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ACHIEVING KNOWLEDGE MANAGEMENT (KM) SUCCESS: EXAMINING A TASK-KM STRATEGY FIT MODEL

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ABSTRACT

Despite the mounting interest in knowledge management (KM), there is very little empirical research on what factors influence KM effectiveness. Based on the management theory of task characteristics and drawing on the concept of Fit, this study proposes a theoretical model on the fit between KM strategies and task characteristics that lead to improved KM effectiveness. Results of a field survey of knowledge workers performing a variety of tasks in three organizations support the hypothesized relationships. Among our significant findings include, a strong positive influence of the fit between the degree of task routineness and extent of knowledge codification on KM effectiveness performance outcomes: KM satisfaction and knowledge quality. The findings suggest that KM practitioners should set up the work environments in such a way that a proper match between tasks characteristics and knowledge management strategy be realized.

Keywords: Knowledge management, Task Characteristics, Knowledge Management Strategy, Knowledge Management effectiveness, Knowledge Satisfaction, Knowledge Quality.

INTRODUCTION

In today's post-capitalist economy, knowledge and its management are critical for enhancing sustainable competitive advantage [8], [10], [22], [27] and improving organizational performance [19], [29]. Knowledge management (KM) and knowledge management systems (KMS) have gained a tremendous momentum within the last decade [1], [8], [23] as more and more organizations are undertaking KM initiatives and incorporating varied KM strategies into their overall business strategy. However, many KM implementations were unsuccessful and

to date many organizations are yet to reap benefits to the fullest extent [25].

One important theme of KM research is that KM strategies cannot be successful without concerted input from other organizational resources in a pattern that fit well together. For example, studies have shown this mutual relationship between IT and KM. IT alone without good KM strategies and initiatives fails to enhance organizational KM performance [25]. Researchers have examined knowledge management systems (KMS) capabilities [6], [8], [32] and proposed steps for aligning them with KM processes: socialization, externalization, combination and internalization [32]. They argued that a good fit between KM processes and KMS capabilities increases KM performance.

In recent years, researchers have begun to consider other factors that need to have a good fit with KM processes to produce positive organizational outcomes. KM implementation should support organizational business strategies and result in achieving the business goals. Greiner et al. [18] have demonstrated that the choice of an appropriate KM strategy should not only depend on the type of knowledge to be shared but also on the organizational environment factors. Shih and Chiang [36] propose that business strategy, knowledge strategy and human resource management strategy should be in alignment to improve performance.

Despite the mounting interest in KM research based on the fit perspective, there is a lack of studies at the fundamental task level grounded in established management theories. After all, knowledge is accessed and utilized to accomplish everyday business tasks. Thus, in addition to addressing the question of fit between KM strategies and macro-level organizational attributes such as business strategies and human resource policies, we need a solid understanding at the micro process level, i.e., the fit between task characteristics and KM strategies, in order to build up a more solid foundation for KM research that shed light on the basic mechanisms that underlie KM success.

Given the importance of understanding the fit between task characteristics and KM strategies, we have found very few previous attempts by researchers to study it. These studies [4], [7] have begun to improve our understanding on how this fit may operate and exert influence on KM success. However, there is a need for a much stronger theoretical basis for studying this fit than these studies offered. To fill this gap in research, we will present the results of a study that is based on a well-established management theory on task characteristics [11]. Specifically, we will attempt to achieve these two research objectives:

1. Based on the management theory of task characteristics [11], we will propose a theoretical model on the fit between KM strategies and task characteristics that lead to improved KM effectiveness.
2. We will develop measurement scales and empirically test the efficacy of the fit model.

The rest of the paper is organized as follows. Next section presents the theoretical basis for the study. This is followed by the research model and a set of testable hypotheses. We will then present research methodology, model fit assessment, and model fit results. Subsequently, we present a discussion of the study results, research limitations, and suggestions for possible future studies.

THEORETICAL BASE

KM Strategies

Two different strategies are discussed in the extant literature in regards to knowledge management. According to Hansen et al. [21], the two major types of knowledge management strategies are codification and personalization. Codification involves recording explicit knowledge in formal documents or electronic databases and knowledge repositories. This would facilitate common access and efficient reuse. Many firms and consulting companies have assigned specialized staff to undertake the knowledge codification tasks. Personalization typically involves personal contacts and spontaneous interactions, often via face-to-face or group meetings. Tacit knowledge can be more efficiently transferred this way than the codification strategy [21], [32]. These two KM strategies can be easily mapped to Nonaka's model [32] for knowledge creation: the personalization strategy is equivalent to the socialization process, and the codification strategy, to the externalization process in Nonaka's model [32].

The relative efficacies of codification and personalization KM strategies have received considerable attention from researchers [21], [37], [17], [20], [18], [31], [28], [5]. Research findings by Greiner et al. [18], for instance, revealed that organizational performance depends on how KM strategy fits with its business strategy: an organization that has process efficiency as business strategy should primarily depend on codification strategy while an organization with product/process innovation as business strategy should primarily depend on personalization strategy.

At a more micro level, Becerra-Fernandez and Sabherwal [4] demonstrated that a good fit between KM processes an organizational subunit employs, and the

characteristics of the tasks it performs would lead to better performance. Building on this study results, Chang Chun-Ming et. al., [7] have shown that a good fit between KM processes, KMS capabilities and task characteristics would improve KM performance. This stream of studies opened up a promising direction for KM research. To understand how KM can be successful in organizations, we must first understand how it can be managed at the basic task level. If we can apply a KM strategy that is appropriate for the task at hand, successful KM becomes possible. Thus, the quest for a fit between task characteristics and KM strategy is critical for KM research.

KM Technologies

Advancements in information technology (IT) have made it easier to capture, store, transfer and utilize knowledge to fulfill organizational goals. Accordingly, many organizations are utilizing IT to manage their organizational knowledge bases and to facilitate knowledge transfer and integration. IT can provide support for both KM strategies: codification and personalization [21]. As codification follows a people-to-document approach, this strategy focuses on codifying more explicit, structured knowledge and storing it in knowledge bases. Once codified and stored, the knowledge artifacts can be accessed and reused over and over. The role of IT in codification is to connect individuals to reusable codified knowledge artifacts through common storage systems. Examples of IT tools that support codification include electronic knowledge repositories, document management systems, expert systems, wikis, workflow systems, simulation tools, data mining etc. While many businesses benefit from these systems, codification approach is effective only for explicit knowledge. Tacit knowledge cannot be easily captured with this approach.

Personalization KM strategy follows people-to-people approach, where the goal is to bring individuals together for sharing largely tacit and unstructured knowledge through some kind of personal communication such as a dialogue. Tacit knowledge by its very nature is bound to its creator and is therefore very difficult to isolate. The role of IT in personalization is to serve as an expertise locator, rather than as an artifact for storing knowledge. Knowledge remains with its creator. IT tools facilitate dialogues / brain storming sessions in knowledge dissemination. Examples of IT tools that support personalization include electronic expert directories, online corporate yellow pages, people-finder databases, group support systems, communities of practice, videoconferencing etc.

Task Characteristics

As indicated above, the studies by Becerra-Fernandez and Sabherwal [4] and Chang Chun-Ming et. Al [7] opened up a critically important area for KM research. However, the way task characteristics are determined in their studies can benefit from further improvement. Following Pisano's framework [34], both of these two studies classify task based on two dimensions of its characteristics: task orientation (process vs. content) and task domain (broad vs. focused). This classification scheme is theoretically appealing, but has limitations. First, there is no objective instrument for measuring the two dimensions. The researchers need to interview the work unit employees and make subjective judgments, which are time-consuming and may not be reliable. Secondly, the task orientation dimension seeks to differentiate between "know how" (process orientation) and "know what" (content orientation). This is problematic since two work units may both show process orientation, but one has clearly documented processes, but the other follows processes that are more tacit. In other words, the extent of tacitness may vary across processes; and yet tacitness is a central concept in KM [32].

To overcome the potential problems in capturing task characteristics in previous studies as discussed above, we will adopt the theoretical framework developed by Perrow [33] and refined by Daft and Macintosh [11], who pioneered the study of organizational information processing. In their seminal paper titled "A Tentative Exploration into the Amount and Equivocality of Information Processing in Organizational Work Units" [11], they theorized that information requirements and processing in a work unit depend on two dimensions of task characteristics: task variety and task analyzability. Task variety is defined to be the frequency of unexpected and novel events. Low variety means that managers in the work unit experience considerable certainty about the occurrence of future events, while high variety means managers typically cannot predict problems or activities in advance. Task analyzability, on the other hand, refers to the extent that the task can be accomplished by following an objective, clearly-documented procedure. They found that the amount of information processing and the use of equivocal information are indeed related to these task characteristics. Based on the work of Perrow [33], they further theorized that these two dimensions of task characteristics would give rise to four types of work unit task environment for information processing and suitable technologies, as depicted in Figure 1. As can be seen in the figure, the joint impact of both task analyzability and variety leads to the two extreme task environments (along the

dotted diagonal line) which can be suitably supported by routine and non-routine technologies.

For the current study, we will gauge task environment by measuring both task variety and analyzability using the scales developed and validated by Daft and Macintosh [11] and determine the extent of task routineness of a process. At the routine end of the continuum, the task environment has low level of variety (certainty about the occurrence of future events) and high level of analyzability (with clearly-documented, unequivocal procedures). At the non-routine end, the task has high level of variety (uncertain about the occurrence of future events) and low level of analyzability (with procedures that are equivocal and difficult to articulate). As can be seen in Figure 1, the other two quadrants (low analyzability and low variety, high analyzability and high variety) would exhibit median level of task routineness.

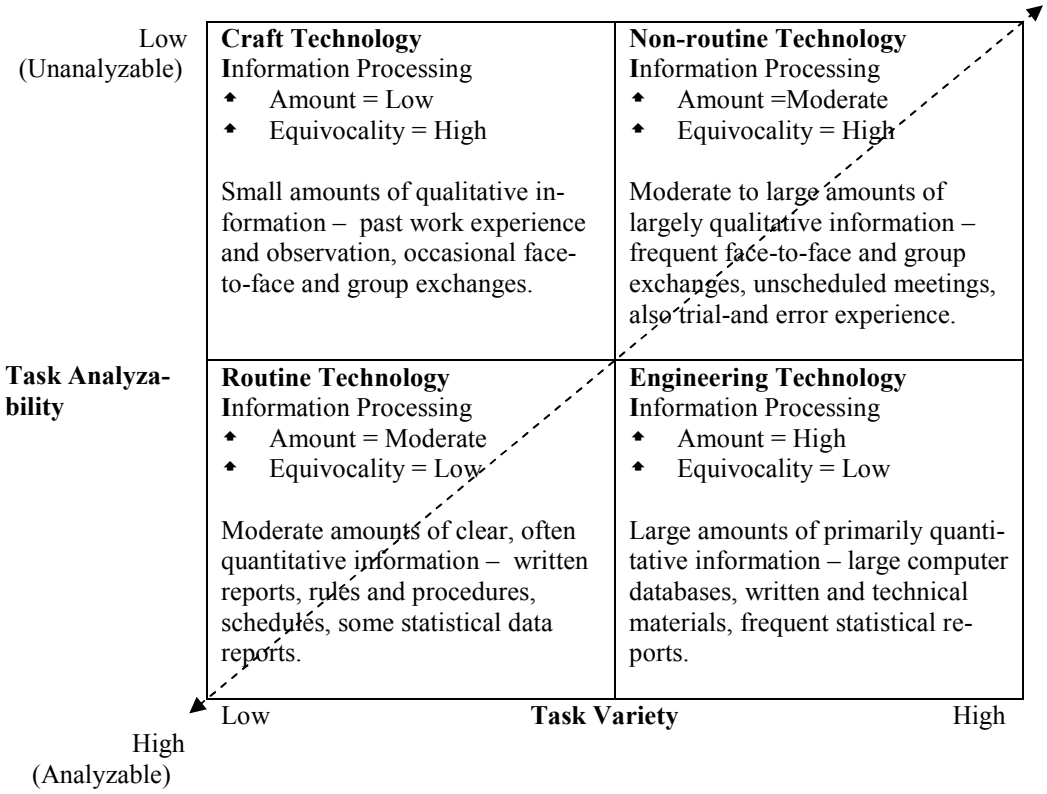

Figure 1: Classification of Work Unit Information Processing and technologies (adopted from Daft and MacIntosh, 1981)

A theoretical fit model: Aligning KM Strategy with Task Environment

The theoretical base for the study, as presented above, has two pivotal continuums. The first one depicts the continuum for knowledge management strategies [21], [32], ranging from pure personalization to extreme codification, with varying blends of both filling the space in between. The second continuum captures a vital characteristic of task environment as theorized and demonstrated by Daft and Macintosh [11]: task routineness. This continuum for task environment, a joint outcome for task variety and analyzability, ranges from a highly non-routine environment to a very routine environments. In this study, we propose that, in order to achieve better KM performance, a fit should exist between these two continuums as portrayed in the theoretical fit model for our study (Figure 2): work units with a highly non-routine task environment should adopt a personalization strategy for knowledge management; in contrast, units with a highly routine task environment should adopt a codification KM strategy. The fit model, as can be seen in the

figure, indicates that the extent of task routineness should match the degree of codification. Similarly, to the extent that the task is non-routine, the knowledge management strategy should include a commensurate amount of personalization.

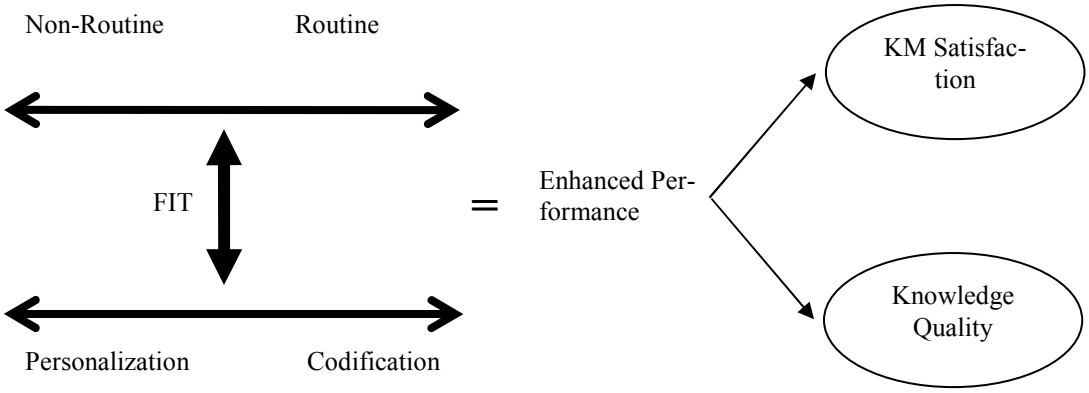

Figure 2: A Theoretical Fit Model: Aligning KM Strategy with Task Environment

RESEARCH MODEL AND HYPOTHESIS

We will now justify the theoretical fit model presented above, which is the basis for the empirical research model for the study (see Figure 3). As shown in the figure, the two independent variables of the model seek to represent the two continuums: a lower value for the "degree of task routineness" variable means the task environment is more non-routine (per the framework in Figure 1), and a smaller value for the "extent of knowledge codification) means more reliance on the personalization KM strategy. With hypotheses H1 and H2, we will empirically test if a fit between the two variables leads to better KM performance in terms of KM satisfaction and knowledge quality.

The original research reported by Daft and Macintosh [11] demonstrated that the use of equivocal information increases as the task environment becomes more non-routine. According to the media richness theory proposed by Daft and Lengel [12], when organizational members encounter non-routine situations involving equivocal information, i.e., the cause-and-effect relationships are not clear-cut, they would normally resort to rich media such as face-to-face meetings and team efforts. In contrast, when the task is routine, media of low richness such as formal information systems reports would be sufficient to handle problems without much equivocality and variety. Empirical evidence for the media richness theory was later reported by the two researchers [13]. In the context of our theoretical fit model (Figure 2), this means that when the task environment is non-routine, the most appropriate KM strategy is personalization. In terms of the research model (Figure 2), this means that when the degree of routineness is low for task, a KM strategy low in codification would be a good fit. This is also consistent with the recommendations made by Hansen et al. [21] that for unstructured management problems such as strategy formulation, personalization is the appropriate KM strategy for achieving better results. These prior theoretical developments and empirical studies provide solid basis for us to propose the following hypotheses:

H1: The Fit between the Degree of Task Routineness and the Extent of Knowledge Codification is related to Knowledge Management Satisfaction.

H2: The Fit between the Degree of Task Routineness and the Extent of Knowledge Codification is related to Knowledge Quality.

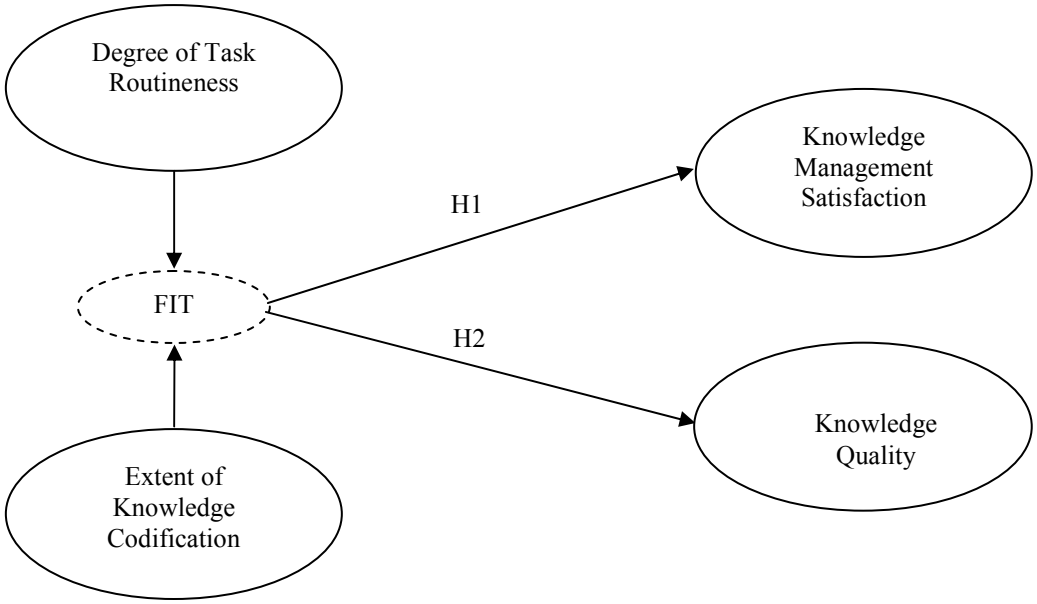

Figure 3: Research Model

RESEARCH METHODOLOGY

We used survey method to empirically test the research model. The items in the questionnaire were based on previously validated instruments. Measurement items for the constructs are based on 7-point Likert-type scale with anchors ranging from 1 'Strongly Disagree' to 7 'Strongly Agree'. The questionnaire was further refined through rigorous pre-testing. All research variables, measurement items, and their sources are listed in the Appendix. We administered the refined questionnaire to knowledge workers performing a variety of tasks in three large companies located in a large southern city in the U.S. Of the 500 questionnaires distributed, a total of 156 were returned for a response rate of 31%. Out of these returned questionnaires, 27 had missing data and were therefore removed from data analysis.

Sample Characteristics

As would be expected the respondents were mostly professionals who carry out advanced knowledge work in their organization. Over half (51.6%) of the survey respondents are professionals in fields such as accounting, customer support, computing and network services, engineering, human resources, project management, process and control, technology and planning etc. Of the respondents, more than 36% were advanced professionals (analysts, engineering specialists, scientist, team leaders, etc.). Senior-level Managers and Executive Management (Director level) accounted for the remaining 9.8% and 2.5% of the total respondents respectively. The organizational tenure ranged from less than 10 years to 30 or more years. A majority (74.2%) of the knowledge workers had been with the organization for less than 10 years, 17.2% for 10 to 19 years, 7% for 20 to 29 years and only 1.6% for 30 or more years. Among these respondents, 67% were male and 33% were female. Their ages ranged from 25 to 65 with an average age of 47.6, thus characterizing knowledge workers from all ages: 7.3% of the respondents were between the ages of 25 and 35; 32.5% were between the ages of 36 and 45; 35% were between the ages of 46 and 55; and 25.2% were 56 years old or older. These distributions of organizational tenure, gender and age are quite dispersed and provide credible indication that our sample is fairly representative of the population of knowledge workers in modern business firms.

Measurement of Variables

As indicated in the research model (Figure 3), the independent variable FIT is determined by two variables: degree of task routineness and extent of knowledge codification. The measure for the degree of task routineness is based on measures for task variety (TV) and task analyzability (TA). These two scales were developed and validated by Daft and Macintosh [11], and we adopted their scales for this study. The cronbach's alpha for TV and TA are 0.77 and 0.86 respectively. The measure for the extent of knowledge codification is based on measures for personalization (PZ) and codification (CF). For these two measures, we adapted scales developed and validated previously by Choi and Lee [9]. The cronbach's alpha for PZ and CF are 0.79 and 0.85 respectively. There are two dependent variables in the research model: KM satisfaction (KSAT) and knowledge quality (KQ). For these two measures, we adapted scales developed by Sabherwal and Becerra-Fernandez [35], McKinney et al., [30], and DeLone and McLean [15]. The cronbach's alpha for KQ and KSAT are 0.70 and 0.80 respectively. All measures, with their sources, items and reliabilities are listed in the Appendix.

The procedure followed in this study for fitting two variables is based on the method developed by Alexander and Randolph [2] which was also utilized in subsequent research studies [24], [3]. This method of analysis is one of several "fit" methodologies discussed at length in a research article by Venkatraman [38]. The two variables TV (Task Variety) and TA (Task Analyzability) were combined by reverse-coding the values of the variable TV, and then adding the values to those from the variable TA, in order to obtain a single value for the combined variable: Degree of Task Routineness (TATV). The resulting scale measures the continuum from "non-routine" to "routine". The same procedure was used for the variable PZ (personalization) and CF (codification) in order to obtain the value for the combined variable: Extent of Knowledge Codification (PZCF). The PZCF scale now gauges the extent of codification in KM.

To measure the fit between the two variables TATV and PZCF (labeled FIT), which gauges the two pivotal continuums in the fit model, we take the absolute value of the difference between the two measures, i.e. FIT = abs |TATV - PZCF| [3], [24], [2].

STUDY RESULTS

To test the two hypotheses, we run regression analysis with FIT as the independent variable and Knowledge Satisfaction and Knowledge Quality as dependent variables. The results are summarized in Table 1, and graphically depicted in Figure 4. Hypothesis H1 is strongly supported (b = - 0.21; $p < 0.01$), and H2 also has received strong support (b = -0.22 ; $p < 0.01$). The results demonstrate that, as the distance between Task Routineness and Knowledge Codification decreases, the level of perceived Knowledge Quality and Knowledge Management Satisfaction increases; thus the significant negative coefficient for the relationships.

Table 1: Overall Model-Fit Statistics

Dependent	B	t-value	Significance
KQ	-0.21	-2.41	$p < 0.01$
KSAT	-0.22	-2.56	$p < 0.01$

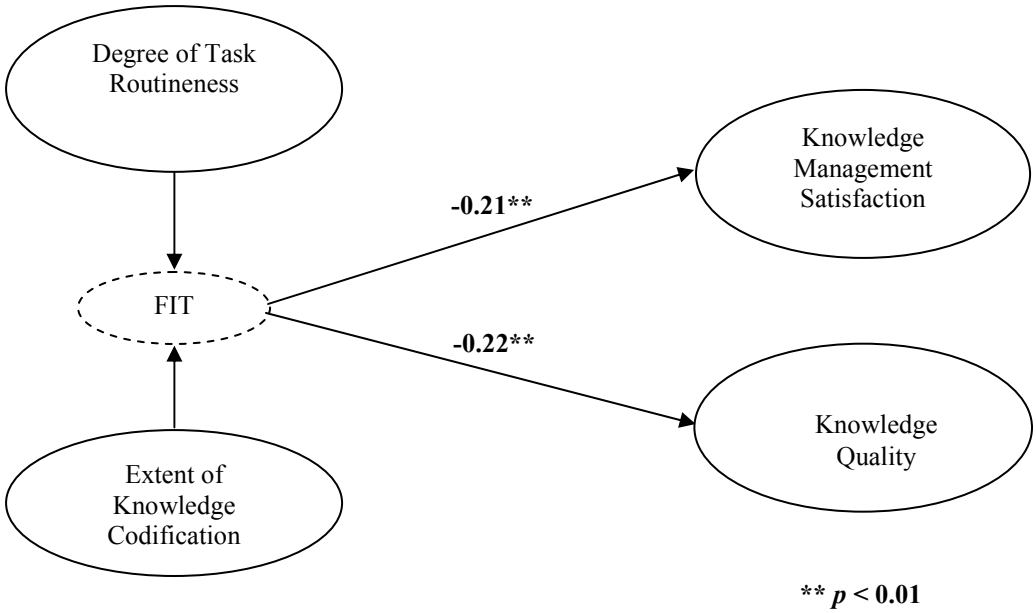

Figure 4: Model Fit

LIMITATIONS, IMPLICATIONS, AND FUTURE STUDIES

Although, our study obtained interesting and insightful results, these results must be interpreted in light of certain limitations inherent in the research mythology used. First, we should exercise caution in making casual inferences, because this study employed cross sectional survey design. Secondly, respondents to the survey come from units in three organizations. The generalizability of the study results may be limited by a lack of many different types of industries that are included in the study. However, a great variety of professional knowledge workers are included and similar types of knowledge workers are found in other industries. While a significant percentage of these employees were professional employees, a broader sample of this class of employees across several additional organizations would have removed any potential bias that may exist. Future studies should try to broaden the sample to include a wider variety of industries across a more disparate geographical area, including perhaps some European and other industrialized countries to gain a more global perspective.

The research proposed that the effectiveness of a knowledge management strategy is the highest when it is matched with a particular type of task environment in the work-unit. The two individual hypotheses that were tested through the use of regression testing answer the questions posed below:

1. Does the Fit between Task Routineness and Knowledge Codification influence Knowledge Management Satisfaction?
2. Does the Fit between Task Routineness and Knowledge Codification influence Knowledge Quality?

The results of the analyses demonstrate that significant relationships exist between the FIT variable and the two Knowledge Management Effectiveness performance outcomes. Therefore, we conclude that a better fit between task characteristics and KM strategy would lead to higher KM effectiveness. This finding has significant implications for KM research. At the most fundamental level, KM must concern how we can manage knowledge better to carry out day-to-day tasks more effectively. There have been previous studies that attempted to establish this fundamental KM principle of fit [4], [7], but these studies were not based on well-established management theories and rigorous measurement scales were also lacking. The study we reported here draws from the elaborate theories in organizational information requirement and media richness [33], [11], [12], [13], and firmly and rigorously established the fit principle empirically. This fit principle can now serve as a foundation for further theoretical development in KM at a more macro level, e.g.

at the organizational level [16] that relates organizational environment to the success of KM policies.

These results as described above also have important implications for KM practice. Information technology managers responsible for providing KMS support in organizations can benefit from the research results. These managers should realize that a high (low) level of codification would be expected to adversely (positively) affect the performance of non-routine tasks because the creativity inherent in the group who would normally accomplish this task would be underutilized (effectively utilized). Likewise high (low) levels of non-codified knowledge would also be expected to adversely (positively) affect the performance of very routine (non-routine) tasks where creativity is not (is) required, only the ability to follow directions is normally required [3]. Therefore, if the task environment and level of knowledge codification are appropriately managed and matched for the expected task routineness, one could expect that the performance outcomes for the tasks would be optimized. Therefore, blindly and indiscreetly apply KMS tools to support tasks would not improve task performance and may even degrade it. A proper mix of different types of KM technologies with proper guidelines for their applications would benefit the organization more.

As organizations strive to compete in the coming knowledge-based society, knowledge resource becomes the basis for sustainable competitive advantage. Successful knowledge management, however, must be rooted in daily organization processes and activities. In this study, we propose a fundamental fit principle that matches the task characteristics with KM strategy in order to improve knowledge work performance for these daily processes and activities. The study results have provided strong support for the validity of this fit principle, and filled a gap in KM research foundation. Managing information technology in the knowledge-based organizations is challenging, and our study results have demonstrated the efficacy of a fundamental principle that the IT managers can rely upon to meet the challenge.

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APPENDIX

All questions begin with the statement: Please indicate the extent to which each statement describes the nature of work or situation in your work-unit. 1 = To a Very Little Extent 7 = To a Very Great Extent.

Degree of Task Variety (TV): adopted from Daft and Macintosh [11]. Cronbach's Alpha = 0.77
TV1: Work decisions are dissimilar from one day to the next.
TV2: The work could be described as routine.
TV3: When a problem arises, it takes a lot of experience and training to know what to do.
TV4: There is variety in the events that cause the work.

Degree of Task Analyzability (TA): adopted from Daft and Macintosh [11]. Cronbach's Alpha = 0.86.
TA1: Normal work activities in our jobs are guided by standard directives, rules and procedures.
TA2: In carrying out our work, there is an understandable sequence of steps that can be followed.
TA3: Established materials (professional books, directives, manuals,statutes) cover our work.
TA4: In our type of work, people actually rely on established practices and procedures.

Extent of knowledge codification (CF): adapted from Choi and Lee [9]. Cronbach' Alpha = 0.85.
CF1: Using formal documents to capture and describe knowledge. Formally recording knowledge whenever it is created (e.g., from projects and meetings).
CF2: Using formal documents to share and transfer knowledge.
CF3: Using knowledge and procedures from formal documents to solve problems.

Extent of knowledge personalization (PZ): adapted from Choi and Lee [9]. Cronbach' Alpha = 0.79.
PZ1: Making face-to-face social interactions to exchange knowledge.
PZ2: Engaging in informal dialogues and formal meetings to share and transfer knowledge.
PZ3: Using meetings and discussion via brainstorming and debate, etc. to generate new knowledge.
PZ4: Using knowledge from accumulated experience to solve problems.

Knowledge Quality (KQ): adapted from Sabherwal and Becerra-Fernandez [35], McKinney et al., [30], and DeLone and McLean [15] Cronbach's Alpha = 0.70.
KQ1: I am satisfied with the availability of knowledge in my work-unit
KQ2: In our work-unit, available knowledge is relevant to performing our tasks.
KQ3: In our work-unit, knowledge is available in a timely manner when it is needed.

KQ4: In our work-unit, available knowledge is sufficient for doing my tasks.
KQ5: In our work-unit, available knowledge is reliable for using it in our tasks.
KQ6: I am satisfied with the overall quality of available knowledge in our work -unit.

Knowledge Management Satisfaction (KSAT): adapted from Sabherwal and Becerra-Fernandez [35] McKinney et al., [30], and DeLone and McLean [15]. Cronbach's Alpha = 0.80.
KSAT1: I am satisfied with how new knowledge is created in my work unit.
KSAT2: I am satisfied with how knowledge is documented and stored in my work unit.
KSAT3: I am satisfied with how knowledge is shared and transferred in my work unit
KSAT4: I am satisfied with how knowledge is applied and utilized in my work unit.
KSAT5: Overall, I am satisfied with knowledge management, i.e., how knowledge is created, acquired, stored, shared, and applied, in my work unit.