive to IS implementation and usage differ between Asian and Western countries (Lu and Farrell 1990; Harrison and Farn 1990). These differences stem from dissimilarities in their economic policies, technological infrastructures, education system, political climate, and cultural values. Family owned businesses with informal policies and operating procedures are the norm in Asian countries. Publicly owned organizations with formal and elaborate modes of operations are common in Western countries. An appropriate fit between the strategy of an organization, its structure, and technology utilization could maximize its effectiveness and efficiency (Neo 1991).

Palvia and Palvia (1992) report that key is issues in India and the United States are mostly common. However, Indian executives tend to be more concerned with operational issues while American managers tend to put greater focus on strategic planning, securing competitive advantage, and the use of end user computing. Dagwell and Weber (1983) suggest that Australian and Swedish IS developers tend to possess a Theory Y view of their users while their counterparts in the United States and United Kingdom tend to have a Theory X view of their users. Kumar and Bjorn-Andersen (1990) found that Canadian IS developers are more likely and willing than Danish IS developers to spend resources on computer backup and recovery procedures. Dove (1990) notes that Chinese systems analysts prefer to elicit information from government publications and newspapers, rather than interviewing managers. Couger and Motiwalla (1985) suggest that IS professionals from different countries are primarily motivated by different sets of incentives.

Differences among IS professionals from different countries are likely to take on a significant role in the emerging global marketplace for systems development skills. By the year 2000, the global market for computer equipment and systems development services is likely to total US$3000 billion, and increasing at an average annual rate of 9.1% (Atkins 1993). Press (1993) notes a growing trend among developing and newly developed nations (e.g. India, Japan, Singapore, South Korea, and Taiwan) to export their systems development skills to the global market. At the same time, developed nations (e.g. the United States) suffers from a shortage of IS professionals, a situation likely to aggravate in the near future (Standard and Poors Industry Surveys 1994). Organizations in developed countries have to rely on imported skills to meet their systems development needs. Thus, it is worthwhile examining cross-cultural differences among IS professional from different countries. The findings would permit the impact of cultural factors on the process and product of systems development to be further examined and better understood.

3 Research Design

3.1 Research Model

Cultural values have a broad domain and exert a pervasive impact on systems development practices. Thus, these values are relevant to research involving IS professionals and systems development. A theoretical framework on such cultural values is provided in Kumar (1984). These values could be measured by self-reported instruments that surface work goals (England 1967; Hofstede 1980; Hoppe 1990). They influence work goals such as satisfaction, earnings, training, cooperation, leadership, and quality of working life. Kumar (1984) offers a personal values questionnaire (PVQ) that assesses the impact of culture on the values of IS professionals. It is partly derived on the personal value model proposed by England (1967). It measures the personal, organizational, and societal goals values by IS professionals (England et al. 1974; England 1975). It has been administered in Canada and Denmark (Kumar and Bjorn-Andersen 1990).

The PVQ elicits 3 dimensions of values: technical, economic, and socio-political (Kumar 1984). The technical dimension is concerned with the quality of work done by IS professionals and their ability to respond to user demands. The economic dimension is concerned with the managment of project costs, manpower, and other resources. The socio-political dimension is concerned with users involvement during the systems development and the quality of working life for IS professionals. Questions for each dimension could be further divided into ends-related, concerning the product of systems development, and means-related, concerning the process of systems development. Kumar (1984) suggests that the importance attached to different values by IS professionals provide a good predictor of their actual behavior during systems development.

3.2 Research Hypothesis

Given the overwhelming empirical evidence revealing differences among IS professionals in different countries, 3 hypotheses are derived:

Hypothesis 1: IS professionals in Singapore and Taiwan will have different technical values.

Hypothesis 2: IS professionals in Singapore and Taiwan will have different economic values.

Hypothesis 3: IS professionals in Singapore and Taiwan will have different socio-political values.

4 Research Methodology

4.1 Research Technique

This study employs a field survey. The questionnaire was administered to IS professionals with the assistance of IS faculty. Data on demographics and opinions are collected. Surveys are appropriate in this situation for several reasons (Gutek 1989). First, it permits generalization of results from a sample to a target population from which the sample is drawn. Second, a large number of subjects could be reached, thus raising statistical power during data analyses. Third, a survey is relatively unobtrusive compared to other research methods. Fourth, it helps to identify domains for further investigation using other research methods.

4.2 Countries and Subjects

Two countries were involved: Singapore and Taiwan. The target population and sample frame was the IS professionals in each country. Singapore and Taiwan had been selected because both are technologically advanced countries with many similarities. These similarities permit elimination of many factors which could confound with the results.

Singapore has about 3 million people, mostly in the 15-64 working age group. It has a high population density, exceeding 4000 people per square mile. About 61% of the population live on 17% of the land area. Singapore has a high literacy rate of about 92% (Economist Intelligence Unit 1994). It has a very low unemployment rate. It is one of the fastest growing economies in Asia. Taiwan has a population of about 21 million, with approximately 67% in the 15-64 working age group. It is densely populated with nearly 1500 individuals per square mile. Taipei is the most densely populated city in the world. The literacy rate in this nation is about 95% (Economist Intelligence Unit 1994). Taiwan has an extremely low unemployment rate. It is one of the wealthiest economies in Asia. The population is almost entirely Chinese.

The process of conducting this field survey parallels that of Kumar and Bjorn-Andersen (1990). Kumar and Bjorn-Andersen (1990) administered their survey in 13 Canadian and 8 Danish business and government organizations. Their final sample includes 132 Canadian and 72 Danish IS professionals. Organizations sampled covered the following sectors: government departments, utilities, manufacturing, retail, insurance, and education. In this study, researchers from Singapore and Taiwan contacted the highest ranking IS executives from selected organizations. These executives were requested to randomly select their IS professionals to respond to the questionnaire. Subjects and organizations were assured of anonymity. Responses came from 9 Singaporean and 15 Taiwanese commercial and government organizations. The sample includes 115 Singaporean and 114 Taiwanese IS professionals. Among Taiwanese respondents, 66 were male and 48 were female. Among Singaporean respondents, 56 were male and 58 were female. In Taiwan, 5 respondents were directors, 45 were project managers or leaders, and 55 were systems analysts and programmers of various ranks. In Singapore, 3 respondents were directors, 32 were project managers or leaders, and 80 were systems analysts and programmers of different ranks. Sectors covered in this study include government agencies, education, transport, health-care, finance, food, and chemical products.

4.3 Instrument and Measures

The PVQ (Kumar 1984) containing 242 items was administered to 38 students with different ethnic backgrounds at a large university in Southwest United States. They reported that the instrument was difficult to complete, citing fatigue and ambiguity as major problems. These observations were used to refine the PVQ for this study. During refinement, ends-related questions assessing the product of systems development were dropped to make the instrument shorter and to reduce respondent fatigue. Ambiguous questions were also omitted. The remaining 29 means-related questions were included in the instrument administered to IS professionals. All questions were anchored on a 5 point Likert scale. To ensure equivalence in scaling, the instrument was reviewed by researchers in Singapore and Taiwan. In Taiwan, it was translated into Chinese by a domain expert and then back into English by another domain expert to ensure that the translation process did not unintentionally changed the meanings of the questions. The Chinese version of the instrument was administered in Taiwan. The English version was administered in Singapore.

5 Data Analyses

Results of data analyses demonstrate that there were significant differences between the values of IS professionals in Singapore and Taiwan. In the following discussion, their differences in each dimension of values would be evaluated. This would be followed by a discussion of the similarities and differences between the findings of this study and those of Kumar and Bjørn-Andersen (1990).

5.1 Technical Dimension

Means and standard deviations for both countries are presented in Table 1 (see Appendix A). Results for the technical dimension are listed in Table 2 (see Appendix A). Among the 8 factors in this dimension, IS professionals in Singapore and Taiwan differed significantly on 7 of them. Hence, hypothesis 1 is supported. IS professionals in Singapore tend to value the use of latest development methodologies and the use of computer-based efficiency tools more than their Taiwanese counterparts. Conversely, IS professionals in Taiwan tend to value promptness in responses, flexible procedures, minimizing analysis and design errors, usability of documentation, and ease of producing documentation more than their Singaporean colleagues. In short, these results suggest that IS professionals in Singapore place great importance on the use of productivity tools while those in Taiwan are more concerned with ensuring that the process of systems development is properly carried out.

When comparing results on the technical dimension with those from Kumar and Bjorn-Andersen (1990), it is evident that there were fewer differences between Canadian and Danish IS professionals than between Singaporean and Taiwanese IS professionals. It is also interesting to note that the same factor, consistency between work done by different individuals, was significant at 0.10 but not at 0.05 for both studies. Given its lack of significant differences across cultures, this factor might not be useful for future cross-cultural studies examining the technical dimension.

5.2 Economic Dimension

Table 3 (see Appendix A) lists the means and standard deviations for the economic dimension while Table 4 (see Appendix B) summarizes the results for the same dimension. Among its 8 factors, IS professionals in Singapore and Taiwan differed significantly on 5 of them. Hence, hypothesis 2 is supported. IS professionals in Singapore rated adherence to development schedule as more important than their Taiwanese counterparts. But IS professionals in Taiwan regarded development costs, skill levels, development manpower, and user manpower as more important than their Singaporean colleagues. Thus IS professionals in Singapore tend to be solely concerned with meeting deadlines while IS professionals in Taiwan tend to value having adequate financial and manpower resources for their systems development projects.

The different findings on the economic dimension obtained in this study are compared to those from Kumar and Bjorn-Andersen (1990). In general, factors discriminating Singaporean and Taiwanese IS professionals along the economic dimension could not distinguish Canadian and Danish IS professionals, and vice versa. The only discriminating factor significant in both studies is having adequate user manpower during systems development. On the basis of these differences in findings, it is likely that IS professionals from the 4 nations are different from each other.

5.3 Socio-political Dimension

The means and standard deviations for the socio-political dimension are listed in Table 5 (see Appendix B). Findings on the socio-political dimension are shown in Table 6 (see Appendix B). Among the 13 factors in this dimension, IS professionals in Singapore and Taiwan differed significantly on 7 of them. Hence, hypothesis 3 is supported. IS professionals in Singapore rated interpersonal relationships, tasks repetitiveness, task variety, task autonomy, user participation and frequency of user reviews as more important than their Taiwanese counterparts. Conversely, IS professionals in Taiwan rated management participation more important than their Singaporean counterparts. These results suggests that IS professionals in Taiwan are solely concerned with meeting management needs while those in Singapore value good working relationships and a proper mix of tasks.

The findings of this study on the socio-political dimension share many similarities with those from Kumar and Bjorn-Andersen (1990). Several factors that could distinguish Singaporean and Taiwanese IS professionals, were also able to differentiate Canadian and Danish IS professionals. These include management participation, task autonomy, and user participation. In general these results seem to indicate that IS professionals in Taiwan share many values with those in Canada. Likewise, IS professional in Singapore have many similar values as those in Denmark. Several factors were not significant in both studies. These are user understanding of the plan, opportunities to learn new skills, and formal assignment of responsibilities. Given their lack of significant differences across cultures, these factors might not be useful for future cross-cultural studies examining the socio-political dimension.

6. Discussion

In summary, the findings of this study reinforce those from Kumar and Bjorn-Andersen (1990) to show that cultural differences in terms of technical, economic, and socio-political values exist among IS professionals in different countries. But the factors which differentiated Singaporean and Taiwanese IS professionals were generally different from those which distinguished Canadian and Danish IS professionals.

Knowledge about the cultural differences among IS professionals from different countries have several benefits. First, organizations in different countries could tailor their systems development process to be coherent with the values of their IS professionals so as to enhance their effectiveness, efficiency, and satisfaction. This leads to lower turnover

among IS professionals and higher productivity during systems development. Second, organizations could be sensitive to cultural differences when transferring technology. What works in one country needs not necessarily work in another (Cateora 1990). Systems development tools and techniques transferred from one country to another might require appropriate modification to make them acceptable to IS professionals in the latter country. Third, countries with certain cultural values might be more effective or efficient at developing specific types of software. Such knowledge would permit organizations to engage an optimal global systems development strategy. The development of specific types of software could be outsourced to IS professionals in countries which could best developed that type of software.

This study has several limitations. First, no causation inferences have been established. Second, caution must be exercised when generalizing its results to IS professionals in other nations. Third, translation and enthnocentricity biases might be present. Fourth, a major proportion of the data collected are subjective in nature. Fifth, cultural values of IS professionals from different countries are assumed to be consistent over time. Implications of these limitations are discussed in Holmes and Spence (1994).

This study uses a field survey to illustrate that cultural differences exist among IS professionals from different countries. Even economically similar nations like Singapore and Taiwan differ on the various dimensions of cultural values. It provides insights into the criteria for effectively and efficiently managing teams composed of IS professionals from different countries and cultural backgrounds. Assumptions about culture within the context of technology should be more clearly specified and closely examined. Existing findings on IS professionals and systems development could be examined for their cultural robustness.

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Appendix A

Factor	Singapore Mean	Singapore Std. Dev	Taiwan Mean	Taiwan Std. Dev
Promptness in responding to requests	2.26	0.65	2.06	0.79
Fexiblie standards and procedures	2.32	0.82	1.73	0.72
Level of errors due to IS professionals	2.29	0.75	1.79	1.00
Use of latest methodologies	2.82	0.88	3.02	1.12
Use of computer-based efficiency tools	2.33	0.87	2.13	0.98
Ease of producing documentation	2.15	0.74	1.90	0.81
Usability of documentation	1.96	0.74	1.69	0.72
Consistency between work of IS professionals	1.95	0.67	2.07	0.90

Table 1: Means and Standard Deviations for the Technical Dimension

Factor (1990)	This study Country	This study Results	Kumar and Bjorn-Andersen Country	Kumar and Bjorn-Andersen Results
Promptness in responding to requests	Taiwan	p = 0.01	Denmark	p = 0.05
Flexible standards and procedures	Taiwan	p = 0.01		
Level of errors due to IS professionals	Taiwan	p = 0.01		
Usability of documentation	Taiwan	p = 0.02		
Ease of producing documentation	Taiwan	p = 0.01	Canada	p = 0.01
Use of latest methodologies	Singapore	p = 0.04		
Use of computer-based efficiency tools	Singapore	p = 0.02		
Consistency between work of IS professionals				

Table 2: Results for the Technical Dimension

Factor	Singapore Mean	Singapore Std. Dev	Taiwan Mean	Taiwan Std. Dev
Costs of development	2.48	0.86	2.17	0.95
Level of required skills	2.02	0.63	1.80	0.68
IS manpower for development	2.09	0.71	2.08	0.77
User manpower for development	2.20	0.74	2.06	0.76
Elapsed time for development	2.25	0.75	2.22	0.81
Development on schedule	1.97	0.65	2.01	0.87
Development within budget	2.26	0.81	2.11	0.87
Planning and control of development	1.82	0.74	1.84	0.80

Table 3: Means and Standard Deviations for the Economic Dimension

Appendix B

Factor	This study		Kumar and Bjorn-Andersen (1990)	
	Country	Results	Country	Results
Costs of development	Taiwan	p = 0.02		
Level of required skills	Taiwan	p = 0.01		
IS manpower for development	Taiwan	p = 0.02		
User manpower for development	Taiwan	p = 0.02	Denmark	p = 0.05
Elapsed time for development			Denmark	p = 0.01
Development within budget			Canada	p = 0.01
Planning and control of development			Canada	p = 0.01
Development within schedule	Singapore	p = 0.02		

Table 4: Results for the Economic Dimension

Factor	Singapore		Taiwan	
	Mean	Std. Dev	Mean	Std. Dev
Repetitiveness of tasks during development	2.89	0.75	3.11	1.00
Variety of tasks during development	2.57	0.76	2.67	1.01
Learning new skills during development	2.38	0.90	2.40	0.90
Challenge of tasks during development	2.57	0.84	2.50	0.86
Social contacts and interpersonal relationships	2.4	0.87	2.10	0.87
Autonomy in planning and performing tasks	2.39	0.72	2.16	0.76
Participation of management	2.24	0.81	1.84	0.86
Participation of user	2.61	1.08	2.22	1.02
User understanding of development plan	2.24	0.92	2.22	0.94
User understanding of overall design	2.11	0.92	2.40	1.02
User understanding of technical design	3.03	1.16	3.42	1.23
Formal assignment of responsibilities	2.00	0.78	2.01	0.80

Table 5: Means and Standard Deviations for the Socio-Political Dimension

Factor	This Study		Kumar & Bjørn-Andersen (1990)	
	Country	Results	Country	Results
Participation of management	Taiwan	p = 0.01	Canada	p = 0.01
Frequency of user reviews	Singapore	p = 0.01		
Social contacts and interpersonal relationships	Singapore	p = 0.05		
Repetitiveness of tasks during development	Singapore	p = 0.03		
Variety of tasks during development	Singapore	p = 0.05		
Autonomy in planning and performing tasks	Singapore	p = 0.05	Denmark	p = 0.01
Participation of user	Singapore	p = 0.01	Denmark	p = 0.01
User understanding of technical design			Denmark	p = 0.05
User understanding of overall design				
Challenge of tasks during development			Denmark	p = 0.01

Table 6: Results for the Socio-Political Dimension