Assessment of Effective Utilization of KM Technologies as a Function of Organizational Culture

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Abstract. Companies are adopting more technologies than ever to maximize the benefit of Knowledge Management (KM). However, recent global analyses of such investments highlight the fact that not all of them are necessarily successful. Too much emphasis on technology without incorporating organizational culture can easily result in failed implementation of KM technology. The key factors for the higher return on the KM technology are the choosing the right technologies for given organizational culture and the effective utilization of those technologies. The purpose of this research is to explore possible relationships between the KM technology types and organizational culture orientations regarding effective utilization of KM technology. Data used to test hypotheses derived for this research were obtained from 294 responders from the Organizational Culture Profile (OCP) survey instruments and 143 responders from the Knowledge Management Technology Profile (KMTP) survey instruments representing 29 separate organizations. The OCP provides a profile of an organization's culture orientation while the KMTP provides a profile of the organization's effective utilization of KM technologies. The results of this research suggest that organizations utilizing collaborative technologies effectively identified people-oriented culture orientation. On the other hand, effective utilization of distributive technologies does not show any relationship with organizational culture orientation.

Keywords: Organizational Culture Orientation, Knowledge Management Technology Taxonomy, Affective Unitization of Knowledge Management Technology.

1 Introduction

The Knowledge Management (KM) technology market has evolved as many organizations have been implementing KM programs, and literally dozens of products and portal solutions deliver the major functions that KM systems require [3]. Many companies implement KM technology with a half-cooked approach by convincing

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themselves, that buying a million dollars' worth of neat technologies will give them a measurable return on investment. However, not all of them are necessarily successful because some of them do not understand all the business practices and cultural and organizational changes they will have to make along with [5]. Too much emphasis on technology without incorporating the other critical elements (i.e., business strategy under leadership, and organizational structure and culture) can easily result in failed implementations of KM program [4]. The same dollar spent on the same system may give a competitive advantage to one company but only expensive paperweights to another. The key factors for the higher return on the KM technology dollar are the choosing the right technologies for given business contexts and the effective utilization of knowledge using those technologies [5].

This research will examine the relationships between organizational culture and KM technology type regarding effective utilization of knowledge using KM technologies. The following sections will examine the literature on Knowledge Management Technology and organizational culture. Then, the rational and methodology for this study will be discussed. Finally, the findings from the surveys conducted for this study will be described with the data analysis and conclusions and recommendations for the future study will be also presented.

2 Knowledge Management Technologies

The creation, retaining and sharing of knowledge within and among different knowledge communities require the coordinated management of tacit and explicit knowledge [2]. Knowledge Management (KM) technologies provide a seamless pipeline for the flow of explicit and tacit knowledge through four modes of knowledge conversion which are socialization, externalization, combination, and internalization. The KM technologies enable capturing knowledge, defining, storing, categorizing, indexing and linking digital objects corresponding to knowledge units, searching for and subscribing to relevant content, and presenting content with sufficient flexibility to render it meaningful and applicable across multiple contexts of use [7].

Processing knowledge can be segmented into two broad classes: distributive and collaborative process, each addressing different knowledge management objectives. Together, these approaches provide a broad set of knowledge processing capabilities. They support well-structured repositories for managing explicit knowledge while enabling interaction to integrate tacit knowledge [10]. Technologies used in distributive process exhibit a sequential flow of explicit knowledge into and out of the repository while technologies used in collaborative process are focused primary on supporting interaction among people holding tacit knowledge [10]. Distributive technologies maintain a repository of explicitly encoded knowledge created and managed for sequent distribution to knowledge consumers within or outside the organization. These technologies provide flexible access and view of the knowledge in a central repository. Knowledge producers and consumers interact with the repository rather than with each other directly [10]. Collaborative technologies may be a simple directory of individuals within or associated with a community of knowledge. It may also take the more interactive form of a knowledge brokerage, an electronic conference or discussion space where people may either search for knowledge by posing questions (e.g., "Does anyone

know?") or advertise their expertise. The most collaborative form supports direct communication through discussion databases, computer conferences, and real-time collaboration technologies. These technologies directly support interaction and collaboration within and among knowledge-based teams, enabling "teams of teams" to form across knowledge communities [10]. The technologies supporting the main functions of Knowledge Management systems (KMS) are well suited to Zack's classification of Knowledge Management technologies (see Table 1.) [5].

Table 1. Classification of KM Technologies

Distributive(Integrative) Technology	Data Warehousing (and Data Mining tools) Database Management technologies Document Management Systems Electronic publishing Information Retrieval Systems Search Engines Intelligent Agents Enterprise Information Portal (i.e. Corporate Intranet) Decision Support Systems Business Modeling Systems
Collaborative(Interactive) Technology	Messaging or E-mail GroupWare Knowledge-mapping tools Enterprise Information Portal (i.e. Corporate Intranet) Web-based Training Help-desk applications Decision Support Systems Workflow Systems

3 Organizational Culture

There are some fundamental areas of agreement in the definition and the important role of culture in an organization, but less agreement exists about its measurement. To investigate person-culture fit, O'Reilly, Chatman, and Caldwell developed a survey instrument called the Organizational Culture Profile (OCP) [8]. This survey instrument contains a set of attribute statements that can be used to assess idiographically the extent to which certain attributes characterize a target organization. In a set of related investigations using multiple sets of respondents, researchers explored the characteristics of the OCP and demonstrated its ability to assess preferences for organizational attributes. The OCP contains 54 attribute statements that can generically capture individual and organizational attributes [8]. In order to define organizational culture orientations in this research, 44 out of 54 OCP attribute statements were mapped against two concerns of the "Managerial Grid" developed by Blake and Mouton, concern for people and concern for production. 10 out of original 54 OCP attribute statements were excluded because they do not fit any of two concerns of the Managerial Grid [9].

Each of two concerns on Managerial Grid was viewed as an organizational culture orientation which is a set of cultural attributions for this research. The original use of

the Managerial Grid is to analyze interactions between significant variables of management – production and people – as consultant to understand a basic conflict in a top management group. The two dimensions of the Managerial Grid include Concern for Production and Concern for the People [1]. In each case, the term "concern for" is not addressing so much with the degree to which the needs of employees and their accomplishments are being considered, but rather the degree of interest that is presented and demonstrated by the organization's management. What is significant is how management concerns itself about production and people and how they interact. In their development of the Managerial Grid, Blake and Mouton defined these dimensions as follows [1]:

- Concern for production. The word "production" and "people" cover a range of considerations. Attitudes of concern toward production, for instance, may be seen in the type of policy decisions, the extent of creativity throughout the organization, procedures or processes, workload and efficiency demands, the quality of services, and the volume of output. The important aspect is that the meaning of production covers whatever the organization deems it important that people accomplish. At the lower level, concern for production may take the form of the number of things that can be counted, or the time it takes to meet production schedule. But at the organizational level, it may be demonstrated in the kind of policies established, the character of direction given to major programmatic efforts, or the importance applied to finding new directions or products to sustain the organization [1].
- Concern for People. In a similar fashion, concern for people can be expressed in a number of different ways. Included might be the degree of concern for personal commitment, accountability, trust versus obedience, self-esteem, good working conditions, benefit packages, security, and social relations or friendships with associates [1].

4 Research Questions and Hypotheses

Research in the field of Knowledge Management (KM) reveals that companies are adopting more KM technologies than ever to maximize the benefit of KM, but they don't take full advantage of them. Is successful implementation of knowledge management not just a combination of new technology, but also organizational culture? If so, which cultural attributes and/or orientations do have positive or negative correlation with effective utilization of a specific kind of KM technology? In determining the relationships between the KM technology type and organizational culture orientation regarding effective utilization of KM technology, two basic hypotheses will be developed and tested.

Hypothesis I

H0: There is no positive correlation between the effective utilization of collaborative technology and people-oriented cultural orientation for that organization.

H1: There is a positive correlation between the effective utilization of collaborative technology and people-oriented cultural orientation for that organization.

Hypothesis II
H0: There is no positive correlation between the effective utilization of distributive technology and production-oriented cultural orientation for that organization.
H1: There is a positive correlation between the effective utilization of distributive technology and production-oriented cultural orientation for that organization.

5 Research Methodology

5.1 Survey Instruments

For this research, the Knowledge Management Technology Profile (KMTP) was developed to assess the effective utilization of knowledge management technology by modifying slightly the Information Technology Investment Performance (ITIP) survey instrument developed by National Research Council [6]. 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 [6]. Methods of determining effective utilization of knowledge management technology were researched and it was decided to use a modification to the ITIP survey instrument. The KMTP represents how effectively each of KM technology types is utilized for the successful implementation of KM program in that organization. On the other hand, The 44 statements of Organizational Culture Profile (OCP) grouped by two concerns of the Managerial Grid (see Table 2.) were used to identify cultural attributes and orientation which most likely describe a given organization [9].

Table 2. 44 Attributes of the OCP

Production-oriented Attributes	People-oriented Attributes
Adaptability	Being calm
Attention to detail	Being different from others
Autonomy	Being easy going
Being aggressive	Being thoughtful
Being carefulness	Confronting conflict directly
Being competitive	Decisiveness
Being exact	Demanding of employees
Being innovative	Developing friends at work
Being result-oriented	Enthusiasm for the job
Compliance	Fairness
Experimentation	Fitting in at work
Flexibility	Having a good reputation
High expectations for performance	Low level of conflict encouraged
Informality	Praise for good performance
Predictability	Respect for the individual's right

Table 2. *(continued)*

Problem solving	Security of employment
Risk taking	Socially responsible
Being rule-orientated	Supportiveness of employees
Sharing information freely	Being team-oriented
Stability	Tolerance of failure
Taking advantage of opportunity	Trust
Taking initiative	Working closely with others

For the purpose of this research, reliability is not a leading concern because of the changing nature of both organizational culture and the way knowledge management technology is utilized across an organization. This research presents only a snapshot of the organization under study and the employees' feeling and perceptions about organizational culture and the implementation of knowledge management technology. An organization is a dynamic entity; conditions surrounding the operation of the business are constantly changing and thus the results from a reliability test of instrument would be expected to vary in reflection of those changing conditions [1]. The questionnaire Organizational Culture Profile (OCP) and the Information Technology Investment Performance (ITIP), slightly modified for this research, have been validated by many researchers in their previous researches.

5.2 Sample

The purpose of this research has been to determine the correlation, if any, between organizational culture attributes and the successful implementation of knowledge management technology. Data used to test the two hypotheses derived for this research were obtained from 294 respondents from the Organizational Culture Profile (OCP) survey instruments and 143 respondents from the Knowledge Management Technology Profile (KMTP) survey instruments representing 29 separate organizations. A total of 1088 OCP survey instruments and 215 KMTP survey

Table 3. Industry Type Patition

Industry Type	Number of Organizations	Percentage	Average Sample Size of KMTP	Average Sample Size of OCP
Consulting	8	30.8%	2.5	10.1
Software Development	6	19.2%	3.0	7.2
Financial/Baking/Accounting	5	19.2%	2.4	9.2
Manufacturing	3	3.9%	3.0	8.0
IT/Telecommunication	4	15.4%	2.3	8.0
Government	2	7.7%	3.0	10.0
Education	1	3.9%	2.0	4.0
Total	29	100.01%		
Average			2.6	8.7

instruments were distributed across 29 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 294 OCP survey instruments were completed and returned from 29 organizations with the response rate of 27.0 percent. A total of 143 KMTP survey instruments were completed and returned from 29 organizations with the response rate of 66.5 percent. Table 3. summarizes industry type partition of 29 participating organizations.

6 Findings

6.1 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 a specific type of knowledge management technology. However, nonparametric alternative to Pearson Product-Moment correlation, Spearman's correlation coefficient, was used when 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.

The correlation between the degree to which specific type of KM technologies is being effectively utilized in an organization and that organization's OCP production-oriented and people-oriented value was examined using a non-parametric correlation analysis. A correlation coefficient of 0.66 was identified between the effective utilization of collaborative technologies and the OCP people-oriented value (see Table 4.). No other significant correlation was identified between those two variables, the effective utilization of KM technology categorized into two types, collaborative and distributive technology and organizational culture orientation.

Table 4. Correlation between effective utilization of KM technology categorized into two types and OCP Cultural Orientations

Correlations

			People-oriented	Production-oriented
Spearman's rho	Collaborative Tech.	Correlation Coefficient	.664**	.184
		Sig. (2-tailed)	.001	.699
		N	29	29
	Distributive Tech.	Correlation Coefficient	-.238	.431
		Sig. (2-tailed)	.359	.055
		N	29	29

** Correlation is significant at the .001 level (2-tailed).

Further analysis revealed other findings which are correlations between the 44 OCP attributes and the effective utilization of collaborative and distributive technologies for each organization. The non-parametric correlation analysis

presented a number of cultural attributes having moderate to high positive correlation with the effective utilization of collaborative technologies while there is no obvious negative correlation between them. These attributes include working closely with others, being team-oriented, having a good reputation, and sharing information freely. Two cultural attributes having a moderate to high positive correlation with the effective utilization of distributive technologies were also identified. These attributes are being rule-oriented, and being result-oriented. Both of them are production-oriented cultural attributes. Even though there was not found any obvious correlation between the effective utilization of distributive technologies and organizational culture orientation, the effective utilization of distributive technologies seems to be more related to production-oriented orientation than people-oriented orientation. The positive correlations between the effective utilization of both collaborative and distributive technologies and the 44 OCP cultural attributes are shown with their correlation coefficients in Table 5.

Table 5. Correlation between Effective Utilization of KM Technology and OCP Cultural Attributes

OCP Attributes	Collaborative Tech.	Distributive Tech.
Working closely with others	0.67	
Having a good reputation	0.60	
Being team-orientated	0.59	
Sharing information freely	0.58	
Being rule-oriented		0.67
Being result-oriented		0.61

6.2 Analysis of Hypotheses

The Spearman's Rank Correlation coefficient (Rho) was used to determine the relationship between two quantitative variables measured in an interval scale by 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 a sample size larger than 30 if the variables are approximately normally distributed. However, the sample size of this research (n=29) 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 6. Testing Hypothesis I

Culture Orientation	Correlation	t - value
People-orientated	0.66	t : 3.34 > $t_{.005,\ 25}$: 2.79

The hypothesis I postulates organizations indicating the effective utilization of collaborative technologies, would find that employees rank people-oriented attributes more positively in their assessment of organizational culture attributes than

employees within organizations indicating a less effective utilization of collaborative technologies. The t-value (Table 6.) was calculated against Spearman's Correlation coefficients of people-oriented culture (r = 0.66) found from the data analysis. The-value is sufficient to reject null hypothesis (Table 6.) then reveals there is a positive correlation between the effective utilization of collaborative technology and people-oriented cultural orientation for that organization in the population.

Table 7. Testing Hypothesis II

Culture Orientation	Correlation	*t* - value
Production-orientated	0.43	t : 2.11 < $t_{.005,\ 25}$: 2.79

The hypothesis II postulates organizations indicating the effective utilization of distributive technologies, would find that employees rank production-oriented attributes more positively in their assessment of organizational culture attributes than employees within organizations indicating a less effective utilization of distributive technologies. The t-value (Table 7.) was calculated against Spearman's Correlation coefficients of production-oriented culture (r = 0.43) found from the data analysis. The t-value is not sufficient to reject null hypothesis (Table 7.) then reveals there is no obvious correlation between the effective utilization of distributive technology and production-oriented cultural orientation for that organization in the population.

7 Conclusions and Recommendations

Before an organization puts knowledge management technologies for a successful KM implementation, it should deal with cultural issues. The success of KM technology implementation is mediated by human behavior. While this research focused on establishing a correlation between organizational culture orientations and the successful implementation of KM technology, evidence suggests that the specific cultural attributes are the drives for or barriers to the successful KM technology implementation. Although focusing on organizational culture and change may extend the time it takes to prepare a KM program, the benefits of doing so include being better prepared for implementation and being more able to leverage existing technology.

The results of the data analysis revealed sufficient evidence to establish a correlation between cultural orientation and effective utilization of collaborative technologies. Employees of organizations, which are more effectively utilizing collaborative technology, have identified people-oriented culture. The research further identifies cultural attributes, which have moderate to high positive correlation with the effective utilization of collaborative technologies such as working closely with others, having a good reputation, being team-oriented, and sharing information freely. On the other hand, there was not found any obvious correlation between the effective utilization of distributive technologies and organizational culture orientation. However, two production-oriented cultural attributes having a positive correlation with the effective utilization of distributive technologies were identified.

This study could help researchers in the field of KM develop a better understanding of the role of cultural climate in the successful implementation of collaborative and distributive KM technology. This study could allow practitioners initiating KM programs to identify their current culture style with quantitative methodology used in this research and suggest a direction of changing it before they put technologies for a successful implementation of KM. The positive and negative cultural attributes to the successful KM technology implementation identified in this research could prove most beneficial to those organizations interested in a successful KM initiative. Organizations should provide their employees with those positive attributes through training programs and incentive systems.

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