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How organizational climate and structure affect knowledge management—The social interaction perspective

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Abstract

The main purpose of this study is to examine the effects of organizational climate and structure on knowledge management from the social interaction perspective. Regression analysis was used to test the hypotheses in a sample of 146 cases. The findings suggest that innovative and cooperative climate is positively related to social interaction; that when the organizational structure is less formalized, more decentralized and integrated, social interaction is more favorable; and that social interaction is positively related to knowledge management. These empirical evidences support the process-oriented view and indicate that social interaction plays the mediating role between organizational climate, organizational structure, and knowledge management.

Keywords: Knowledge management; Social interaction; Organizational climate; Organizational structure

1. Introduction

In today's increasingly turbulent and competitive environment, knowledge is widely recognized as the main source of competitive advantage of firms (Chen, 2004; Matusik & Hill, 1998; Spender & Grant, 1996). Successful firms are those that can consistently manage and integrate knowledge assets into operational activities to fulfill their objectives and achieve superior performance (Droge, Claycomb, & Germain, 2003; Teece, 1998). Knowledge management encompasses the spectrum of management concerns from knowledge creation or codification to knowledge diffusion and exploitation (Chen & Lin, 2004; Wong, 2000). Some earlier literatures attempted to focus primarily on the knowledge creation or codification processes in organizations (e.g., Nonaka, 1991, 1994; Spender, 1989). However, knowledge creation and codification do not necessarily lead to performance improvement or value creation (Alavi & Leidner, 2001). Value is created only when knowledge is shared throughout an organization and applied where it is needed (Grant, 1996; Spender, 1996; Teece, 2000). Therefore, firms' competitive advantages depend not only on knowledge creation but more importantly on knowledge diffusion and application (Droge et al., 2003; Grant, 1996; Spender, 1996;

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Teece, 2000). Although the importance of the diffusion and application phase of knowledge management in organizations is recognized, it is still least theoretically attended (Claycomb, Droge, & Germain, 2002). Therefore, we drew on the social interaction perspective to focus primarily on the diffusion and application phase of knowledge management.

In the present study, we sought to answer the research questions that focus on the role of social interaction between two theoretically plausible variables and the knowledge management. First, does social interaction intervene between organizational climate and knowledge management in an important way? Organizational climate is shared value, beliefs, and work atmospheres that could have significant impacts on the behaviors of employees (Long, 2000; Schneider, 1990). Organizational climate has been mentioned for its possible role in organizational learning (Alavi & Leidner, 2001; Gold, Malhotra, & Segars, 2001) because it may provide supports and incentives to promote interpersonal contact and communication (Hoegl, Parboteeah, & Munson, 2003; Jaw & Liu, 2003). Owing to its nature of stickiness and tacitness, knowledge is difficult to spread among members within an organization (Szulanski, 1996; Teece, 2000; Tsai, 2002). Some prior studies have highlighted the importance of social interaction among organizational units in dealing with knowledge exchange (e.g. Tsai & Ghoshal, 1998; Tsai, 2002). They suggested that organizational units can leverage valuable resources and knowledge through interacting with one another (Hansen, 1999; Ibarra, 1993; Kogut & Zander, 1992; Tsai, 2002). However, little empirical work has been done specifically in examining the role of the interpersonal interaction behavior in intra-firm knowledge management. In this study, we adopted the process-oriented view to investigate the mediating effect of social interaction on the relationship between organizational climate and knowledge management.

Secondly, we attempted to examine how social interaction affects the relationship between organizational structure and knowledge management. The characteristics of the organizational structure have been recognized as critical elements in influencing the productivity and innovation in companies (Drucker, 1999; Germain, 1996) and in providing the relationships of task and authority that predetermine the way people work (Hunter, 2002). Firms can implement, execute, and coordinate different organizational activities through the structural mechanism of workflow (Ouchi, 1979; Robbins & Decenzo, 2001). In the knowledge management literature, little has been done in investigating the role of organizational structure in the process or outcome of the knowledge management. This deficiency is serious because organizational structuring of the workflow is the primary mechanism available to the firm for implementing, executing, and controlling knowledge management activities. Therefore, in this study we attempted to examine whether organizational structure will directly affect the knowledge management or it will play the indirect role in affecting sharing and application of knowledge through the intermediate variable such as social interaction.

Accordingly, the main purpose of this study is to examine the mediating effects of social interaction between organizational climate, organizational structure, and knowledge management. The rest of the paper is set out as follows. Section 2 considers the previous literature and sets out the hypotheses of this study. Section 3 deals with the methodology for the study. Section 4 presents the results of the empirical study in achieving the goals as those set out above. Discussion and conclusions are provided in Section 5.

2. Background

2.1. Organizational climate

Organizational climate refers to common practices, shared beliefs, and value systems that an organization follows (Janz, Wehterbe, Colquitt, & Noe, 1997; Schneider, 1990). For the individual members within the organization, climate takes the form of a set of attributes and expectancies that describe the overall pattern of organizational activities (Jaw & Liu, 2003). Organizational climate plays an essential role in shaping employees' behaviors and influencing their perception of knowledge management (Chen & Lin, 2004; Long, 2000; Sveiby & Simons, 2002). One of the keys to remain competitive advantage for organizations is to foster the continuously innovative atmosphere to set in motion in its internal processes, procedures, and capabilities (Merrifield, 2000). Firms can encourage employees to think freely, to communicate their opinions and ideas openly, and to explore non-routine alternatives through formulating an innovative climate (Edmondson, 1999; Jaw & Liu, 2003; Norrgren & Schaller, 1999). Under an innovative climate, when team members encounter

certain project dilemmas, they may participate aggressively in their work teams and interact with each other to find out appropriate solutions (Hoegl et al., 2003). When firms possess a higher level of innovative climate, employees are more inclined to increasing interaction to exchange and share knowledge for creative thoughts (Edmondson, 1999; Norrgren & Schaller, 1999). Accordingly, an innovative climate will increase the social interaction among organizational members.

When insightful and innovative ideas occur to individuals, cooperation between individuals typically plays a critical role in developing these ideas (Jaw & Liu, 2003; Sveiby & Simons, 2002). Effective collaboration in the use of information is one of principal source of competitive advantage (Gibson, 2001; Spender & Grant, 1996). New organizational knowledge initially generated by the individual is developed through the communities of interaction (Floyd & Lane, 2000). When cooperative climate exists in companies, members of a group are more inclined to working together to share and develop tacit knowledge and try to promote each other's performance and learning (Janz & Prasarnphanich, 2003). In other words, firms can enhance individuals' willingness to interact with others by nurturing a cooperative climate. When employees perceive a higher degree of cooperative atmosphere inside the organization, they will be more likely to build up the interactive relationships with other members.

Accordingly, social interaction among individuals would be influenced by the organizational climate (Jaw & Liu, 2003). If the organization possesses a strong innovative and cooperative climate, employees would receive a clear signal that it is acceptable or desirable for them to build up interaction networks to share and gather knowledge. Conversely, if the innovative and cooperative climate is relatively weak or inexistent, employees would perceive a lower need to interact with colleagues. As a result, we can reasonably expect that an innovative and cooperative climate would provide a vital atmosphere for strengthening social interaction among organizational members. Thus, the following hypothesis is proposed.

Hypothesis 1. The degree of innovative and cooperative climate is positively related to social interaction.

2.2. *Organizational structure*

Besides organizational climate, organizational structure is also likely to affect the social interaction among organizational members. Organizational structure is usually categorized into three elements including formalization, centralization, and integration (Andrews & Kacmar, 2001; Germain, 1996; Robbins & Decenzo, 2001; Sciulli, 1998). Formalization refers to the degree to which jobs within the organization are standardized and the extent to which employee behavior is guided by rules and procedures (Andrews & Kacmar, 2001; Robbins & Decenzo, 2001). In organizations with high formalization, there are explicit rules and procedures which are likely to impede the spontaneity and flexibility needed for internal innovation (Bidault & Cummings, 1994). Standardization would eliminate the possibility that members engage in alternative behaviors and remove the willingness for members to discussions on considering alternatives (Robbins & Decenzo, 2001). As tasks are preprogrammed by the organization, there is less need for organizational members to discuss how work is done. Conversely, in organizations with low formalization, job behaviors are relatively unstructured and members have greater freedom in dealing with the demands of their relevant tasks (Sivadas & Dwyer, 2000). In this case, social interactions among organizational members are more frequent and intensive for implementing the tasks. Therefore, the less formalized work process is likely to stimulate the social interactions among organizational members.

Centralization refers to the locus of decision-making authority lying in the higher levels of a hierarchical relationship (Robbins & Decenzo, 2001; Tsai, 2002). Centralization creates a non-participatory environment that reduces communication, commitment, and involvement with tasks and projects among participants (Damanpour, 1991; Sivadas & Dwyer, 2000). However, under the increasingly dynamic and competitive pressure, knowledge workers who have wider skills, expertise, and work responsibilities would need greater autonomy and self-regulation. If individuals have freedom, independence, and discretion to determine what actions are required and how best to execute them (Janz et al., 1997), they will accept the resulting decision because they have the opportunity to provide inputs and further communicate their ideas during the decision-making process (Yap, Foo, Wong, & Singh, 1998). The more autonomy organizational members possess, the more responsibility they will feel for the work role and context (Janz et al., 1997; Spreitzer, 1995).

Furthermore, it is believed that employees can be capable of self-organizing social interaction networks to solve new or existing problems if they are allowed to do so (Gold et al., 2001; Janz & Prasarnphanich, 2003). Thus, interpersonal exchange and social interaction would increase in decentralized organizations.

Integration refers to the extent to which various subdivisions of an organization work interrelatedly (Germain, 1996; Sciulli, 1998). Employees in the organization should be able to have access to the broadest variety of knowledge for work and problem solving. Integrative work structure provides opportunities for employees to learn from their colleagues. By working together, sharing information, and watching out for one another, individuals could build communication and coordination channels to exchange relevant expertise and knowledge (Janz & Prasarnphanich, 2003). When firms possess a higher level of integrated mechanism, they are more inclined to increasing the social interaction within the organization.

Therefore, it is expected that when the organizational structure is less formalized, less centralized, and more integrated, social interaction among organizational members is more favorable. In light of the above reasoning, the following hypothesis is developed.

Hypothesis 2. The degree of formalization and centralization of organizational structure is negatively related to social interaction, while the degree of integration is positively related to social interaction.

2.3. Social interaction

Social interaction, in this study, refers to the extent to which organizational members interact with each other in terms of trust, communication, and coordination. Prior studies have recognized the importance of interpersonal social interaction for enabling knowledge management behavior among individuals (Bartol & Srivastava, 2002; Hoegl et al., 2003; Janz et al., 1997; Koskinen, Pihlanto, & Vanharanta, 2003; Nahapiet & Ghoshal, 1998). Koskinen et al. (2003) argued that in team and group work contexts, different team members have different professions and backgrounds, and they tend to seek relevant knowledge from trusty and capable colleagues. Bartol & Srivastava (2002) suggested that mutual understanding and trust among work members allow companies to relinquish information and integrate its distributed expertise more efficiently. Thus, trusting relationships improve willingness of individuals to exchange and absorb other's knowledge, thereby leading to greater knowledge sharing (Bouty, 2000; Levin & Cross, 2004; Tsai & Ghoshal, 1998).

In term of communication, Hoegl et al. (2003) suggested that when individuals have wider communication channels or rich communication interactions, the transferability of critical information and knowledge in intra-organizational settings may be facilitated, and individuals may relatively easily expend considerable resources to acquire, share, and utilize the needed knowledge. Nahapiet and Ghoshal (1998) indicated that while much knowledge may be written down or stored formally, other knowledge is stored informally through the collective memories of individuals. Hence, they proposed that organizational knowledge is created through combination and communication of individual learning among co-workers. In addition, coordination is the degree to which members feel their organizations well organized and integrated (Janz et al., 1997). Knowledge work is characterized by unpredictable, multidisciplinary, and non-repetitive tasks, and companies require coordinative effort to take advantage of multiple viewpoints (Tsai & Ghoshal, 1998). Coordinative behaviors blur the boundaries among organizational units, and stimulate the formation of common interests that, in turn, support the sharing and application of the needed knowledge within the organization (Janz et al., 1997; Tsai, 2002).

The previous discussion suggests that social interaction among organizational members, in terms of trust, communication, and coordination, would affect the sharing and utilization of tacit knowledge. Social relationship among organizational members is an important forum for the sharing of the individual's tacit knowledge and its subsequent application to the organizational context (Bartol & Srivastava, 2002; Levin & Cross, 2004; Singh, 2005). Because of the complexity of transforming individual tacit knowledge into a shared understanding of explicit knowledge, the development and growth of interaction networks would increase the likelihood that important information is passed on and remembered over time (Hoegl et al., 2003; Singh, 2005). Thus, the establishment of social interaction networks is necessary for organizational members to foster the knowledge variety required for the work (McGrath, 2001) and to timely integrate knowledge across organizational boundaries (Szulanski, 1996). Through interpersonal social interaction, diverse knowledge and

expertise of individuals from various functional areas can be assembled, integrated, and applied to the task at hand. Hence, we propose the following hypothesis.

Hypothesis 3. The degree of trust, communication and coordination of social interaction is positively related to knowledge management.

2.4. Mediating effect

Hypotheses 1 and 2 propose that organizational climate and organizational structure both affect the social interaction in task environment, and Hypothesis 3 suggests that social interaction is positively related to knowledge management. If the hypotheses are examined as a set, we specify a string of relationships from organizational climate and structure to social interaction and from social interaction to knowledge management. This means that the relationships between organizational constructs and knowledge management are hypothesized to be indirect, with no direct effects. Therefore, from the process-oriented point of view, social interaction plays the role of intermediate variable to mediate the relationships between independent variables of organizational climate and organizational structure and dependent variable of knowledge management. Accordingly, the following hypotheses are developed.

Hypothesis 4. Social interaction mediates the effect of organizational climate on knowledge management.

Hypothesis 5. Social interaction mediates the effect of organizational structure on knowledge management.

3. Research methods

3.1. Data collection and sample

The empirical study employed a questionnaire approach designed to collect data for testing the validity of the model and research hypotheses. Variables in the questionnaire included background information, organizational climate, organizational structure, social interaction, and knowledge management. All of the independent and dependent variables were based on a seven-point Likert-type scale ranging from ''strongly disagree'' to ''strongly agree''. The population in this study was the top 5000 Taiwanese firms listed in the China Credit Information Service Incorporation. A stratified random sampling method was used to select 150 firms in each of the five 1000 levels. A total of 750 questionnaires were mailed. Follow-up letters, e-mails and phone calls were done after 2 weeks. Of the 157 questionnaires returned, 11 responses were incomplete. The remaining 146 valid and complete questionnaires were used for the quantitative analysis. It represented a useable response rate of 19.47%. Table A1 presents the comparisons of some characteristics between respondent and non-respondents groups. The possibility of non-response bias was checked by comparing the characteristics of the respondents to those of the original population sample. The calculated t-statistics for the amount of capital ($t = -1.083$, $p = 0.279$), the annual sales ($t = 0.254$, $p = 0.800$), and the number of employees ($t = -1.419$, $p = 0.157$), and the χ^2-test for the industry affiliation of the company ($\chi^2 = 0.079$, $p = 0.779$) were all statistically insignificant, suggesting that there are no significant differences between the respondent and non-respondent groups.

3.2. Measures

Dependent variable: In this study, knowledge management construct was assessed with five items that reflected the extent to which firms were satisfied with the achievements in their knowledge management. We examined the dimensionality of our measures by conducting a principal components factor analysis with varimax rotation. As shown in Appendix Table A2, two factors emerge with eigenvalues greater than one and account for 86.10 percent of the variance. According to the previous studies (e.g. Lin & Lee, 2005; Gold et al., 2001), these two factors of knowledge management construct were named as knowledge sharing and knowledge application. They appropriately represent the knowledge management items, whereby primary loadings exceed 0.83 and cross-loadings are lower than 0.42. The Cronbach's α coefficients in parentheses,

computed to assess the internal consistency reliability of the measures, for the two factors are both above the suggested value of 0.70 (Hair, Anderson, Tatham, & Black, 1998). The knowledge sharing factor was measured with a three-item scale tapping how much the informants agreed with the following statements: (1) knowledge is shared between supervisors and subordinates, (2) knowledge is shared among colleagues, and (3) knowledge is shared across the units ($\alpha = 0.886$). Two indicators measuring knowledge application reflected whether the respondents agreed that the firm (1) effectively manages different sources and types of knowledge and (2) utilizes knowledge into practical use ($\alpha = 0.919$).

Independent variables: Organizational climate construct was assessed with five items reflecting the shared patterns of understanding and norms of behavior within the organization. Based on the work of Jaw and Liu (2003), we adapted two dimensions of organizational climate including innovative climate and cooperative climate. A principal components factor analysis with varimax rotation was done on the five items of the construct. The factor analysis supports two factors of organizational climate that have eigenvalues greater than 1 and explain 86.99 percent of the variance, as shown in Appendix Table A3. Each item loaded on its appropriate factor with primary loading exceeding 0.85 and cross-loading lower than 0.37. The Cronbach's α coefficients in parentheses for the two factors are both above the suggested value of 0.70 (Hair et al., 1998). Innovative climate was measured with a three-item scale by asking the informants to indicate the extent to which they agreed that: (1) the firm provides incentive environment to promote innovation, (2) the firm stimulates employees to be creative and innovative, (3) the firm is actively committed on doing innovations ($\alpha = 0.905$). Two indicators were used to measure cooperative climate: (1) the firm provides employees needed support and (2) employees in the firm have sense of security ($\alpha = 0.904$).

Organizational structure was based on eight items indicating the extent to which firms designed their organization to authorize decision-making power, to standardize the rules and procedures, and to integrate members and work. Drawing upon previous research (e.g., Germain, 1996; Andrews & Kacmar, 2001), we adapted three dimensions of organizational structure including formalization, centralization, and integration. The principal components factor analysis using varimax rotation settled on a three-factor solution, which explains 76.48 percent of the variance, as depicted in Appendix Table A4. Results indicated that the three factors are appropriately constructed: eigenvalues for the three factors are greater than 1, primary loadings are greater than 0.74, and cross-loadings are lower than 0.45. The Cronbach's α coefficients for the three factors in parentheses are above the threshold of 0.70 (Hair et al., 1998). The formalization factor was reflected by asking informants three questions: (1) the firm has a large number of explicit work rules and policies, (2) employees follow the clearly defined task procedures made by the firm, (3) the firm relies on strict supervision in controlling day-to-day operation ($\alpha = 0.791$). Three indicators were used to measure the centralization factor: (1) employees have autonomy to do their work, (2) employees participate in the decision-making process, (3) employees search for problem solutions from many channels ($\alpha = 0.726$). The integration factor was measured by two items: (1) the firm integrates vertically, (2) the firm integrates horizontally ($\alpha = 0.948$).

Social interaction construct was based on seven items, adapted from Sivadas and Dwyer (2000), to reflect the degree of interactions among organizational members. The items of social interaction were submitted to a principal components factor analysis with varimax rotation. As shown in Appendix Table A5, three factors emerge with eigenvalues greater than 1 and account for 84.50 percent of the variance. According to Sivadas and Dwyer (2000), these three factors of social interaction construct are trust, communication, and coordination. They appropriately represent the social interaction items, whereby primary loadings exceed 0.80 while cross-loadings are lower than 0.34. The Cronbach's α coefficients for the three factors in parentheses are above the threshold of 0.70 (Hair et al., 1998). The trust factor was reflected by three items indicating how much the informants agreed with the following statements: (1) employees have confidence on other organizational members on their abilities and skills to do the work, (2) employees have confidence on other organizational members on making decisions, and (3) employees have confidence on other organizational members to act in company's best interests ($\alpha = 0.894$). The communication factor was measured by two items: (1) employees communicate and discuss with other members frequently and (2) employees have willingness to communicate and discuss with other members in depth ($\alpha = 0.822$). Two items measuring coordination reflected whether the respondents agreed that: (1) the task assignments of the employees are well planed and (2) the work procedures and activities are well scheduled ($\alpha = 0.829$).

Control variables: Four control variables were included in the analysis. The first three control variables, including capital, annual sales, and number of employees, were used to measure the possible firm-size effects. The amount of capital and annual sales were measured in million NT dollars and the number of employees was calculated as the total number of employees in the firm. The fourth control variable is industry type. We created one dummy variable to indicate whether a company belonged to manufacturing or service industry (manufacturing industry = 1, service industry = 0).

4. Results

This study attempted to understand the relationships among organizational climate, organizational structure, social interaction, and knowledge management. Table 1 shows the means, standard deviations, and correlations of all variables. The values of variance inflation factors (VIFs) associated with each of the predictors are within a range from 1.33 to 3.47, with a mean of 2.28. The effects of multicollinearity are within acceptable limits, suggesting no need for concern with respect to multicollinearity (Hair et al., 1998).

Table 2 displays the results of the regression analyses of the effects of organizational climate and organizational structure on social interaction. Models 1a–1c in Table 2 are the base models that include the control variables. They indicate that this combination of variables does not have significant effects on the dependent variable ($F = 0.97$, $R^2 = 0.03$; $F = 2.18$, $R^2 = 0.06$; and $F = 0.50$, $R^2 = 0.01$). Models 2a–2c capture the effects of organizational climate on social interaction. These three models are significant at the $p < 0.001$ level ($R^2 = 0.59$, 0.39, and 0.48, respectively) and explain an additional 56.0, 33.0 and 47.0 percent of variance over what the control variables alone explain. Coefficients of innovative climate are positive and significant for trust ($p < 0.001$), communication ($p < 0.01$), and coordination ($p < 0.001$). Similarly, cooperative climate has positive and significant effects on trust ($p < 0.001$), communication ($p < 0.001$), and coordination ($p < 0.001$). These findings support Hypothesis 1 and indicate that firms would achieve a higher degree of social interaction among organizational members if they build up a more innovative and cooperative atmosphere to encourage their employees to do challenging work collectively.

Models 3a–3c show the relationships between organizational structure and social interaction. These three models are significant at the $p < 0.001$ level ($R^2 = 0.47$, 0.35 and 0.49, respectively) and explain an additional 44.0, 29.0 and 48.0 percent of variance over what the control variables alone explain. Coefficients of formalization are negative and significant for trust ($p < 0.01$) and coordination ($p < 0.001$). Centralization also has negative and significant effects on trust ($p < 0.001$), communication ($p < 0.05$) and coordination ($p < 0.01$). However, integration has positive and significant effects on trust, communication, and coordination

Table 1
Means, standard deviations, and correlations[a]

Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Capital	4.16	1.84													
2. Sales	5.12	1.93	0.73***												
3. Number of employees	2.82	1.92	0.76***	0.62***											
4. Industry type[b]	0.62	0.48	−0.02	0.01	−0.19*										
5. Innovative climate	5.18	1.05	−0.06	0.01	−0.06	0.02									
6. Cooperative climate	5.54	0.91	−0.10	0.07	−0.06	−0.02	0.63***								
7. Formalization	2.67	0.90	−0.02	−0.11	−0.13	−0.02	−0.28**	−0.29**							
8. Centralization	3.29	0.97	−0.06	−0.26**	−0.12	0.17*	−0.43***	−0.40***	0.05						
9. Integration	5.14	0.97	−0.03	0.06	−0.06	0.03	0.56***	0.64***	−0.32***	−0.34***					
10. Trust	5.32	0.88	0.02	0.06	−0.01	−0.10	0.65***	0.68***	−0.33***	−0.40***	0.61***				
11. Communication	5.76	0.74	0.07	0.15	0.14	−0.16*	0.47***	0.55***	−0.26**	−0.34***	0.51***	0.61***			
12. Coordination	5.13	0.86	0.01	0.06	0.03	0.04	0.62***	0.61***	−0.49***	−0.34***	0.59***	0.65***	0.45***		
13. Knowledge sharing	5.41	0.94	−0.07	0.03	−0.06	−0.12	0.74***	0.62***	−0.31***	−0.43***	0.60***	0.77***	0.58***	0.66***	
14. Knowledge application	5.16	1.04	0.06	−0.01	0.05	−0.05	0.62***	0.49***	−0.31***	−0.16*	0.53***	0.60***	0.52***	0.59***	0.68***

*$p < 0.05$ **$p < 0.01$ ***$p < 0.001$.
[a]$n = 146$ (two-tailed test).
[b]Dummy variable coded as manufacturing industry, 1; service industry, 0.

($p<0.001$). These findings support Hypothesis 2 and indicate that organizational members interact more favorably if the organizational structure is less formalized, less centralized, and more integrated.

Next, we examined how social interaction affects knowledge management. Table 3 displays the results of the regression analyses of the effects of social interaction on knowledge management. Models 4a and 4b are the base models that include the control variables. They indicate that this combination of variables does not have significant effects on the dependent variable. Models 5a and 5b in Table 3 present the effects of the three social interaction factors, trust, communication, and coordination, on knowledge management. Both models are significant ($p<0.001$) and yield an R^2 of 0.68 and 0.50. The results for trust ($p<0.001$ and $p<0.05$), communication ($p<0.05$ and $p<0.01$), and coordination ($p<0.001$ and $p<0.001$) in Models 5a and 5b suggest that they are significant determinants of knowledge management. The positive and significant coefficients indicate that firms would enhance the degree of knowledge management when the organizational members trust each other, communicate and coordinate more frequently and effectively. In summary, three factors of

Table 2
Results of regression analyses of social interaction[a]

Variable	Dependent variable (social interaction)								
	Trust *M*1a	Communication *M*1b	Coordination *M*1c	Trust *M*2a	Communication *M*2b	Coordination *M*2c	Trust *M*3a	Communication *M*3b	Coordination *M*3c
Capital	0.04	−0.16	−0.16	0.23*	0.01	0.01	0.23*	−0.04	0.06
Sales	0.13	0.20	0.13	−0.07	0.03	−0.05	−0.12	0.02	−0.12
Employees	−0.16	0.11	0.09	−0.11	0.14	0.13	−0.17	0.13	0.02
Industry type[b]	−0.14	−0.15	0.05	−0.12*	−0.13	0.07	−0.12	−0.14*	0.06
Innovative climate				0.37***	0.22**	0.38***			
Cooperative climate				0.47***	0.42***	0.39***			
Formalization							−0.20**	−0.09	−0.35***
Centralization							−0.25***	−0.14*	**−0.22****
Integration							0.47***	0.45***	0.42***
R^2	0.03	0.06	0.01	0.59	0.39	0.48	0.47	0.35	0.49
F	0.97	2.18	0.50	32.60***	14.61***	21.38***	17.28***	10.45***	19.12***

*$p<0.05$ **$p<0.01$ ***$p<0.001$.
[a]$n = 146$ (two-tailed test). Standardized coefficients are reported.
[b]Dummy variable coded as manufacturing industry, 1; service industry, 0.

Table 3
Results of regression analyses of knowledge management[a]

Variable	Dependent variable (knowledge management)			
	Sharing *M*4a	Application *M*4b	Sharing *M*5a	Application *M*5b
Capital	−0.16	0.15	−0.11	0.23*
Sales	0.21	−0.14	0.08	−0.26**
Employees	−0.10	0.02	−0.07	0.01
Industry type[b]	−0.15	−0.05	−0.08	0.01
Trust			0.49***	0.24*
Communication			0.16*	0.25**
Coordination			0.27***	0.34***
R^2	0.04	0.02	0.68	0.50
F	1.63	0.57	41.57***	19.47***

*$p<0.05$ **$p<0.01$ ***$p<0.001$.
[a]$n = 146$ (two-tailed test). Standardized coefficients are reported.
[b]Dummy variable coded as manufacturing industry, 1; service industry, 0.

Table 4
Results of regression analyses of mediating effects[a]

Variable	Dependent variable (knowledge management)							
	Sharing *M*6a	Application *M*6b	Sharing *M*7a	Application *M*7b	Sharing *M*8a	Application *M*8b	Sharing *M*9a	Application *M*9b
Capital	−0.02	0.27*	−0.10	0.25*	0.03	0.26*	−0.09	0.20
Sales	0.06	−0.28**	0.09	−0.27**	−0.04	−0.28*	0.04	−0.23*
Employees	−0.06	0.06	−0.06	0.01	−0.11	0.03	−0.06	0.03
Industry type[b]	−0.15**	−0.04	−0.10*	−0.02	−0.13	−0.07	−0.07	−0.03
Innovative climate	0.60***	0.51***	0.36**	0.33**				
Cooperative climate	0.24***	0.23**	0.06	0.01				
Formalization					−0.17*	−0.17*	−0.01	−0.01
Centralization					−0.26***	−0.02	−0.08	−0.13
Integration					0.46***	0.50***	0.10	0.18*
Trust			0.37***	0.11*			0.44***	0.22**
Communication			0.13*	0.22**			0.13*	0.22**
Coordination			0.18**	0.24**			0.24***	0.30***
R^2	0.62	0.46	0.74	0.55	0.47	0.35	0.69	0.52
F	37.10***	19.93***	42.62***	18.35***	17.26***	10.82***	29.91***	14.78***

$p<0.05$ **p<0.01 ***$p<0.001$.
[a]$n = 146$ (two-tailed test). Standardized coefficients are reported.
[b]Dummy variable coded as manufacturing industry, 1; service industry, 0.

social interaction have the expected signs and also have significant effects on knowledge management. Accordingly, Hypothesis 3 is supported.

We adopted a sequential procedure recommended by Baron and Kenny (1986) to test the mediating effects of social interaction on knowledge management. In the first step of the analysis, the dependent variable, knowledge management, was regressed on organizational climate and organizational structure, separately. The results of Models 6a, 6b, 8a, and 8b in Table 4 indicate that organizational climate and organizational structure have significant effects on knowledge management. In the second step, the mediator, social interaction, was regressed on the independent variables, organizational climate and organizational structure. The results, shown in Models 2a–2c and Models 3a–3c in Table 2, indicate that organizational climate and organizational structure have significant effects on social interaction. The third step is to examine the relationship between the mediator and the dependent variable. The results, shown in Models 5a and 5b in Table 3, indicate that social interaction has a significant effect on knowledge management.

Lastly, the mediator, social interaction, was included in the models to examine whether it reduces the effects of the antecedents to non-significance. Mediation occurs if the effects of the antecedents on knowledge management are reduced in the presence of the mediator and the overall fit is improved. The results of Models 7a and 7b in Table 4 show that the effects of organizational climate factors are significantly reduced, one of them to non-significance, in the presence of the mediator, social interaction, and the overall fits of the two models are both improved ($\Delta R^2 = 0.12$ and 0.09). These findings support Hypothesis 4 and indicate that social interaction plays a mediating role between organizational climate and knowledge management. Similarly, the results of Models 9a and 9b in Table 4 show that the effects of organizational structure factors are significantly reduced, two of them to non-significance, in the presence of the mediator, social interaction, and the overall fits of the two models are both improved ($\Delta R^2 = 0.22$ and 0.17). These findings support Hypothesis 5 and indicate that social interaction mediates the effects of organizational structure on knowledge management.

5. Discussion and conclusions

This study develops a conceptual model to examine the role of social interaction between organizational climate, organizational structure, and knowledge management. The results of the regression analysis indicate

that in general if firms possess a higher degree of innovative and cooperative climate, the social interaction among organizational members would be more favorable and then the degrees of knowledge management would be more enhanced. These findings show that organizational climate can promote a higher degree of knowledge sharing and application within firms but primarily do so through the mediating effects of social interaction. The key point is that organizational climate works its beneficial effects on knowledge management through increasing trust, communication, and coordination behaviors among employees. In addition, the present results are also quite instructive in helping to explain the effects of organizational structure on knowledge management. In general if the characteristics of organizational structure are less centralized, less formalized, and more integrated, the social interaction among organizational members would be more favorable and then the levels of knowledge management would be more enhanced. Organizational structure can lead to favorable social interaction and, in turn, results in a higher degree of knowledge sharing and application. Thus, social interaction plays a mediating role in the relationship between organizational structure and knowledge management.

Our study offers several theoretical implications. The findings of this study firstly contribute to incorporate the social interaction perspective into the knowledge management literature by showing that social interaction is effective for knowledge sharing and application. Knowledge management literature (e.g. Grant, 1996; Droge et al., 2003; Spender, 1996) emphasized the value of sharing and leveraging knowledge to generate new combination. Our study provides support to the arguments of prior studies (e.g. Bartol & Srivastava, 2002; Hoegl et al., 2003; Janz et al., 1997; Koskinen et al., 2003; Nahapiet & Ghoshal, 1998) that social interaction among employees and their networks of interrelationships enable individuals not only to have access to information and resources, but also to efficiently exchange and utilize knowledge.

Secondly, given the sparseness of research on factors that may promote individuals' network building (Mehra, Kilduff, & Brass, 2001), our study contributes to the literature by investigating such potential factors. By specifying critical antecedents of social interaction behaviors, we show that individuals in a higher degree of innovative and cooperative climate are more inclined to building up a higher degree of social interaction relationship. Our results evidence the suggestions of previous research (e.g. Hoegl et al., 2003; Janz & Prasarnphanich, 2003; Jaw & Liu, 2003; Sveiby & Simons, 2002) that organizational climate provides a vital atmosphere for relational and social exchange. Similarly, individuals have a general preference on interaction with one another when they perceive the characteristics of organizational structure are more autonomous, empowered, and integrated. The empirical evidences echo the assertions of previous studies (e.g. Gold et al., 2001; Janz & Prasarnphanich, 2003; Sivadas & Dwyer, 2000; Yap et al., 1998) concerning the importance of structure design to social interaction among individuals.

Thirdly, based on process-oriented view, we hypothesized that social interaction would mediate the effect of organizational contextual factors on knowledge management. This study demonstrates the potential mediation effect. The results join previous research (e.g. Hansen, 1999; Singh, 2005; Szulanski, 1996; Tsai & Ghoshal, 1998), which suggested that social capital serves as the necessary conduits to obtain and exchange useful knowledge, to highlight the strategic role of social interaction within an organization.

From a practical point of view, our study suggests that managers should be aware of the importance of social interaction in the link of organizational climate, organizational structure, and knowledge management. The empirical results indicate that interpersonal contact and linkages are crucial for knowledge sharing and application. It is imperative for firms to develop the social interaction among their core knowledge workers in order to share and apply their expertise. To enhance the social interaction in house, firms should provide incentives and supports to encourage employees to build up the collaborative links rather than merely track the knowledge base of employees. Accordingly, employees would be motivated to do the social interaction to exchange, learn, and apply knowledge. Furthermore, firms should carefully design and nurture appropriate organizational contexts to facilitate social interaction and knowledge management. Firms need to cultivate an innovative and cooperative atmosphere to facilitate the intensity of interpersonal social interaction among their employees, and thus enhance knowledge sharing and application. In addition, firms need to design their structure as

less formalized, more decentralized, and more integrated to provide employees a great deal of autonomy and make them feel honored to participate in their work. Accordingly, employees would be motivated to increase their behaviors of social interaction, which in turn would result in favorable knowledge sharing and application.

This study has some inherent limitations. First, the smaller sample size of this study raised the non-response bias concern. We have done the *t*-statistics and χ^2 test to verify that the non-response bias is not a significant issue. Also, the sample size in our study is barely satisfactory to generate the meaningful results as the regression models include 8–12 independent variables. Accordingly, the smaller sample size of the survey is noted as a potential limitation in this study. Secondly, this study shows social interaction as a potential mediator between organizational climate and structure, and knowledge management. We followed a sequential procedure of regression analysis recommended by Baron and Kenny (1986) to test the mediating effects. Future research could use a covariance structure model that would allow the direct and indirect relationships between the variables in the study to be explored simultaneously. Thirdly, this study focuses only on two organizational context including climate and structure. There are clearly other organizational constructs that warrant discussion. Future research may explore how these different constructs affect intra-organizational social interaction and knowledge management.

Appendix A

See Table A1 for the details about the characteristics of the respondents and non-respondents of this study. Tables A2, A3, A4 and A5 show results of factor analysis of ''knowledge management'', ''organizational climate'', ''organizational structure'' and ''social interaction'' items, respectively.

Table A1
Characteristics of the respondents and non-respondents

	Respondents ($n = 146$)	Non-respondents ($n = 604$)
Capital		
Less than 50 million	34 (23.3%)	132 (21.9%)
50–100 million	11 (7.5%)	40 (6.6%)
100 million–1 billion	50 (34.2%)	191 (31.6%)
1–2 billion	13 (8.9%)	56 (9.3%)
2–5 billion	13 (8.9%)	64 (10.6%)
More than 5 billion	25 (17.1%)	121 (20.0%)
Sales		
Less than 100 million	22 (15.1%)	92 (15.2%)
100–200 million	7 (4.8%)	52 (8.6%)
200–500 million	16 (11.0%)	51 (8.4%)
500 million–1 billion	11 (7.5%)	50 (8.3%)
1–5 billion	52 (35.6%)	192 (31.8%)
More than 5 billion	38 (26.0%)	167 (27.6%)
Number of employees		
Less than 100	39 (26.7%)	159 (26.3%)
101–500	52 (35.6%)	183 (30.3%)
501–1000	14 (9.6%)	48 (7.9%)
1001–2000	14 (9.6%)	75 (12.4%)
2001–3000	7 (4.8%)	29 (4.8%)
More than 3000	10 (13.7%)	110 (18.2%)
Industry type		
Manufacture sector	91 (62.3%)	384 (63.6%)
Service sector	55 (37.7%)	220 (36.4%)

n = number of subjects.

Table A2
Results of factor analysis of "knowledge management" items

Items	Factors	
	1	2
Knowledge sharing		
Knowledge is shared between supervisors and subordinates	0.85	0.28
Knowledge is shared among colleagues	0.84	0.33
Knowledge is shared across the units	0.83	0.38
Knowledge application		
The firm effectively manages different sources and types of knowledge	0.29	0.92
The firm utilizes knowledge into practical use	0.42	0.86
Eigenvalue	2.38	1.93
Common of variance (%)	47.55	38.55
Total variance (%)	47.55	86.10

Table A3
Results of factor analysis of "organizational climate" items

Items	Factors	
	1	2
Innovative climate		
The firm provides incentive environment to promote innovation	0.88	0.29
The firm stimulates employees to be creative and innovative	0.86	0.31
The firm is actively committed on doing innovations	0.85	0.31
Cooperative climate		
The firm provides employees needed support	0.27	0.92
Employees in the firm have sense of security	0.37	0.88
Eigenvalue	2.45	1.89
Common of variance (%)	49.07	37.92
Total variance (%)	49.07	86.99

Table A4
Results of factor analysis of "organizational structure" items

Items	Factors		
	1	2	3
Formalization			
The firm has a large number of explicit work rules and policies	0.85	−0.18	−0.01
Employees follow the clearly defined task procedures made by the firm	0.83	−0.25	0.13
The firm relies on strict supervision in controlling day-to-day operation	0.80	0.01	−0.09
Integration			
The firm integrates vertically	−0.15	0.94	−0.12
The firm integrates horizontally	−0.19	0.93	−0.15
Centralization			
Employees have autonomy to do their work	−0.08	0.07	0.80
Employees participate in the decision-making process	0.05	−0.17	0.80
Employees search for problem solutions from many channels	0.07	−0.45	0.74

Table A4 (*continued*)

Items	Factors		
	1	2	3
Eigenvalue	2.13	2.09	1.90
Common of variance (%)	26.61	26.14	23.73
Total variance (%)	26.61	52.75	76.48

Table A5
Results of factor analysis of "social interaction" items

Items	Factors		
	1	2	3
Trust			
Employees have confidence on other organizational members on their abilities and skills to do the work	0.82	0.26	0.34
Employees have confidence on other organizational members on making decisions	0.81	0.24	0.29
Employees have confidence on other organizational members to act in company's best interests	0.80	0.34	0.27
Communication			
Employees communicate and discuss with other members frequently	0.28	0.87	0.14
Employees have willingness to communicate and discuss with other members in depth	0.27	0.86	0.22
Coordination			
The task assignments of the employees are well planed	0.29	0.21	0.86
The work procedures and activities are well scheduled	0.32	0.16	0.85
Eigenvalue	2.31	1.81	1.79
Common of variance (%)	32.97	25.92	25.61
Total variance (%)	32.97	58.89	84.50

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