

STRATEGIES FOR INFORMATION SYSTEMS SUCCESS: BELIEFS OF DEVELOPERS IN ASIAN COUNTRIES

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Abstract

An increasing number of corporations are developing and implementing information systems (IS) applications which cross national boundaries and span diverse cultures. In the current study, developers from three Asian countries – Japan, Taiwan, and Korea - rated the importance of eight criteria of a successful IS. The criteria are categorized at hierarchical levels, and also as short-term or long-term. The results indicated the IS developers viewed criteria at the system and organizational level as more important than criteria at the user and strategic levels. Although there were no significant differences regarding short-term criteria, there were significant differences in the views of IS developers from the three countries regarding the perceived benefits of long-term/indirect impacts of an IS. As for the implementation strategies, there appears to be a very strong and significant agreement on the importance of IS strategies among the three countries.

1. Introduction

Assessing the success of information systems (IS) has been one of the most important issues for practitioners as well as for academicians. Numerous studies have been conducted to measure IS success and to investigate various implementation strategies that are associated with IS success. However, the bulk of the research concerning IS development and implementation has been conducted under assumptions that may only be applicable in the United States [4,5]. With an increasing number of corporations developing and implementing IS applications which cross national boundaries and span diverse cultures, there is an urgent need for managers to learn and understand the different values and strategies that are considered important in other countries [4,5]. It has become evident that simply understanding the strategies that have been successful in the United States may not be sufficient in a rapidly changing global environment. In addition, it has been noted that Asian offices especially pose major problems for multinational corporations, mainly due to social and cultural difference [2].

The purpose of this paper is to examine the value structures of IS developers in Asian countries, including Korea, Japan, and Taiwan, regarding IS success. Although there are many studies that have focused on the success factors and strategies involving the development and management of IS in the United States, there are very few studies that have focused on detailing the success factors in other cultural environments.

2. IS Success Dimensions

In an effort to assess IS success, prior research has viewed IS from a variety of perspectives, and has used varying definitions and measures of IS success reflecting the evolving role of IS [1,3,7,16,17]. When IS was first utilized to automate during the 1950's up to the 1970's, the research on the IS success attempted to assess the IS success using efficiency measures at the system level. [16]. As the application of IS expanded to higher levels of organizational operations, the evaluation measurement focus moved from efficiency to effectiveness. For example, an effective IS is concerned about the impact of the information provided in helping users do their jobs. Lucas [11] first introduced the idea of including user views when assessing the IS success.

Based on a review of 180 articles attempting to measure IS success, Delone and McLean [3] proposed that the existing measures could be classified into six major dimensions. The dimensions are: (1) system quality - the measures of the IS itself, (2) information quality - the measures of the IS output, (3) information use - recipient consumption of the IS output, (4) user satisfaction - recipient response to the use of the IS output, (5) individual

impact - the effect of information on the behavior of the recipient, and (6) organizational impact - the effect of information on organizational performance. In a later study, Myers et al. [16] developed a framework of system success containing eight dimensions of IS functions: service quality, system quality, information quality, use, user satisfaction, individual impact, workgroup impact, and organizational impact. Saunders and Jones [17] proposed that as the IS function matures, measures likely change from a structured focus on operational efficiency and user satisfaction to a more unstructured concern for IS impact on strategic direction. Subramanian & Nosek [19] also assessed the value of IS from the different roles that IS play for organizations. They asserted that IS could be used to benefit operational efficiency, to improve managerial productivity, to improve customer satisfaction, and to enable cooperative partnerships.

Most of the prior research suggests IS success should be assessed in various dimensions and at different levels. Mirani and Lederer [15] categorized IS benefits as strategic, informational, or transactional. Garrity & Sanders [7] addressed the need to incorporate different viewpoints and various dimensions concerning IS success. Based on these earlier studies, this study identified eight success criteria, which are perceived to be relevant to IS developers (See Table 1). The criteria may be categorized according to the four levels of IS impact as suggested in prior research: system level [3,7,16], user level [3,7,16,17,19], organizational level [3,7,15,16,17], and strategic level [15,17,19].

Previous studies also implied that IS success can be measured in terms of short-term or immediate impact and long-term or indirect impact [7,16]. Thus, the eight success criteria may further be classified as having immediate and/or direct consequences, versus indirect and/or relatively longer-term consequences from the perspectives of IS developers. Table 1 demonstrates how the criteria could be classified according to these factors. For example, a "reliable system" can be considered an immediate result of system development, while a "well - maintainable system" has a long-term impact. "Improving productivity of managers" takes a longer period of time to achieve than satisfying "user needs." "Business operation" can be improved immediately after utilizing a new system, but "generating operational benefits" will generally take time and will be achieved through operational benefits. "Improving customer service" can be an immediate concern for IS developers, while "enabling cooperative partnership" can be a corporate objective which is a relatively indirect concern for IS developers.

Table 1. IS Success Dimensions on the Four Levels of System Impact

Levels	Direct / Immediate	Indirect / Longer-term
System	Reliable (bug-free) system	Easy maintainable system
User	Satisfying user needs	Improving productivity of managers
Organizational	Improving business operation	Generating operational benefits
Strategic	Improving customer service	Enabling cooperative partnership

3. Asian Cultures

Hofstede's [6] research on cultural dimensions provides a theoretical foundation for exploring the impact of cultural differences on the adoption and use of information technology. Hofstede identified four dimensions of societal culture, namely (1) power-distance, (2) the level of uncertainty avoidance, (3) individualism versus collectivism, and (4) masculinity versus femininity [6]. Power distance refers to how a society accepts the fact that power in institutions and organizations is unequally distributed. Uncertainty avoidance is the degree to which members of a society feel uncomfortable with uncertainty and ambiguity. Cultural members in a strong uncertainty avoidance society are stressed by the continuous threat of uncertainty and attempt to reduce this stress by relying on strict adherence to plans, rules, and legal measures [18]. Members in a weak uncertainty avoidance culture do not feel the same stress. They are generally willing to accept the uncertainty of the future and therefore do not perceive the need for strict regulations. The individual-collectivism dimension refers to the relationship between the individual and the group of which he or she is a member. In a high individualism culture, members are concerned primarily about themselves and their own self-interest. In this type of society, individuals are allowed the personal freedom and autonomy to pursue their own goals. A society considered high in collectivism is one in which individuals consider themselves primarily as members of a group and tend to look after one another. Masculinity-femininity refers to a cultural group's dominant value set with regard to work. In a masculine society, the dominant values are to perform, achieve, and make money. In the feminine society, the dominant values are to be people-

oriented, value the quality of life, and the preservation of the environment [6,18].

The cultures of Japan, Korea, and Taiwan differ substantially from the US on all four of the cultural dimensions. The U.S. is considered a low power distance culture in that the members are reluctant to accept unequally distributed power. Power in the U.S. is generally widely dispersed and participation and democracy are highly valued. Members of western cultures want to have a voice in the decisions made by their organizations. Employees in the western culture expect their company to have an open and accessible communication system. On the other hand, the cultures of Japan, Korea, and Taiwan are predominantly a high power distance culture. Inequality in power is accepted as appropriate and legitimate. A few people should be independent; most should be dependent [6]. In most cases, there is little perceived need for subordinate participation in the organizational decision making process [6,18]. Subordinates do not expect to be consulted or to become privy to the information held by management.

The U.S. and other western nations are typically considered low in uncertainty avoidance (UA) and therefore do not see the need for a rigid set of rules and laws. The cultures of Japan, Korea, and Taiwan on the other hand, have very high UA index scores. The inclination of the society members to avoid uncertainty and ambiguity can affect the use and the adoption of specific IS implementation strategies. There is a need for written rules and regulations. Belief is placed in experts and their knowledge. The authorities are assumed to be competent.

In addition, the US and the western cultures tend to be high on individualism. This implies that individuals have the right to pursue their own interests and are expected to achieve personal success. In the U.S., independence is encouraged, autonomy is highly valued, and the pursuit of self-interest is legitimate. Belief is placed in individual decisions, and everybody has a right to an opinion. On the other hand, Japanese, Korean, and Taiwanese are collectivists, placing more emphasis on group interest and on the requirements for maintaining social harmony than on individualism. Organization or clan provides expertise, order, duty, and security. There is emotional dependence of individual on institution, and the emphasis is on belonging to organizations.

All three countries are on the opposite side of the US on the index scales of the cultural dimensions except Japan on the masculinity dimension. Japan has the highest masculinity index score unlike other Asian countries, even higher than the western countries. While other Asian countries are feminine societies where men can assume nurturing roles and small and slow are believed beautiful, Japan is a masculine society where men are believed to dominate in society, performance is counted, and big and fast are considered beautiful [6].

While US culture has consistently been placed at the "dominant" relationship to the environment and is imbued with values of agency, performance, and achievement, these East Asian culture is characterized as mutual cohabitation and harmony with the environment. US preference for open and accessible communication systems in organizations also has little appeal in East Asia. There is little perceived need for subordinate participation in decision making processes. East Asian management approaches are less amenable to quantitative decision making and planning, but achieved primarily through a continual personal immersion in a network of informal business contacts. Experience, judgment and intuition are used to assess situations and determine appropriate courses of action rather than through a formal planning and quantitative method. East Asian organizations have a tendency to resist complexity and to remain structurally simple.

4. Hypotheses

IS implementation research in the U.S. has typically focused on users' views when evaluating IS success. However, IS developers make numerous decisions which significantly affect the system development process and eventually the success or failure of IS. The developers have to define, interpret, and operationalize IS development strategies, and in so doing, they have to rely on their own judgment, which is also influenced by how they view IS success. Unfortunately, their views on achieving IS success may not always be consistent with organizational objectives [9]. A number of authors suggest that IS developers' views may be overly technical, accompanied by a lack of attention to political, and organizational issues, and this may be one cause for the deficiencies in existing IS development practices [9]. It has been suggested that the views of IS developers may be overly technical, accompanied by a lack of attention to political and organizational issues [9]. Schultz and Slevin [9] suggest that developers are primarily concerned with "technical validity" while the users are concerned with "organizational validity" of the system. Designers often do not consider the effects of a system on user's jobs [9]. Finally, others have speculated that users and developers differ in their perceptions of the systems success [9]. Earlier studies also suggested IS developers are concerned with short-term and direct consequences of IS implementation. Thus, our first two research hypotheses are:

H1: The IS developers will perceive the success criteria at the System Level as more important than the criteria associated with the User, Organizational, and Strategic Levels.

H2: The IS developers will perceive the short-term, immediate criteria as more important than the long-term, indirect criteria.

Although Japan has the highest masculinity index score, even higher than many western countries, three countries are similar to each other on the all other dimensions. The cultures of Japan, Korea, and Taiwan are predominantly a high power distance culture, and inequality in power is accepted as appropriate and legitimate. Japanese, Korean, and Taiwanese are collectivists, placing more emphasis on group interest and on the requirements for maintaining social harmony than on individualism. The cultures of Japan, Korea, and Taiwan all have very high UA index scores, and there is a tendency to avoid uncertainties. Thus, we will test the following null hypothesis.

H3: There will be no significant differences among the developers' views of the three countries regarding the implementation strategies.

5. Research Methodology

5.1 Questionnaire and Sample

The questionnaire used in the present study was validated by a pre-test involving several faculty members working at a university in the United States. It was then pilot-tested with IS developers of two local companies in the Midwest United States. Based on feedback of the pilot test, several changes were made to improve the clarity of wording and comprehension. For the Asian samples, the questionnaire was then 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 school.

The questionnaires were distributed to IS developers working in large conglomerate corporations in Japan, Korea, and Taiwan. The sample consisted of IS employees from 20 different companies. Almost all of the respondents who received the questionnaire supplied data. A total of two hundred and two (202) useable questionnaires were returned by IS developers. This was generally a convenience sample selected primarily because of the existence of personal contacts with the firms. One supervisor from each company filled out a questionnaire containing the company information. The IS developers answered another questionnaire related to the values and strategies that individual developers believe important.

5.2 Companies

The type of organizations involved in the current survey included: manufacturing (2), wholesale/retail (2), financial/banking/insurance (6), transportation (3), public utility (1), engineering (2) and computer consulting (4) government. Of the firms surveyed, 27% had between 500 and 1,000 total employees, 46% had between 1,000 and 5,000 employees, and the remaining 27% had over 5,000 employees. The number of IS employees in the organizations ranged from 9 to 2,500 with a median of 68 employees. For the 18 non-government organizations, the annual gross revenue was between 0 to \$1 million for 2 companies, \$1.1 to 10 million for 3 companies, \$11 to \$100 for 1 company, \$101 to 500 million for 4 companies, \$500 to 1 billion for 2 companies, and over \$1 billion for 6 companies.

5.3 Respondents

Individual IS developers were asked to provide some biographical information in addition to their importance ratings for the eight objectives of an IS. Table 2 summarizes the results of the biographical information. As can be seen in Table 2, for all three countries the majority of IS developers were males. Only 13% of the respondents in the survey were females. A majority of the respondents had a least a college degree (86%). As can be seen in Table 2, the Japan sample was slightly older and had more experience working as an IS developer, but the programmers from Taiwan tended to have more education than the other two countries.

Table 2. Profile of Respondents by Nationality

		Japan	Taiwan	Korea	Totals
Sample Size		46	29	127	202
Gender					
	Males	41	20	115	176
	Females	5	9	12	26
Education					
	Graduate Degree	2	13	13	28
	College Degree	37	16	93	146
	No College Degree	7	0	21	28
Experience					
	Mean	13.37	6.85	6.26	7.81
	Standard Deviation	7.02	4.59	4.28	5.73
Age					
	Mean	38.09	32.72	32.24	33.64
	Standard Deviation	8.21	4.48	4.42	6.01

5.4 Data Measurement

Eight items were used as the criteria for system success. These items were adopted from the work of earlier research presented by Delone and McLean [3] and Subramanian and Nosek [19]. Redundant items were eliminated. Eighteen items were used as the critical strategies for project management. These items were derived from the work of Pinto and Prescott [13] and McDaniel et. al. [12].

Respondents were asked to evaluate the importance of each IS success criteria on a seven point Likert-type scale ranging from (1) extremely unimportant to (7) extremely important. Respondents were also asked to convey their agreement or disagreement on a seven-point scale ranging from (1) strongly disagree to (7) strongly agree in response to each of the statements which measured the importance of the strategies. Respondents were asked to rate each item with regard to the extent it contributed to IS project failure. Respondents were also asked to enter the rate of their project success and failure (percentage of successful projects and failed projects that they have completed).

6. Analysis and Results

6.1 IS Success Criteria

The results for the perceived importance of the objectives are presented in Table 3. To examine the perceptions on the systems objectives a 3 (Countries) X 4 (Levels) X 2 (Duration short vs. long-term) Split-Plot ANOVA was performed on the data. The results produced a significant effect of duration ($F = 251, p .0001$). As can be seen in the table, the short-term objectives were viewed as significantly more important. The results also produced a significant effect of level ($F = 54.7, p .0001$). As can be seen in Table 4, the system and organizational goals were viewed as more important than the user and strategic goals. The results also produced a significant triple interaction effect ($F = 7.71, p = .0001$). The triple interaction may be illustrated best by the one-way ANOVA results presented in Table 3. In general, there were little differences between the three countries in terms of the perceived importance of the short-term goals. All three countries view these objectives as important. However, on the long-term benefits, IS developers from Taiwan tended to perceive these items as significantly more important.

Table 3 Mean Rating of Objectives by Country

Item	Taiwan	Korea	Japan	F-value	P-value
Short Term					
Reliable (bug-free) System	6.448	6.377	6.244	0.51	.603
Satisfying user needs	6.000	5.937	6.044	0.24	.786
Improving business operation	6.517	6.000	6.266	4.71	.010
Improving customer services	6.448	5.992	6.088	2.65	.073
Long Term					
Easily maintainable system	6.137	5.826	5.555	3.18	.044
Productivity of managers	6.103	5.527	5.488	3.90	.022
Generating operational Benefits	6.214	5.858	5.600	3.08	.048
Cooperative partnerships	5.896	4.803	3.377	44.76	.001

Table 4. Mean Objective Score by Nationality and Level

Level	Japan	Taiwan	Korea
System	5.90	6.29	6.10
User	5.77	6.05	5.73
Organizational	5.91	6.37	5.92
Strategic	4.73	6.17	5.39

6.2 Implementation Strategies

To compare the three countries in terms of implementation strategies, a one-way ANOVA was performed on each item. In most cases, the results were significant due to the fact that Taiwan gave significantly higher ratings than did Korea or Japan. It is possible that this could partially be attributed to differences in the language or the translation process. A more interesting result might be the degree to which the countries are in agreement about the relative importance of the 18 items. To measure the degree to which the three countries agree about the relative importance of the strategies, the 18 items were rank ordered as can be seen by the values in parentheses in the Table 5. Kendall's coefficient of concordance was calculated on the basis of the rank scores. The degree of agreement was found to be very high, .845 (on a scale from 0 to 1.0). The degree of association between the three countries was significant (chi-square = 43.12, $p < .01$). Thus, there appears to be a very strong and significant agreement among the three countries.

The degree of agreement between any two countries can be measured with Spearman's rank order correlation. The results indicated a very strong association between all countries. For Taiwan and Korea, the correlation was .753, for Taiwan and Japan it was .792, and between Korea and Japan the correlation was .778. All three correlation coefficients were significant ($p < .05$). Thus, the level of agreement regarding the relative importance of the strategies appears to be very strong among the three countries.

Table 5. Mean Rating and Ranks of System Strategies by Country

Item	Taiwan	Korea	Japan	F-value	P-value
1. User participation	6.172 (8)	6.063 (1.5)	6.063 (2)	0.14	.871
2. Top management support	6.448 (1)	5.874 (4)	5.889 (3.5)	3.58	.030
3. Clear objectives	6.379 (2)	6.063 (1.5)	6.178 (1)	1.25	.289
4. Alignment of project And corporate goals	6.207 (6)	5.709 (7)	5.477 (8)	4.40	.014
5. Detailed project plan	6.207 (6)	5.653 (9.5)	5.289 (10)	8.32	.001
6. Leader feedback	6.034 (12)	5.457 (12.5)	5.422 (9)	5.02	.008
7. Leader experience	6.310 (3)	5.795 (6)	5.711 (6)	4.88	.009
8. Leader project control	6.207 (6)	5.835 (5)	5.889 (3.5)	1.84	.162
9. Project scope	6.241 (4)	5.543 (11)	5.556 (7)	7.07	.001
10. Reengineering business exp	5.896 (15.5)	5.653 (9.5)	4.933 (15)	9.82	.001
11. Adequate training	6.000 (13.5)	5.472 (12.5)	4.773 (16)	15.60	.001
12. Peer review	5.896 (15.5)	5.110 (17.5)	4.721 (18)	11.90	.001
13. Utilizing a prototype	5.500 (18)	5.110 (17.5)	4.733 (17)	4.29	.015
14. Team member experience	5.759 (17)	5.362 (16)	5.178 (11)	2.94	.055
15. Team member commitment	6.138 (9.5)	5.953 (3)	5.091 (13)	14.96	.001.
16. Member's self-control	6.138 (9.5)	5.409 (14)	5.136 (12)	9.21	.001
17. Effective methodology	6.000 (13.5)	5.409 (15)	5.089 (14)	7.65	.001
18. Use appropriate technology	6.103 (11)	5.685 (8)	5.778 (5)	2.50	.085

7. Conclusions

Assessing the value of IS developers regarding IS success is important since developer's values affect various decisions associated with system development and resource allocation. This study evaluates and compares the views of IS developers in different cultural backgrounds with respect to IS success dimensions. Several observations can be drawn from the results of the study.

First, there are some demographic similarities between programmers in the three countries. First, the ages and the experiences of developers in Korea and Taiwan are similar. Mean age in Korea is 32.34 while mean age in Taiwan is 32.72. Job tenures of developers in both countries are also very similar (6.26 versus 6.85). In terms of education, majority has the college degrees. The majority of the developers in the three countries are male.

The results show some significant similarities among the three countries with respect to developers' views of the three countries. All developers considered system level and organizational level objectives more important than user or strategic level objectives. All developers also considered short-term objectives more important than long-term objectives. . When individual objectives are examined, all developers considered the criteria of "improving business operation" and "developing reliable system" as most important. The developers in three countries also considered "improving customer service" more important than "satisfying user needs." As for long-term/indirect objectives, however, the Taiwan developers rated all items much higher than the developers in other countries. As for the implementation strategies, Taiwan also gave significantly higher ratings to the items than did Korean and Japan. However, the degree of association between the three countries was significant.

In conclusion, the results of this study show that there are some significant similarities among developers of three countries with respect to their views on IS success and on the implantation strategies.

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