PERCEPTIONS ON INFORMATION SYSTEMS RISKS: A COMPARISON OF DESIGNERS FROM THE UNITED STATES, JAPAN, AND KOREA

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Abstract

Information Systems (IS) development projects have been characterized as risky undertakings. IS designers from the United States, Japan, and Korea were surveyed to explore potential similarities and differences in their views on various types of IS risks and the perceived success rate on IS projects. Three types of risks were considered: functional, cost, and schedule risks. The IS designers from Korea, viewed unmet project goals as more likely to contribute to IS failure than designers from the U.S. Designers from Korea also rated missed deadlines as more likely to cause IS failure than designers from the U.S. No differences were observed between the three countries in terms of the frequency of budget overruns. The designers from the U.S. reported the highest success rate on IS projects, while the designers from Korea reported the lowest IS success rate. The results were discussed in terms of implications for global IS development.

1. Introduction

Despite advances in system development methodologies and tools, recent studies indicate that unmet goals, cost overruns, and schedule delays continue to plague the IS development process. For example, studies have estimated that up to 90 percent of all IS projects fail to meet their goals [5]. In addition, studies have reported that between 40 and 80 percent of IS projects exhibit some degree of budget escalation [5]. Empirical evidence also reveals that between 30 and 70 percent of IS projects are designated as sometimes or usually late [11,14]. Thus, it is perhaps not surprising that three-fourths of all large-scale IS developed in the United States are considered to be "operational failures" .

The goal of this study was to compare the views of IS designers from the U.S. Japan, and Korea in terms of their perceptions on IS risks and overall success on IS projects. The risks involved in IS development include: technical or functional risks, cost risks, and schedule risks [8]. The technical risks concern the performance of the software product and include such issues as the ability of the software to meet the users' expectations. Cost risks involve budget related issues including the ability to develop software within the spending limits set by management. Schedule risks are associated with the timetable for the development of the software product and include the ability to meet planned milestones.

The decision to compare the U.S. with Japan and Korea was based on several considerations. First all three nations are technologically advanced and are actively involved in the development of global IS. In addition, all three countries have subsidiaries and actively market goods and services in the other countries. Perhaps more importantly, Japan and Korea differ from the U.S. on a number of cultural dimensions which is a factor assumed to highly influence the IS development process [12].

Since IS designers are likely to be highly knowledgeable about IS risks and IS project success rates, this study surveyed IS designers from each of the three countries concerning their experiences with unmet goals, budget overruns, and missed deadlines. The following section discusses the relevant literature relating to potential national differences in IS risks and presents the rationale for the hypotheses tested in this study.

2. Hypotheses Development
2.1 National Differences in Perceptions of Unmet Goals.

While a number of factors are likely to contribute to failure to achieve project goals, effective organizational communication and the sharing of information between functional areas is often considered crucial [10,11]. For this reason, IS designers from Korea may view unmet goals as more likely to be a contributor to unsuccessful IS projects than designers from the U.S. and Japan. Of the three countries investigated in this study, the literature clearly suggests that organizational communication is most likely to be a problem in Korean organizations [4]. The communication process in Korean firms is almost entirely one from top-down. The top-down form of communication stifles information flow within Korean firms. It has often been noted that the poor horizontal communication between departments is a major barrier of many Korean companies to efficient organizational performance [6]. Thus, it was anticipated that IS designers from Korea would be most likely to view unmet goals as a cause for unsuccessful IS projects.

Organizational communication and information sharing is unlikely to represent a major obstacle with respect to the achievement of project goals for firms in Japan. Organizations in Japan are typically characterized by an efficient top-down and bottom-up communication process. In addition, vertical information sharing is also considered a strong point in Japanese firms [3]. However, the literature suggests that the approach used in the U.S. and Japan to achieve IS goals may differ. In the U.S., it is often the responsibility of the IS designers to develop IS that are consistent with the organization's goals . Thus it is recommended that the training and education of IS designers include knowledge about organizational operations and business functions to provide designers with the ability to align IS with corporate strategies [9]. Perhaps as a consequence of the extensive training in business applications, IS designers in the U.S. often take an active role in ensuring IS objectives are achieved. As a result, IS designers in the U.S. are likely to view themselves as service providers offering "technology solutions" to business problems [2].

Conversely, IS designers from Japan generally view themselves as technicians rather than business professionals. They are more likely to have an engineering background and have less training in business management than their American counterparts [1]. Instead of training IS technicians in business applications, non-IS managers in Japan are often responsible for developing an understanding of what information technology can provide for the firm through a job rotation program that requires them to spend two or three years in the information technology department [2]. Thus, IS designers from Japan apparently do not have as much responsibility for ensuring that IS goals are achieved as do the designers in the U.S. Rather, IS designers from Japan are more likely to view users and clients as collaborators and work in a cooperative relationship with the users and clients to negotiate and jointly define the goals of the project [7]. However, IS managers in Japan have reported that IS often fail to achieve their goals because users are unable to describe their needs and IS designers fail to fully understand the IS applications [7]. Based on these reported observations, it was expected that failure to achieve project goals would be viewed as more likely to be a contributor to unsuccessful IS projects in Japan than in the U.S. The following represents the first hypothesis tested.

H1: IS designers from the U.S. will be less likely to view unmet goals as a cause of for unsuccessful IS projects than designers from both Japan and Korea, while designers from Japan will be less likely to view unmet project goals as a cause for unsuccessful IS projects than the designers from Korea.

2.2 National Differences in Perceptions on Budget Overruns and Missed Deadlines.

Budget overruns and missed deadlines are typically the result of overly optimistic projections. Overly optimistic projections has been attributed to a lack of experience among the IS designers [11,14]. Thus, it might be expected that budget overruns and missed deadlines would occur more frequently in situations in which there is a lack of experienced IS personnel.

Several articles have suggested that in comparison to the U.S., countries in Eastern Asia may be at a severe disadvantage in terms of the availability of experienced IS personnel [7,13]. Among the potential reasons Asian countries may lack experienced IS personnel include; (1) the rapidly growing rate of the software industry in Asia, (2) the perceptions among Asian students that IS personnel are paid less, work longer hours, and have less status than other professionals, and (3) a late start in the software industry compared to the U.S. [2]. Thus, it might be expected that the designers from Japan and Korea would have less experience in the IS field than designers from the U.S. As a consequence, budget overruns and missed deadlines may be more likely to be reported as a cause for unsuccessful IS projects in Japan and Korea than in the U.S. Based on the above assumptions, the following hypotheses were tested.

H2: IS designers from the U.S. will view budget overruns as less likely to be a contributor to unsuccessful projects than IS designers from Japan and Korea.

H3: IS designers from the U.S. will view missed deadlines as less likely to be a contributor to unsuccessful projects than IS designers from Japan and Korea.

2.3. National Differences in Perceived IS Success Rate

This study also investigated the designers' perceptions on the overall IS success rate. Based on the previously stated hypotheses suggesting that unmet goals, budget overruns, and missed deadlines would represent greater problems in Japan and Korean than in the U.S., the following hypothesis was proposed for the estimated overall success rate on IS projects.

H4: The IS designers from the U.S. will perceive a higher overall success rate on IS projects than will IS designers from Korea and Japan.

3. Method
3.1. The Questionnaire.

The survey used in this investigation was first pre-tested by distributing it to 21 CIS faculty members in the U.S., of which several provided written and oral feedback on the questionnaire. The questionnaire was then pilot-tested with IS designers from two local companies in the mid-western United States. For the Japanese and Korean sample, the questionnaire was translated by a faculty member at a university in the host country and pre-tested by several graduate students and faculty members working at the same institution using the same pre-test methods used for the English language version.

The primary items related to this study are presented in the Appendix. Respondents were also asked to assess the percentage of IS projects that were a success and the percentage that were unsuccessful. The purpose of asking both questions was to encourage respondents to think in terms of their experience with both successful and unsuccessful projects. Since the estimated rate for unsuccessful projects was always the complement of the estimated success rate, only the estimates for success rate were used in the analysis. In addition, the respondents estimated the percentage of times each of the three types of IS failure were considered a major reason a project was unsuccessful. The respondents were also asked to provide some biographical information, which is summarized in Table 1.

Table 1
Profile of Respondents

	United States	Japan	Korea
Sample Size	137	46	127
IS Experience			
Mean	10.17	13.37	6.26
Standard Deviation	7.05	7.02	4.28
Age			
Mean	35.45	38.09	32.24
Standard Deviation	8.42	8.21	4.42
Gender			
Males	70.1%	89.1%	90.6%
Females	29.9%	10.9%	9.4%
Education			
Graduate Degree	27.0%	4.3%	10.2%
College Degree	56.9%	80.4%	73.2%
No College Degree	16.1%	15.3%	16.6%
Major			
Computer Science	31.2%	10.9%	42.5%
MIS/CIS	29.8%	4.3%	4.7%
Business	9.1%	15.2%	3.9%
Other	29.9%	69.6%	48.9%
Job Title			
Programmer	8.9%	17.4%	43.3%
Analyst	7.4%	17.4&	2.4%
Programmer/Analyst	56.6%	15.2%	41.7%
Other	28.1%	50.0%	12.6%

3.2 The Sample.

The 26 companies participating in the study were selected primarily because of previous contacts with the companies through personnel recruitment with the host university. Questionnaires were mailed to an appointed liaison officer at each company with instructions on how to distribute them confidentially to IS designers using a systematic random sampling process. Based on information provided by the contact person, all of the respondents who received the questionnaire supplied data. While the selection of organizations was not random, the use of this procedure avoided the usual problems associated with non-response bias. A supervisor from each company was asked to complete a survey regarding company information.

The data for the U.S. sample were obtained from eight organizations, including three in manufacturing and one each in transportation, technology, wholesale/retail, public utility, and government. For the total number of employees in the companies, three had between 500 and 1,000 employees, three had between 1,000 and 5,000 employees, and the remaining two had over 5,000 employees. The number of IS employees ranged from 50 to over 150. The IS budget was between 5.1 and 10 million dollars for two companies, between 10.1 and 100 million dollars for three companies, over $500 million for two companies, and one company left this item blank.

The data for the Japanese sample were obtained from eight organizations, including three in financial services/banking/insurance, three in manufacturing, and two in wholesale/retail. For company size, four had less than 1,000 employees, two had between 1,000 and 5,000 employees, and the remaining two had over 5,000 employees. The number of IS employees ranged from 9 to over 170. The IS budget was between 5.1 and 10 million dollars for two companies, between 10.1 and 100 million for two companies, over $500 million for two companies and two companies left this item blank.

Data for the Korean sample were obtained from ten organizations. Five were consulting- computer service companies, four were in manufacturing, and one company was in the oil industry. Three companies had less than 500 employees, two had between 500 and 1,000 employees; two had between 1,000 and 5,000 employees and the remaining three companies had over 5,000 employees. The number of IS employees ranged from 20 to over 250. The IS budget was under one million for one company, between 1.1 and 5 million for six companies, between 5.1 and 10 million for one company, and over 10 million for two companies.

4. Results

The results for the three types of IS risks and overall IS success rate are presented in Table 2. A 3 (Countries) X 3 (Types of IS Risks) mixed ANOVA was used to analyze the risk data. The interaction between the two factors was

significant (F = 2.62, p < .05).

Table 2.

Means for Types of IS Risks and Overall success Rates by Nationality

	United States	Japan	Korea	Grand Mean
Unmet Project Goals	.215^a	.288^b	.395	.299
Budget Overruns	.159	.186	.186	.174
Missed Deadlines	.318^b	.301^b	.416	.355
Estimated IS Success Rate	.800^b	.750	.703	.753

a – indicates the mean is significantly lower than the means for the other two countries.
b – indicates the mean is significantly lower than the country with the highest mean value.
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To examine Hypothesis 1, posteriori tests were performed to analyze the difference between the three countries regarding their views on unmet goals. The results revealed that the differences between all three countries were significant. As illustrated in Table 2, the designers from the U.S. rated this type of risk as less likely to contribute to unsuccessful projects than did the designers from Japan and Korea. Designers from Japan rated unmet goals as significantly less likely to contribute to unsuccessful IS projects than did the designers from Korea.

Posteriori tests were also conducted to test Hypothesis 2 on potential differences between the three countries regarding perceptions on budget overruns. None of the differences between the three countries were statistically significant for budget overruns. Regarding Hypothesis 3, the results showed that the designers from the U.S. and Japan were significantly less likely to view missed deadlines as a contributor to unsuccessful projects than were the designers from Korea.

Hypothesis 4 was tested by performing a completely randomized ANOVA on the perceived IS success rates. The results indicated a significant difference between the three countries (F = 5.73, p < .01). Using Tukey's tests to make pairwise comparisons revealed that the only significant difference was between the U.S. and Korea. As shown in Table 2, the designers from the U.S. perceived a higher overall success rate on IS projects than did the designers from Korea.

5. Discussion

The results indicate that the first hypothesis was supported by evidence demonstrating that Korean designers are more likely to view unmet goals as a contributor to unsuccessful projects than the designers from the U.S. and Japan. These results could be interpreted as being consistent with the poor organizational communication and information sharing that is characteristic of many Korean organizations. These findings imply that managers of global IS involving designers from Korea may need to make sure the goals of the IS are clearly communicated. In Korea however, supervisors should refrain from issuing detailed directives because such behavior is often interpreted by subordinates as indicating that the supervisors do not have much confidence in their ability [4]. Instead, to ensure IS goals are properly understood, discussions between supervisors and designers may be more appropriately conducted through informal relations during non-business hours where much of the effective organizational communication takes place in Korea firms [4].

The designers from Japan also rated unmet goals as more likely to contribute to unsuccessful IS projects than did the designers from the U.S. This result may be attributed to the differences in the roles of IS designers from the two countries. The literature seems to suggest that designers from the U.S. are expected to take a larger role in ensuring that IS goals are met, whereas in Japan more responsibility is placed on non-IS managers to know what can be achieved through information technology. The results of this study would suggest that the approach used in the U.S. is more likely to be successful in achieving IS goals. Regardless of which procedure may be superior, managers of global IS need to be aware of the possibility that designers in Japan are likely to view themselves as technicians and are likely to expect users and clients to be responsible for ensuring the achievement of IS goals. Thus, managers of global IS involving designers from Japan may find it beneficial to hold more frequent Joint Application Development sessions to allow designers to interact with users and managers and become more familiar with the IS goals.

The results did not support the second hypothesis. That is, there were no significant differences in the perceptions of budget overruns as a contributor to IS failure. However, the data supported Hypothesis 3. Designers from Korea were more likely to view missed deadlines as a contributor to unsuccessful projects than were the designers from the U.S. These results tend to suggest that managers of global IS may find that overly optimistic projections for completion times are common in countries like Korea. Thus, managers of global IS involving designers from Korea may need to allocate more time and resources to train IS designers to avoid the possibility of overly optimistic projections leading to missed deadlines.

The results for the overall perceived rate of success on IS projects was lower in Korea than in the U.S. These findings would seem reasonable since the Korean designers reported a higher incidence of unmet goals and missed deadlines, which may be attributable to poor organizational communication and lack of experienced IS personnel in Korea.

With respect to overall IS success in Japan, the results in this study are consistent with earlier empirical investigations demonstrating that there are no significant differences in the quality of software products developed in

the U.S. and Japan. Thus, it may be reasonable for managers of global IS to expect comparable success rates in the U.S and Japan.

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