지식경영 시스템 투자를 위한 기업 조직문화 요소에 대한 연구

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Exploring Factors of Knowledge Management Technology Investment

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Abstract

The Knowledge Management (KM) technologies has been implemented to improve customer relationship and to develop new products and services in many organization. However, current review of articles and journals about implementations of KM reveals that effectiveness on the KM implementation is depended on an organizational culture that supports knowledge sharing. The purpose of this research is to explore the possible relationship between specific organizational culture attributes of the successfully KM technology implemented organization to improve customer relationship and to develop new products and services. The OCP and the KMTP instruments were used to identify and rank the most critical organizational culture attributes of promoting successful KM technology implementation to improve customer relationship and developing new products and services. Data were collected from twenty six US organizations involved in a KM implementation effort.

keywords:
Organizational Culture, Customer Relationship, New product Development, KM Technology, KM success

1. Introduction

The success of businesses in today's highly unstable and competitive business environment depends critically on the quality of knowledge which allows organizations to develop new products and services with better quality, faster response to market and higher customer satisfaction[10]. However, most organizations have very ambiguous ideas about how to discern what they know, what their knowledge is worth, and how to convert that knowledge into useful products and services in order to maximize its earning potential. There are many problems associated with finding out their knowledge assets and being able to use them in an efficient and cost-effective manner[4]. Many organizations are implementing Knowledge Management (KM) strategies and infrastructures to solve the problems associated with managing their knowledge assets in an efficient and cost-effective manner but they don't take full advantage of KM[8].

The primary challenge of Knowledge Management (KM) is the need to relate KM programs to organization's people and culture. The result from a recent survey conducted by the Knowledge Management Review demonstrates the main challenges KM practitioners faced when launching their KM initiative. The two main challenges are "Encouraging cultural adoption of KM" mentioned by 37.8% of the respondents and "Encouraging people to share" mentioned by 27.7%. "Managing information" was only mentioned by 8.1% of the respondents which

indicates that Information Technology (IT) is far to be one of the main barriers to KM initiative success. It seems that currently the IT tools designed to facilitate knowledge creation, capture, storage and distribution are available (even though no vendor currently offers an integrated enterprise wide KM solution) but the efficient use and acceptance of those tools are constrained by organizational culture. After having primarily focused efforts on IT, practitioners are now realizing the importance of the "soft" aspect of KM initiatives. Just a few academic researches have been conducted defining the key organizational culture attributes that support more effective utilization of KM technologies and knowledge sharing[8]. The purpose of this research is to define these key cultural attributes. Once defined, one can measure them within organizational cultures and focus a cultural change initiative on these values.

2. Research Attributes Modeling and Measurement

One of the quantitative methods, Organizational Culture Profile (OCP) developed by Harper was used for this research to obtain a global perception of the culture of an organization[6]. The OCP contains 44 attribute statements as shown in Table 1 that can generically capture individual and organizational attributes. The set of attribute statements was developed on the basis of an extensive review of academic and practitioner-oriented writings on

organizational attributes and culture (Harper 2000). One aspect of this review was to identify a comprehensive set of attributes that could be used to characterize organizations. An attempt was made to find items that (1) could be used to describe any organization, (2) would not be equally characteristic of all organizations, and (3) would be easy to understand (Harper 2000). The OCP uses the 8-category 44-item Q-sort scale with distribution {3-5-7-7-7-7-5-3}, which meets the general Q-sort distribution decisions based on symmetry of distribution, the number of judgment categories, and the essential shape of the symmetrical distribution. Respondents are asked to sort the 44 items into 8 categories, ranging from most to least desirable or from most to least characteristic, and to put a specified number of statements on each category. Items judged to be less characteristic or uncharacteristic were placed into middle categories[6]. While sorting the deck, the respondents were asked how to describe the culture of a focal organization. To develop a profile of an organization's culture, respondents familiar with the organization were instructed to sort the 44 attributes according to the extent to which the items were characteristic of the organization. With such a procedure, separate groups of individuals can be used to assess a firm's culture.

<Table 1> Attributes of the OCP

Trust	Problem Solving	Demanding of employee
Flexibility	Being exact	Supportive of employees
Adaptability	Team oriented work	Having a good reputation
Stability	Decisiveness	Sharing information freely
Predictability	Being competitive	Socially responsible
Being innovative	Being aggressive	Being different from others
Compliance	Being result oriented	Security of employment
Experimentation	Fairness	Praised good performance
Risk taking	Informality	Fitting in at work
Being careful	Tolerant of failure	Confront conflict directly
Freedom of action	Taking initiative	Develop friends at work
Rule oriented	Being thoughtful	Enthusiasm for the job
Attention to detail	Being easy going	Working closely with others
Take advantage of opportunity	Respect for individuals' right	Being calm
High expectation for performance	Low level of conflict encouraged	

3. Research Methodology

For this research, the Knowledge Management Technology Profile was developed to assess the success of knowledge management technology implementation on improving customer relationship and developing new products and services[8]. The KMTP was developed by modifying the Information Technology Investment Performance (ITIP) survey instrument developed by National Research Council[9]. The ITIP was developed to assess and understand patterns of behavior that could help explain why some organizations were, or were not, realizing greater payoffs from the investment in information technology[9]. Methods of determining success on knowledge management technology implementation on improving customer relationship and developing new products and serviceswere researched and it was decided to use a modification to the ITIP survey instrument. To gauge the momentum of the KM movement, International Data Corp. and Knowledge Management Magazine undertook an extensive electronic survey of U.S. user organizations and individuals familiar with KM (Dyer 2000). The results of the study demonstrating the most important reasons for implementing KM on improving customer relation and developing new products and services were used in modification to ITIP. Once individual KMTP surveys were grouped by organization, two KMTP scores, one for the success on improvement of customer relation and satisfaction and the other for the success on development of

new products and services, were determined by averaging the responses to each question and summing the average of each question by category. There are two groups of questions. One is for measuring the success on improvement of customer relation and satisfaction and the other is for measuring the success on development of new products and services. These give each organization two KMTP scores, indicating its success in implementation of KM technology on improvement of customer relation and satisfaction and development of new products and services. The 44 attribute statements contained in OCP were sorted by responders using 8-category 44-item Q-sort scale with distribution [3-5-7-7-7-7-5-3]. Responders first chose the 3 attributes most like the organization and the 3least like the organization. Those 3 attributes chosen as most like the culture of the organization and the 3 chosen as least like the organizational culture were each given a score of 4 points. The next 5 attributes chosen as most and least like the organizational culture were each given a score

of 3 points. The next pair of 7 attributes received a score of 2, and the final pair of 7 attributes received a score of 1. Once individual OCP surveys were grouped by organization, an alike and an unlike scoring average of the score totals were produced for each of the 44 OCP attribute statements from each of the total number of responders (N). The score averages, $[(T_i+)/N]$ or $[(T_i)/N]$, were normalized (multiplying by 2.5 since the highest possible score is 4 if a responder had scored an attribute statement as most like or unlike the organizational culture). The resulting values $(P_i+$

or Pi), Equation (4.1), indicate the relative degree that attribute statement (i) is thought to be like or unlike the organizational culture and is used to produce a cultural attribute profile element for that organization.

$Pi+ = (Ti+ / N) (2.5)$ or

$Pi+ = (Ti / N) (2.5)$ (4.1)

Then, a positive normalized total score (Pi+) and a negative normalized total score (Pi) for each attribute statement were calculated. The profile element composite for each cultural attribute statement is the difference of these positive and negative profile values, Equation (4.2). The total cultural profile for a particular organization is then developed by ordering all 44-attribute element composites by descending totals. Attributes with higher negative scoring (-Ti) product negative profile elements.

Pi attribute element composite = (Pi+) (Pi)

(4.2)

The content validity of the KMTP was evaluated by 23 professional members in related areas. To test concurrent validity of the KMTP, those two questions in the final set of nine questions derived from several iterations of content validity test were distributed to employees knowledgeable about the use of knowledge management technology across the organization. Respondents included 12 IT managers from 2 software development companies 9 IT managers from 3 consulting firms; and 1 executive, 2 IT mangers and 5 information technologists from 3 financial/accounting service companies. Once individual sets of two questions were grouped by organization, they were averaged. Using the Spearman-Brown prophecy formula, it was found thatthe coefficient alphas

emerging from these averages are ranged from 0.69 to 0.83. Each coefficient provides an estimate of how likely one would be to get the same (mean) profile if everyone in the organization had taken the KMTP survey instrument, rather than a sample of informants. Such reasonably high scores indicate that those two questions in the KMTP captured a representative knowledge management technology profile for each organization about the project evaluation of KM technology investment. The 27 sets of two questions from 8 organizations were also evaluated for how closely any two respondents in an organization view the implementation of knowledge management technology. The average pairwise correlation across all pairs of individual raters within each organization was calculated. The median within-firm correlation among rates within an organization ranged from 0.31 to 0.62 and the median within-firm correlation for the entire data set was 0.51. Taken together, the alpha coefficient and the average pairwise correlation reflect a high level of agreement in perceptions of KM technology implementation.

4.   Research Hypotheses and Hypotheses

Research in the field of Knowledge Management reveals that companies are adopting more knowledge management (KM) technologies to improve customer relationship and to develop new products and services than ever, but they don't take full advantage of KM. Is successful

implementation of knowledge management not just a combination of new technology, but also organizational culture? If so, which cultural attributes do have positive or negative correlation with the successful KM technology implementation on improving customer relationship and developing new products and services?In determining these correlations two basic hypotheses will be developed and tested.

Hypothesis I:

H_o: There is no positive relationship the high return on knowledge management technology investment in improving customer relationship satisfaction and cultural attributes [flexibility, being innovative, sharing information freely, or working closely with others] for that organization. H_a: There is a positive relationship between the high return on knowledge management technology investment in improving customer relationship satisfaction and cultural attributes [flexibility, being innovative, sharing information freely, or working closely with others] for that organization.

Hypothesis II:

H_o: There is no positive relationship between the high return on knowledge management technology investment in developing new products and services and attributes [experimentation, flexibility, being innovative, sharing information freely, or problem solving] for that organization.
H_a: There is a positive correlation between the

high return on knowledge management technology investment in developing new products and services and cultural attributes [experimentation, flexibility, being innovative, sharing information freely, or problem solving] for that organization.

5. Research Findings from Empirical Investigation

Data used to test the two hypotheses derived for this research were obtained from 227 respondents from the Organizational Culture Profile (OCP) survey instruments and 67 respondents from the Knowledge Management Technology Profile (KMTP) survey instruments representing 26 separate organizations. A total of 1060 OCP survey instruments and 212 KMTP survey instruments were distributed across 44 organizations. The OCP survey instruments were distributed to employees within the organization regardless of employees' function and level. The KMTP survey instruments were distributed to managers who were in a position to be knowledgeable about knowledge management technology across the organizations. A total of 236 OCP survey instruments were completed and returned from 26 organizations with the response rate of 22.3 percent. A total of 67 KMTP survey instruments were completed and returned from 26 organizations with the response rate of 31.6 percent. One organization that returned only the OCP survey instruments was excluded out of sample organizations. Table 2 provides detailed

information as to the number of respondents to the OCP and the KMTP survey instruments from each of 26 participating organizations and the industry types of these organizations. The alphabet (A to Z) was assigned to each of 26 organizations randomly to protect confidentiality of participating organizations.

technology. However, nonparametric alternative to Pearson Product-Moment correlation, Spearman's correlation coefficient, was used with replacing the data values for each variable by ranks because the variables are not normally distributed. The fact that variables are not normally distributed is due to the sample size.

5.1 Data Analysis

The Pearson Product-Moment correlation coefficient was considered as a method of determining linear relationship between two quantitative variables measured in interval scales organizational culture and the successful implementation of knowledge management

5.1.1 Relationship between Improvement of Customer Relation and OCP Cultural Attributes

The correlations between 44 OCP cultural attributes and the KMTP success Score of improving customer relation were examined using Spearman's correlation coefficients (Table 2).

<Table 2> Correlation between OCP Cultural Attributes and KMTP Score of Improving Customer Relationship

OCP Attributes	Correlation
Having a good reputation	0.69
Problem solving	0.62
Sharing information freely	0.61
Trust	0.55
Team oriented work	0.54
Working closely with others	0.54
Autonomy	0.54
Enthusiasm for the job	0.53
Supportive of employees	0.52
Being innovative	0.46
Flexibility	0.42
Praised good performance	0.37
Fairness	0.35
Demanding of employees	0.31
Take advantage of opportunity	0.31
Tolerance of failure	0.30
Being exact	0.28
Taking initiative	0.28
High expectations for performance	0.17

Adaptability	0.16
Developing friends at work	0.09
Being thoughtful	0.04
Being aggressive	0.01
Low level of conflict encouraged	-0.04
Being careful	-0.04
Socially responsible	-0.04
Stability	-0.08
Confront conflict directly	-0.09
Fitting in at work	-0.18
Respect for individual's right	-0.19
Being different from others	-0.19
Being calm	-0.20
Informality	-0.23
Experimentation	-0.30
Being result oriented	-0.31
Predictability	-0.33
Decisiveness	-0.34
Being easy going	-0.35
Compliance	-0.35
Being competitive	-0.38
Attention to detail	-0.38
Risk taking	-0.39
Rule orientation	-0.40
Security of employment	-0.44

A non-parametric correlation analysis produced the Spearman's correlation coefficients between the responder's judgment on KM technology investment in improving customer relation and satisfaction and the 44 OCP attributes. Table 2 summarizes the Spearman's correlation coefficients between these two variables. The attributes having a good reputation, problem solving, and sharing information freely produced correlation of 0.69, 0.62 and 0.61 respectively. Responders to the OCP instrument from organizations indicating that knowledge management technology has been successfully used to improve customer relation and satisfaction,

ranked those attributes as more like their organization's culture than responders from organizations indicating little or no focus on using knowledge management technology to improve customer relation and satisfaction. Such finding would suggest that organizations successfully implementing KM technology to improve custom relation and satisfaction would value having a good reputation, problem solving, and sharing information freely within the organizational culture, but not necessarily flexibility, being innovative, andworking closely with others. However, the correlation analysis couldn't find any attribute having a moderate to high negative

correlation with the successful KM technology implementation on improving customer relation and satisfaction.

5.1.2. Relationship between Development New ProductsandServicesandOCPCulturalAttributes

The average KMTP score for the successful KM technology implementation on the development of new products and services and responses scoring for the 44 OCP cultural attributes for each of the participating organizations were tailed and normalized. Table 3 summarizes the Spearman's correlation coefficients between these two variables. A number of attributes were found to have moderate to high positive correlation with the KMTP score for developing new products and services. These attributes include being innovative, sharing information freely, being different from others, fitting in at work and tolerance for failure. These attributes produced correlation of 0.83, 0.69, 0.68, 0.60 and 0.56 respectively while the attribute experimentation, flexibility, and problem solving produced correlation of 0.35, 0.34 and 0.09. Such findings would suggest that organizations successfully implementing KM technology to develop new products and services would value being innovative, problem solving, being different from others, fitting in at work and tolerance for failure within the organizational culture, but not necessarily experimentation, flexibility, and sharing information freely. Similarly, correlation analysis revealed a number of cultural attributes having a moderate to high negative correlation with the successful KM technology implementation on developing new products and services. These attributes include predictability $(r = -0.69)$, high expectations for performance $(r = -0.64)$, being result oriented $(r = -0.61)$, and stability $(r = -0.59)$.

<Table 3> Correlation between KMTP score developing new products and service and OCP cultural attributes

OCPAttributes	Correlation
Being innovative	0.83
Sharing information freely	0.69
Being different from others	0.68
Fitting in at work Trust	0.60
Tolerant of failure	0.56
Take advantage of opportunity	0.52
Team oriented work	0.46
Supportive of employees	0.44
Autonomy	0.44
Having a good reputation	0.41
Fairness	0.38
Experimentation	0.35
Flexibility	0.34

Adaptability	0.31
Confront conflict directly	0.31
Developing friends at work	0.29
Praised good performance	0.27
Being thoughtful	0.24
Stability	0.20
Socially responsible	0.19
Informality	0.17
Attention to detail	0.15
Respect for individual's right	0.15
Enthusiasm for the job	0.10
Problem Solving	0.09
Security of employment	0.01
Demanding of employee	-0.09
Compliance	-0.14
Low level of conflict encouraged	-0.15
Risk taking	-0.24
Being careful	-0.28
Taking initiative	-0.34
Being aggressive	-0.34
Rule oriented	-0.38
Being exact	-0.38
Being easy going	-0.39
Predictability	-0.41
Being competitive	-0.41
Being calm	-0.43
Decisiveness	-0.44
Stability	-0.59
Being result oriented	-0.61
High expectation for performance	-0.64
Predictability	-0.69

6. Analysis of Hypotheses

The Spearman's Rank Correlation coefficient (Rho) was used to determine the relationship between two quantitative variables measured in interval scale with replacing the data values for each variable by ranks because the variables are not normally distributed. The Pearson Product-Moment correlation could be used with the sample size larger than 30 if the variables are approximately normally distributed. However, the sample size of this research (n=26) is not sufficiently large to use the Pearson Product-Moment correlation coefficient. The hypotheses were tested based on the findings from the correlation analysis with 99% confidence interval.

<Table 4> Testing Hypothesis I

OCP Attributes	Correlation	t-value
Flexibility	0.42	$t : 2.10 < t.005, 25 : 2.79$
Being innovative	0.46	$t : 2.30 < t.005, 25 : 2.79$
Sharing information freely	0.61	$t : 3.05 > t.005, 25 : 2.79$
Working closely w/ others	0.54	$t : 2.70 < t.005, 25 : 2.79$

The research hypothesis I postulates organization indicating a high return on knowledge management technology investment in improving customer relation and satisfaction, would find that employees rank attributes such as flexibility, being innovative, sharing information freely, or working closely with others more positively in their assessment of organizational culture attributes than employees within companies whose investment in knowledge management technology indicate less return on improving customer relation and satisfaction. The t values (Table 4) were calculated against Spearman's Correlation coefficients of attributes, , flexibility (r = 0.42), being innovative (r = 0.46), sharing information freely (r = 0.61), or working closely with others (r = 0.54) found from the data analysis. The t value of the attribute sharing information freely is sufficient to reject null hypothesis and

establishes a positive relation between the successful implementation of KM technology on improving customer relation and satisfaction and the cultural attribute sharing information freely in the population. The result of testing supplemental hypothesis I suggests that organizations successfully implementing KM technology to improve customer relation and satisfaction would value sharing information freely within the organizational culture, but not necessarily flexibility, being innovative, and working closely with others.

The supplemental hypothesis II postulates organization indicating a high return on knowledge management technology investment in development new products and services, would find that employees rank attributes such as experimentation, flexibility, being innovative, sharing information freely, or problem solving

<Table 5> Testing Hypothesis II

OCP Attributes	Correlation	t - value
Experimentation	0.35	$t : 1.75 < t.005, 25: 2.79$
Flexibility	0.34	$t : 1.70 < t.005, 25 : 2.79$
Being innovative	0.83	$t : 4.15 > t.005, 25 : 2.79$
Sharing information freely	0.69	$t : 3.45 > t.005, 25 : 2.79$
Problem solving	0.09	$t : 0.45 < t.005, 25 : 2.79$

more positively in their assessment of organizational culture attributes than employees within companies whose investment in knowledge management technology indicate less return on developing new products and services. The t values (Table 5) were calculated against Spearman's Correlation coefficients of attributes experimentation (r = 0.35), flexibility (r = 0.34), being innovative (r = 0.83), sharing information freely (r = 0.69), or problem solving (r = 0.09) found from the data analysis. The t values (Table 6) of the attributes being innovative and sharing information freely are sufficient to reject null hypothesis then reveals there are a positive relationship between the successful implementation of KM technology on developing new products and services and the cultural attribute being innovative, sharing information freely in the population. The correlation coefficients of the attributes experimentation, flexibility, and problem solving are not sufficient to establish an obvious relation with the successful implementation of KM technology on producing new products and services in the population.

7. Conclusions and Recommendations

The results of the data analysis revealed sufficient evidence to establish a correlation between cultural attributes and the successful implementation of knowledge management technology on improving customer relation and developing new products and services. Before an organization launches a knowledge management technology initiative,

it should deal with cultural issues. The success of KM technology implementation is mediated by human behavior. The research identifies cultural attributes, which have moderate to high positive correlation with the success of KM technology implementation on improving customer relation and satisfaction such as having a good reputation, problem solving, and sharing information freely. Many organizations are actually implementing KM strategies and technologies that are giving them real benefits in terms of the development of new products and services. The results of this research which support two hypotheses indicate that a high return on knowledge management technology investment in developing new products and services has moderate high correlation with cultural attributes such being innovative sharing information freely, being different from others, fitting in at work and tolerance for failure. The findings of this research could help KM researchers and practitioners to develop a better understanding of the role of organizational culture in the successful implementation of KM technology. The findings provide some key cultural attributes that practitioners will be able to focus on and to pay particularly attention to during cultural change initiatives.

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▨ 저자소개 ─────────────────────

박희준 (Park, Heejun)
George Washington University 전산학과를 졸업하고 동 대학교에서 정보경영시스템으로 석사, 박사학위를 취득하였다.
.Marymount University에서 조교수로 재직한 바 있으며 현재 숭실대학교에 재직 중이다. 주요 연구 관심분야는 전자상거래, 지식경영 등이다.

정덕훈 (Jeong, Dukhoon)
현재 동국대학교 경영대학 정보관리학과 조교수로 재직 중이다. 미국 George Washington University에서 정보관리학과 대학원을 졸업하였으며, 동 대학에서 MIS 전공으로 박사학위를 취득하였다. 주연구 관심분야는 위기관리 정보시스템, 전자상거래 및 정보시스템 평가 등이다.

안승호 (Ahn, Seungho)
연세대학교 영문학과를 졸업하고 Michigan State University에서 경영학으로 석사학위를 취득하였으며 University of Oklahoma에서 마케팅전공으로 박사학위를 취득하였다. 충북대학교에서 조교수로 재직한 바 있으며 현재 숭실대학교에 조교수로 재직 중이다. 주요 연구 관심분야는 Macromarketing, Retailing, International Marketing 등이다.