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Effects of Managerial Drivers and Climate Maturity on Knowledge Management Performance: Empirical Validation[1]

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Abstract

This study examined the effects of managerial drivers and climate maturity on knowledge management performance, measured in terms of knowledge quality and level of knowledge sharing. Reward, top management support, and IT service were selected as the managerial drivers. The climate maturity construct reflects learning orientation, trust, and employee commitment as an aggregated indicator of the cultural dimension of knowledge management. The hypothesized relationships were tested by multiple regressions with data from 356 respondents of the 42 organizations. Additionally, this study examined the mediating effect of climate maturity for knowledge management between managerial drivers and knowledge management performance. The results of this study indicate that reward and IT service quality are critical management drivers to influence climate maturity and finally lead to high knowledge management performance.

Keywords: Knowledge Management, Climate, Knowledge Quality, Knowledge Sharing

1. Introduction

Despite the active interest in knowledge management from the industry, knowledge management as a research discipline has hardly established itself. At the practice level, influenced by the leading consulting firms' strategic and aggressive investment in knowledge management effort (Anderson (O'Leary, 1998), Ernst & Young (Chard & Sarvary, 1997), KPMG (Alavi, 1997), McKinsey (Bartlett, 1998), etc.), firms of different sizes, industries, and culture are rapidly embracing knowledge management as the new management paradigm (Ruggles, 1998; Wiig, 1997). Many of them believe that they can manage their organizational knowledge resources by building a knowledge management system (KMS), also called a knowledge repository system.

Such a belief, however, is only as valid as believing that installation of a database management system (DBMS) will guarantee enterprise-wide integration and integrity of corporate data. In reality, as firms in more advanced knowledge management stages come to realize, successful knowledge management implementation warrants systematic managerial

efforts beyond building repositories, networks, and search engines. Organizational learning and knowledge management literature emphasizes the importance of building managerial drivers such as top management support (Klein, 1998), measurement and reward systems for motivating employees (Liebowitz, 1999; Tampoe, 1993), flexible organizational structure (Tobin, 1997), and organizational culture for supporting knowledge management activities such as knowledge creation, sharing, and utilization (Davenport and Prusak, 1998).

However, few empirical studies investigated which managerial drivers are effective in creating an organizational climate that will facilitate successful knowledge management implementation. Furthermore, while many knowledge management initiatives focus on the quantitative side of knowledge management implementation, few looked into the quality of organizational knowledge, which may turn out to be more critical for ultimate success of the organization.

The research framework proposed in this study aims to analyze the effects of managerial drivers on organizational climate and establish the role of organizational climate as a critical success factor for knowledge management. The following sections will introduce the research model and hypotheses, describe the research method adapted, and discuss the testing results and implications for further studies.

2. Research Model & Hypotheses

Since knowledge management is as much a social activity as a managerial or technical activity, cultural change is a prerequisite for its successful implementation (Klein, 1998; Nonaka and Takeuchi, 1995; O'Dell and Grayson, 1998). Additionally, among the managerial drivers for knowledge management, reward, top management support, and IT service quality have been the most frequently cited factors in the literature (Klein, 1998; Liebowitz, 1999; O'Dell and Grayson, 1998). Focusing on the two indicators of knowledge management performance (knowledge quality and knowledge sharing level), we developed a research model as shown in figure 1. That is, quality of organizational knowledge and its sharing level are hypothesized to be affected by the climate maturity for knowledge management, which is expected to be influenced by the managerial drivers such as reward system, top management support, and IT service quality.

The following sections introduce the theoretical background on each of the research construct and the expected relationships between them in the form of research hypotheses.

2.1 Organizational Climate for Knowledge Management

Nonaka and Takeuchi (1995) emphasized the importance of organizational cultural background by arguing that tacit knowledge is deeply rooted in an individual's actions and experiences as well as in the ideas, values, schemata, and mental models. O'Dell and Grayson (1998) also argued that learning and sharing knowledge are continuous social activities and identified cultural support of knowledge management as one of the four enablers for internal

benchmarking and best practice transfer.

Figure 1: Research model
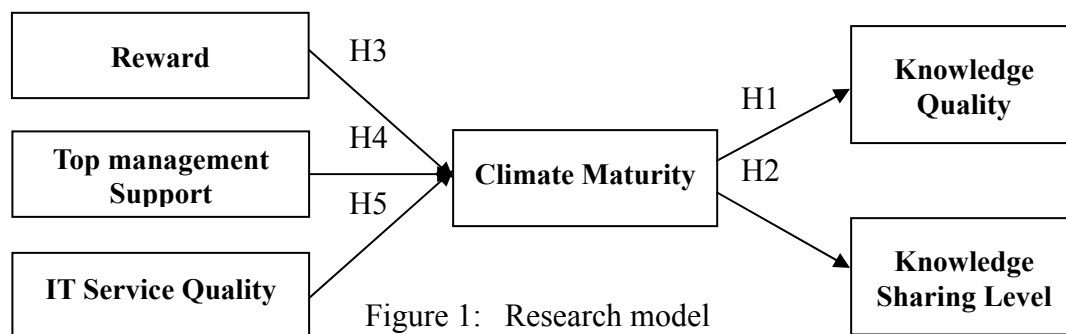
Despite the importance of organizational culture in knowledge management, changing an organizational culture is a challenge for most knowledge management teams (Ruggles, 1998, O'Dell and Grayson, 1998). Ruggles (1998) found out, from his survey study of 431 US and European firms, that organizational culture is one of the biggest impediments to enterprise-wide knowledge sharing. Moreover, creation of an organizational culture usually takes a long time and is context or climate-dependent (Schein, 1985). Since most organizations are still at too early stage of knowledge management implementation to form a culture (Ruggles, 1998), this study proposes climate maturity for knowledge management as an emotional and behavioral determinant of knowledge management performance.

We expect that, if a supportive organizational climate for knowledge management does not exist, there will be no motivation for organizational members to engage themselves into unfamiliar social activities. Consequently, quality knowledge may not be actively generated and shared. Therefore, the following two hypotheses will be tested in this study.

> *H1: The climate maturity for knowledge management will have a positive effect on the quality of knowledge.*

> *H2: The climate maturity for knowledge management will have a positive effect on the level of knowledge sharing.*

In the knowledge management and learning organization literature, representative characteristics of organizational climate have been learning orientation, trust, active communication, openness, voluntary participation and leadership (Liebowitz, 1999; Davenport and Prusak, 1998; O'Dell and Grayson, 1998). Schein (1985) suggested that culture could be assessed at three levels: artifacts and creations such as technology and behavioral patterns; values; and basic assumptions about human nature, activity and relationship. Based on his suggestion, this study operationalized climate maturity for knowledge management in terms of learning orientation in behaviors, trust among organizational members, and employees' commitment for knowledge management.

The learning orientation of organizational activities is a behavioral characteristic of learning

organizations (Garvin, 1993; Von Krogh, 1998). Garvin (1993) argued that the common activities of innovative and learning organization are systematic problem solving, experimentation, learning from past experience, learning from others, and transferring knowledge. The behavioral patterns of learning orientation naturally increase the level of knowledge creation and sharing activities. Since knowledge is generally created from individual experiences and shared through social interactions such as communications and collaborations (Kogut and Zander, 1992; Nonaka and Takeuchi, 1995), its creation and sharing are directly related with the behavioral patterns of learning orientation. As the behavioral patterns become mature, the quality of created knowledge will also become higher. Accordingly, in order for knowledge management strategies to be successful in an organization, a continuous learning orientation of an organizational climate needs to be built.

Trust is one of the most frequently mentioned factors known to affect knowledge creation and sharing (Botsik, 1999; Heumer, et al., 1998; Szulanski, 1996; Von Krogh, 1998). Heumer et al. (1998) argue that trust facilitates learning between partners, and that decisions to exchange knowledge under certain conditions are based on trust. Accordingly, trust and knowledge sharing mutually reinforce each other. Szulanski (1996) also empirically found out that the lack of trusting relationships among employees is one of the key barriers against best practice transfer within an organization.

Since knowledge is inherently created and resides in individuals, employees' commitment is important for the success of a knowledge management initiative (Nonaka and Takeuchi, 1995; Wiig, 1997). Knowledge management, by nature, is a social activity (Mann, et al., 1991; Schein, 1996), requiring active participation from organizational members. Accordingly, in the state of high commitment, employees at all levels of an organization are more likely to share critical knowledge so that they can influence and be rewarded for organizational performance.

2.2 Knowledge Sharing and Quality

A knowledge management initiative typically starts with identifying internal or external knowledge and collecting it for sharing and utilization among the organizational members (O'Dell and Grayson, 1998). A majority of the current knowledge management initiatives in organizations are focused on creating an enterprise-wide knowledge management system and applying diverse managerial drivers for enterprise-wide knowledge sharing and utilization (Ruggles, 1998). These initiatives are based on the assumption that knowledge sharing and utilization can induce new knowledge creation through individual interactions among organizational members, finally leading organizations to innovation opportunities (Kogut and Zander, 1992; Nonaka and Takeuchi, 1995). Therefore, the primary management focus of the knowledge management initiatives to date seems to have been on the acquisition of organizational knowledge from internal or external sources, and sharing of this knowledge

among the organizational members.

At the same time, quality of the acquired and/or shared knowledge is also a critical factor for successful knowledge management. The ultimate goal of knowledge management should be to help organizations to become more competitive through introducing innovative products and services or optimizing organizational processes in terms of speed, quality and costs. If quality of such knowledge is in doubt, impact of actively sharing them will only result in marginal improvement. Neither the combination of incorrect knowledge (Kogut and Zander, 1992) nor the absorption (Cohen and Levinthal, 1990) of incorrect knowledge will lead to strategic innovations.

2.3 Managerial Drivers for Building Knowledge Management Climate

2.3.1 Reward

Organizations usually use reward to motivate and drive employees' performance. Reward can be monetary or non-monetary as in the cases of promotion opportunity, education opportunity, and reputation. Organizational reward typically results from performance measurement so that organizations can improve employee motivation.

Marshall and his colleagues (1996) argue that using a knowledge-based qualitative compensation scheme enables back and front office expertise to be better aligned. Hence, they maintain that reward and incentives signal what behaviors and outcomes are most valued by the management. Tampoe (1993) empirically showed that there is a significant relationship between reward and knowledge worker's performance. Liebowitz (1999) also emphasizes the importance of applying reward systems for successful knowledge management, categorizing rewards into challenges, personal recognition, freedom of activity, and financial benefits. Therefore, we expect that the level of financial and non-financial reward offered by organizations will have a positive effect on knowledge quality and sharing:

H3: The level of reward will have a positive effect on climate maturity for knowledge management.

2.3.2 Top Management Support

Top managers usually exert influence over the members of an organization through its shared perspective of environmental events and organizational. That is, actions of the top management have major impact on the organization's culture and employees' behaviors (Schein, 1985). Through what they say and how they behave, senior executives establish norms that filter down through the organization as to whether risk taking is desirable; how much freedom managers should give their subordinates; what is appropriate dress; what actions will pay off in terms of pay raises, promotions, and other reward; and the like.

Beckman (1998) verified the importance of executive leadership and commitment for

successful knowledge management from his multiple reviews of knowledge management projects. Klein (1998) also emphasizes the role of the visible top management support for organizational culture for knowledge management. O'Dell and Grayson (1998) emphasized the roles of senior leadership as a critical success factor of internal benchmarking and transfer for group innovation. Ruggles (1998) identified the top management's failure to signal the importance of knowledge as one of the biggest impediments to knowledge transfer in his survey of 431 US and European firms. Therefore, we expect that top management support will be positively related to climate maturity for knowledge management:

H4: The level of top management support will have a positive effect on climate maturity for knowledge management.

2.3.3 IT service quality

Mann and his colleagues (1991) emphasized the role of IT in the EPRINET case where people were forming "intellectual neighborhoods" by means of tailored distribution lists and bulletin boards to exchange each other's knowledge. Gill (1995) also emphasized the use of IT to support organizational learning because IT can support the amount and richness of the bi-directional information flow, multi-communication channels, and performing tasks that cannot be performed manually. Finally, Marshall et al. (1996) explained that IT has roles in transferring knowledge, increasing accessibility to existing knowledge, representation of knowledge, embedding knowledge into controls and processes, testing organizational knowledge, and generating new knowledge. In various parts of the world, numerous organizations are currently developing knowledge management systems or already using them (Davenport and Prusak, 1998; Ruggles, 1998).

However, if the quality of IT service provided by the knowledge management systems does not meet the users' needs, IT will turn into a major impediment to facilitating enterprise-wide knowledge activities. There are key quality dimensions of IT service (Bailey and Pearson, 1983; Delone and McLean, 1992), which can be applicable to the typical knowledge management system. Stein (1995) emphasized the speed of an information system in their argument that organizational learning evolves to a higher level only when knowledge management radically improves and effectively exploits organizational memory with the aid of IT. Huber (1990) argued that the use of IT leads to accessibility of information and finally, to improvements in effectiveness of intelligence development and decision-making. Therefore, we posit that a high quality service of knowledge management systems will be crucial for building a supportive climate for knowledge management:

H5: The quality of IT service will have a positive effect on climate maturity for knowledge management.

3. Research Method

3.1 Sample and Data Collection

The unit of analysis in this study is the organization that is implementing or already implemented enterprise-wide knowledge management initiatives. We distributed questionnaires to firms and government institutions that are in the process of implementing knowledge management initiatives. A total of 920 surveys were mailed to 92 organizations, which were identified through relevant conferences and news media coverage, with 10 questionnaires assigned to each organization. The data for analysis was collected from 356 (38.6 percent) survey participants of the 42 (45.7 percent) organizations.

Table 1 shows the respondent characteristics in terms of industry type, number of employees, and time period of knowledge management implementation. The distribution of industry types indicates that a large portion of the respondent organizations is from the manufacturing sector. All respondent organizations had less than 3 years of knowledge management implementation history, with about half of them having less than 6 months of implementation.

Table 1. Profiles of the respondent organizations

Industry types	Freq.	Percent	Number of Employees	Freq.	Percent	Period of KM implementation	Freq.	Percent
Manufacturing	13	31.0	Less than 100	10	10	Less than 6 months	19	45.2
Banking/ Insurance	6	14.3	100 – 200	5	5			
Construction	5	11.8	200 – 500	7	7	6 - 12 months	9	21.5
Distribution	2	4.8	500 - 1,000	5	5	12 - 24 months	8	19.0
Communication	4	9.5	1,000 - 3,000	8	8	24 - 36 months	6	14.3
Research	6	14.3	3,000 - 5,000	2	2	More than 36 months	0	0
Others	6	14.3	5,000 - 10,000	3	3			
Unanswered	0	0	10,000 and above	2	2	Unanswered	0	0
Total	42	100	Total	42	100	Total	42	100

3.2 Instrument Development

The design of the questionnaire, implementation, and conduct of the survey followed the Dillman's Total Design Method (TDM) approach (Dillman, 1978). Format and content of the questionnaire were initially developed from the literature reviews, and reviewed by the practitioners and academics familiar with knowledge management issues. The questionnaire consisted of multiple items for each construct. Each item was measured based on a 7-point Likert scale from 'strongly agree' to 'strongly disagree'. Respondents were invited to report on the knowledge sharing activities and quality of knowledge within their knowledge sharing systems.

Knowledge sharing level was intended to measure the level of activities for sharing individual knowledge with other organizational members. Though knowledge sharing can take place through physical documents, face-to-face communications, education or training, for internal control purpose, this study limits the scope of knowledge sharing to activities of registering individual knowledge into the organizational knowledge sharing system and

utilizing the registered knowledge. Accordingly, knowledge sharing level was measured by the degree of registering or uploading (4 items) individual knowledge into the knowledge sharing system, and its utilization for regular and irregular works (3 items). The measurements of knowledge quality were adapted from the results of the MIT's TDQM research (Wang and Strong, 1996). Among the information quality dimensions developed by Wang and Strong (1996), relevancy (4 items), completeness (4 items), accuracy (4 items), and reliability (4 items) were used in this study to measure the quality of knowledge in the knowledge sharing system.

Wherever possible, for the measurement validity, this study adopted the well-established standard research instruments with minor changes in wording. Most of the independent and mediating variables were operationalized based on the related existing literature: organization theory, learning organization, information systems and knowledge management. The level of reward (4 items) was operationalized by the level of organizational support in four types: monetary reward, promotion opportunity, education opportunity, and honorary reward. Top management support (4 items) was measured by presentation of a clear vision of knowledge management, understanding of knowledge management, frequency of mentoring on the importance of knowledge management by top managers, and the level of manager-presence in knowledge management activities as emphasized by Tobin (1997). The level of IT service quality was adapted from the information system literature (Delone and McLean, 1992). Since a knowledge sharing system is just a category of information systems used in an organization, the measurement reflects the same service quality dimensions such as level of availability, accessibility, speed, ease of use, and stability provided by a knowledge sharing system.

The climate maturity for knowledge management was measured by aggregating the three measures: learning orientation, trust, and employees' commitment. Learning orientation was measured by the degree of active scanning to find internal and external information, experimentalism to try new approaches, learning intention of organization members, and a systematic approach in problem solving by organizational members (4 items). Trust (3 items) among organizational members was measured by the beliefs and willingness in truthfulness, reliability, and consideration among organizational members. Employees' commitment (4 items) was measured by the degree of employees' interest, recognition, participation, and willingness of sacrifice for knowledge management.

3.3 Reliability and Validity of the Instrument

To test the internal consistency of the instrument, the Cronbach's alpha values of the variables were computed. They ranged from 0.78 to 0.97 as shown in table 2. Examination of this table indicates that the internal consistency of the variables were acceptable, with all scales attaining the Crnbach's alpha level of 0.70 or higher. Additionally, convergent validity was tested by computing the correlation of each item with item-total. Discriminant validity

was tested with the value of factor loading on a single factor. All values of both validities scored higher than 0.7, which enables further analysis. Since each variable was measured by the multi-item constructs, a principal component factor analysis with a varimax rotation was conducted to check the uni-dimensionality of the items. All items were loaded on 8 factors, each with higher than 0.55 factor loading values. Together, the eight observed factors accounted for 76.5 % of the total variance.

Table 2. Reliability and validity of instruments

Variables (Items)	Mean	S.D	Alpha	Correlation of each item with item-total	Factor loading on single factor
Level of reward (4)	3.082	1.326	0.873	0.741, 0.812, 0.705, 0.657	0.865, 0.905, 0.835, 0.799
Top management support (4)	5.098	1.431	0.924	0.851, 0.750, 0.856, 0.845	0.920, 0.852, 0.924, 0.916
Level of IT support (5)	3.974	1.401	0.908	0.789, 0.663, 0.835, 0.814, 0.758	0.869, 0.771, 0.902, 0.892, 0.852
KM Climate (3)	**4.482**	**1.000**	**0.775**	**0.669, 0.615, 0.551**	**0.869, 0.836, 0.787**
Learning orientation(4)	4.435	1.224	0.870	0.714, 0.755, 0.752, 0.677	0.842, 0.872, 0.868, 0.816
Level of trust (3)	4.627	1.146	0.906	0.810, 0.839, 0.790	0.917, 0.931, 0.905
Employee commitment (4)	4.362	1.239	0.910	0.804, 0.846, 0.728, 0.803	0.893, 0.919, 0.842, 0.893
Quality of knowledge (16)	4.281	1.094	0.967	0.769, 0.823, 0.777, 0.826, 0.839, 0.837, 0.823, 0.828, 0.778, 0.786, 0.750, 0.744, 0.797, 0.777, 0.811, 0.682	0.799, 0.847, 0.805, 0.848, 0.865, 0.864, 0.850, 0.854, 0.803, 0.810, 0.778, 0.774, 0.825, 0.808, 0.839, 0.719
Level of knowledge sharing (7)	3.846	1.229	0.951	0.823, 0.825, 0.859, 0.843, 0.826, 0.827, 0.838	0.869, 0.871, 0.897, 0.886, 0.876, 0.877, 0.887

While the unit of analysis in this study is the organization, the questionnaire was distributed to organizational members to measure facts or characteristics of their organizations. Accordingly, answers from the same organization were aggregated and used as an organizational indicator. Given the perceptual nature of the measures, especially for organizational climate factors, and the conversion of individual responses into organizational indicators, inter-rater reliability was checked. The agreement level of all respondents from the same organization was calculated based on the James' recommendation (James, 1982). The inter-rater agreements were assessed with both single-measure and average-measure as shown in table 3. The single-measure intraclass correlations of each variable were from 0.467 (level of reward) to 0.681 (level of trust). The range of average-measure intraclass correlations was from 0.704 (learning orientation) to 0.924 (level of trust), indicating that all variables were usable for further analysis. Additionally, the averaged agreement levels of all variables for each organization also ranged from 0.338 to 0.838 for single-measures, and from 0.679 to 0.964 for average-measures, indicating that all organizations show acceptable agreement levels and support the aggregation.

Table 3. Pearson Correlations of all variables

Variables	Average agreement on single measure	Average agreement on average measure	1	2	3	4	5
1. Reward	0.467	0.708	1.0				

2. Top Mgt. Support	0.514	0.748	0.540**	1.0			
3. IT Service Quality	0.558	0.818	0.314*	0.144	1.0		
4. Climate Maturity	-	-	0.649**	0.520**	0.659**	1.0	
5. Knowledge Quality	0.522	0.909	0.534**	0.123	0.608**	0.667**	1.0
6. Knowledge Sharing Level	0.675	0.924	0.625**	0.182	0.629**	0.697**	0.776**

* $p < 0.05$, ** $p < 0.01$

The correlations among all variables are shown in table 3. While there were significant correlations between reward and the other two management driver variables (top management support and IT service quality), since they are not linked to the final dependent measures directly in the hypothesis, predictive validity of the research model is not likely to be interfered by such correlations.

4. Testing Results

The hypotheses of this study were tested in two phases. In the first phase, this study tested a base model of relationships among managerial drivers, climate maturity and knowledge management performance. In the second phase, the mediating effect of climate maturity on both dependent variables was examined. The test was conducted, following the four criteria recommended by Baron and Kenny (1985).

4.1 Testing of the Base Model

Hypothesis 1 and 2 predict that the climate maturity for knowledge management has a positive effect on knowledge quality and knowledge sharing level, respectively. Table 4 presents the results of the multiple regression analysis to test the relationships between mediating variables and dependent variables. The first two models were simple regressions of climate maturity on knowledge quality (R^2=0.444, F=32.000) and its sharing level (R^2=0.486, F=37.883). The regression results show that the level of climate maturity for knowledge management has a significant effect on knowledge quality (β= 0.667, $p < 0.01$) and knowledge sharing level (β= 0.697, $p < 0.01$), supporting both H1 and H2.

Equation 3 is to test the relationships between managerial drivers and climate maturity for hypothesis 3, 4, and 5 (adjusted R^2=0.675, F=29.343). From the results, it was found that all managerial drivers are related with organizational climate maturity for knowledge management, indicating the support of H3, H4, and H5. Especially, IT service quality (β= 0.513, $p < 0.01$) was found to be more crucial than reward (β= 0.349, $p < 0.01$) or top management support (β= 0.258, $p < 0.05$).

Table 4. Results of multiple regressions for the base model

Equation	R^2	Adjusted R^2	F-value	Beta	Hypothesis Result
1. Knowledge Quality = Climate Maturity + ε	0.444	0.431	32.000**		

Equation	R^2	Adjusted R^2	F-value	Beta	Hypothesis Result
Climate Maturity (H1)				0.667**	Supported
2. Knowledge Sharing =CM + ε	0.486	0.474	37.883**		
Climate Maturity (H2)				0.697**	Supported
3. Climate Maturity = Reward + Top_support + IT_service + ε	0.698	0.675	29.343**		
Reward (H3)				0.349**	Supported
Top management support (H4)				0.258*	Supported
IT service quality (H5)				0.513**	Supported

* $p < 0.05$, ** $p < 0.01$

4.2 Testing the Mediating Effects of Climate Maturity

To test a mediating model, four criteria should be assessed (Baron and Kenny, 1986). First, the independent variable should be significantly correlated to the mediating variable. Second, the independent variable should influence the dependent variable in a regression of the independent variable on the dependent variable. Third, the mediating variable should affect the dependent variable in a regression of both the independent variable and the mediating variable on the dependent variable. Last, the effect of the mediating variable on the dependent variable in such regression should be higher than the effect of the independent variable.

Table 5. Results of multiple regressions of managerial drivers on KM performance

Equation	R^2	Adjusted R^2	F-value	Beta	Hypothesis Result
Knowledge Quality = Reward + Top_inv. + IT_service + ε	0.534	0.497	14.504**		
Reward				0.499**	Supported
Top management support				-0.216	Not supported
IT_service				0.483**	Supported
Knowledge Sharing = Reward + Top_inv. + IT_service + ε	0.627	0.598	21.326**		
Reward				0.585**	Supported
Top management support				-0.202	Not supported
IT_service				0.475**	Supported

* $p < 0.05$, ** $p < 0.01$

The first condition seemed satisfied, judging from the Pearson's correlation values in table 3. All managerial drivers were significantly correlated with the mediating variable, climate maturity. In a regression of managerial drivers on knowledge quality and knowledge sharing level for a test of the second condition, only reward and IT service quality were significant (β= 0.499, 0.483, $p < 0.01$, respectively). Accordingly, for top management support, it was difficult to conclude that the climate maturity has a mediating effect. So, we dropped top management support from further mediating effect test.

For the third condition, regressions of both the independent variables and climate maturity on knowledge quality and sharing were tested as shown in table 6. The results show that all models provide strong evidence of the mediating effects of climate maturity. That is, the climate maturity significantly reduces the degree of relationship strength between

independent variables (reward and IT service quality) and dependent variables (knowledge quality and knowledge sharing level). The most noticeable finding was that the mediating effects of climate maturity were higher for IT service quality than for reward on both dependent variables.

Table 6. Mediating effects of climate maturity

Dependent variable	Independent Variable	Without climate maturity	With climate maturity	R^2 Differences	Beta Differences
Knowledge Quality	**Reward** Adjusted R^2 F Value β for reward (p-Value) β for climate maturity (p-Value)	0.267 15.968(0.000) 0.534(0.000) -	0.435 16.761(0.000) 0.175(0.036) 0.553(0.001)	0.168	-0.359
	IT service Adjusted R^2 F Value (p-Value) β for IT service(p-Value) β for climate maturity (p-Value)	0.354 23.506(0.000) 0.608(0.01) -	0.469 19.109(0.000) 0.299(0.055) 0.470(0.004)	0.115	-0.309
Knowledge Sharing	**Reward** Adjusted R^2 F Value (p-Value) β for reward (p-Value) β for climate maturity (p-Value)	0.375 25.618(0.000) 0.625(0.000) -	0.514 22.675(0.000) 0.298(0.044) 0.504(0.001)	0.139	-0.327
	IT service Adjusted R^2 F Value (p-Value) β for IT service(p-Value) β for climate maturity (p-Value)	0.381 26.213(0.000) 0.629(0.000) -	0.513 22.636(0.000) 0.300(0.045) 0.500(0.001)	0.132	-0.329

5. Findings and Discussion

Assuming that knowledge quality and level of knowledge sharing are the critical indicators of successful knowledge management, we can infer several implications from the results of this study on how to understand and implement the enterprise-wide knowledge management initiatives.

First, the organizational climate maturity for knowledge management was found to be significant in assuring high quality of organizational knowledge and active knowledge sharing. The climate maturity variable explained 44.4% of the knowledge quality variance and 48.6% of the knowledge sharing variance. With beta coefficients of 0.667 for knowledge quality and 0.697 for knowledge sharing, the climate maturity construct seems to reflect an organizational knowledge-friendly (through learning orientation) and knowledge management ready (through trust and employee commitment) culture and have predictive validity over organizational knowledge quality and knowledge sharing level. Therefore, as suggested in the literature (Liebowitz, 1999; O'Dell and Grayson, 1998; Ruggles, 1998), we conclude from this study that successful knowledge management requires a mature

supportive organizational climate.

Second, we found that all managerial drivers - reward, top management support and IT service - significantly affect the organizational climate maturity for knowledge management as shown in table 4. Together, they explained 69.8% of the total climate maturity variance. This fact confirms the current organizational trends and Ruggle's findings (1998) that many organizations are initiating managerial efforts by building a knowledge management system, adapting a reward system to motivate employees, and showing strong top management support for knowledge management. It also reinforces O'Dell and Grayson's (1998) recommendation to address managerial issues such as information technologies, reward, and leadership to create an organizational environment for knowledge management. It is noteworthy that, compared with reward (β=0.349) or top management support (β=0.258), IT service quality (β=0.513) turns out to be the more crucial management driver affecting the climate maturity for knowledge management. This fining leads us to believe that, while IT alone may not guarantee the success of an organizational knowledge management initiatives, it, nonetheless, serves the role of a critical and necessary tool for knowledge management so that every organizational member can access and share core organizational knowledge any time, form any place, in a secure and user-friendly way.

Lastly, it was found that the direct effects of reward and IT service quality on knowledge quality and sharing are significantly weaker than their indirect effects on knowledge quality and sharing through the climate maturity for knowledge management construct. The results imply that a mature organizational climate for knowledge management is a facilitator for maximizing the effects of various managerial drivers to implement successful knowledge management. Therefore, we argue that organizations should focus their management efforts on building a knowledge-friendly climate, rather than expecting a quick return from a knowledge management initiative, based on aggressive reward schemes or sophisticated knowledge management systems.

6. Summary & Conclusion

This study was the first effort to empirically verify the relationships among managerial drivers (reward, top management support, and IT service), climate maturity, and knowledge management performance (knowledge quality and sharing) at the organization level. With the surveyed data of 356 respondents from 42 organizations, we found that climate maturity for knowledge management significantly impacts organizational knowledge quality and knowledge sharing level, and that it mediates the relationship between two of the three proposed managerial drivers and knowledge management performance. Additionally, we learned that the currently dominant knowledge management initiatives such as developing a knowledge management system, adapting reward systems, or top management support significantly effect the building of a supportive organizational climate for knowledge

management, which finally leads to high quality organizational knowledge and active knowledge sharing.

This study had several limitations. First, while the respondent organizations represent multiple industries, the relatively small sample size (42 organizations) limits the generalization of the findings. Secondly, the sample data was collected from organizations mostly at an early stage of knowledge management implementation (less than 3 years). Consequently, the findings of this study may not be generalizable to organizations with more than 3 years of knowledge management experience. Third, while the three management drivers and the two dependent measure variables had high measurement validity (Cronbach's alpha values higher than 0.87), the key construct of the study, climate maturity for knowledge management, had a Cronbach's alpha value of 0.775, leaving room for further instrument refinement. Lastly, despite of the natural lead time between implementation of management drivers and realization of knowledge management performance, this study only analyzed the cross-sectional view of the respondent organization's knowledge management environment, thus limiting the interpretation of its findings to correlational, rather than causal, link between independent and dependent variables.

These limitations suggest the directions for the future research to address the similar theme. First, a larger and more heterogeneous set of organizations needs to be analyzed. Second, deeper and more theoretical understanding of the climate maturity construct is necessary, along with enhancing its measurement validity. This includes the breakdown of the climate maturity construct into more cohesive sub-constructs and analyzes the hypotheses at the level of such sub-constructs. Third, as more organizations move into more advanced stages of knowledge management, it might be desirable to conduct a longitudinal study on their migration from earlier stages and identify the critical success factors for successful knowledge management evolution over time.

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Appendix: Questionnaire of the survey

Respondents were invited to focus on knowledge sharing and quality within their knowledge management system. In addition to general information about respondents and their organizations, following items were asked with a 7-point Likert scale.

The detail questions are not included here because of the page limit. Please contact authors