Knowledge Sharing Behaviour in Innovative Working Environment: A Case of a Software Developing Company

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Abstract: This study examines knowledge sharing behaviour in a highly innovative company. Particularly, the effect of key organizational factors, namely culture, trust, reward system, information system and structure on knowledge sharing is looked into. Team performance is also included as outcome construct to provide greater insights into the role of knowledge sharing. A quantitative approach via questionnaire-based survey was administered in a software development company in Malaysia. Data collected was then tested using correlation and regression analysis. The findings show that all organizational factors under investigation have positive effect on knowledge sharing and subsequently team performance. Despite being innovative and competitive, employees are willing to share knowledge mainly due to the culture, structure and information system of the organization.

Key words: Knowledge sharing, team performance, structure, trust, culture, information system, reward, innovation

INTRODUCTION

The subject of knowledge is one that has been studied long since modern businesses were formed. Knowledge was studied from the times of philosophers such as Plato and Aristotle under a subject called epistemology which is concerned with defining the nature and scope of knowledge and how it can be acquired. As the business world becomes more competitive, organizations are making use of every resource at their disposal including knowledge to gain an advantage. In addition, the current shift from an industrial-based economy to a knowledge-based economy is putting the subject of knowledge in the spotlight (Nonaka and Takeuchi, 1995). Even in Malaysia, the government has introduced measures to support the knowledge-based economy by introducing initiatives to promote the culture of innovation and creativity (Rahman, 2011).

As the business grows with more people being hired and departments being formed, organizations have found that more knowledge is being compartmentalized. Knowledge is dispersed as employees in different (or even the same) departments may have certain technical or industrial specific knowledge as a result of different experiences. Hence, it is important to understand how knowledge sharing behaviour can be made more effective. Poor knowledge sharing is seen to contribute to low productivity since longer time would be taken to do tasks. When knowledge such as best practices is not shared between employees, there is tendency to make mistakes including repeating the same mistakes as well as making poor decisions. Furthermore, there is a need to address knowledge gaps in this area such as the study of other complementary predictors of tacit knowledge sharing behaviour (Al-Alawi et al., 2007; Joia and Lemos, 2010; Suppiah and Sandhu, 2011). When such knowledge is shared, it will enhance collective performance of the organizations.

The concerns related to willingness to share knowledge are known in many organizations, including those in the Information Technology (IT) industry. For instance, most software development companies are using the agile development method, which is characterized by quick and successive iterations of design, development and test, until the final product is complete. This quick and incremental work has resulted in most knowledge not being documented, let alone being shared. In light of the aforementioned, the purpose of this study is to delve into knowledge sharing behaviour in a highly innovative working environment by looking at the effect of key organizational factors on knowledge sharing and team

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performance. Specifically, organizational culture, trust, reward system, information system and structure are adopted from past literature to examine their relationship with knowledge sharing and team performance (Al-Alawi *et al.*, 2007; Gruber, 2000; Suppiah and Sandhu, 2011; Zhang, 2005). It is believed that such investigation would provide valuable understanding to knowledge sharing in the context of innovative and competitive working environment in IT industry.

LITERATURE REVIEW

Knowledge management: Knowledge constitutes items including contextual information, know-how or skills, expert insight, values as well as experiences and cognition. Knowledge is also a prerequisite to action. Simply put knowledge can be acted upon (Davenport and Prusak, 2000; Newell *et al.*, 2002). For instance, people only take action after they are sure that they know what they are doing. Particularly, knowledge can be divided into two categories: tacit and explicit (Nonaka and Takeuchi, 1995). Tacit knowledge refers to the knowledge that resides in people's heads and which is difficult to articulate or put into words. Explicit knowledge refers to knowledge which is externalized for instance put into words or written down in a book.

Having a clearer view of what knowledge is, it can be clearly seen that to manage knowledge means to manage or tap into, the knowledge that resides in people's minds. This reflects the community view of the knowledge management process which holds that knowledge is embedded in and constructed through social relationships and interactions (Blackler, 1995; Nonaka and Takeuchi, 1995). Therefore, it places emphasis on relationships shared understanding and attitudes to knowledge formation and knowledge sharing (Kofman and Senge, 1993).

Organization factors and knowledge sharing: Channels for sharing knowledge are very important. The channel can be an environment which allows knowledge to be shared between source and recipient (Desouza and Paquette, 2011). In the context of an organization, the environment can be referred to as the organizational factors that can affect knowledge sharing activity. Based on a review of the literature, several key organizational factors have been found to affect knowledge sharing:

Organizational culture: Organizational culture consists of values, beliefs, understandings and norms shared by members of an organization (Lawson, 2003). Culture is deemed to influence knowledge sharing because culture influences how people behave in an organization. Behaviour is an important determinant in whether employees make their experience and expertise available to others (Moisiadis *et al.*, 2008) while management values that support risk taking, learning and collaboration also support the management and sharing of knowledge. Furthermore, culture shapes people's assumptions about what knowledge is important, mediates the relationships between organizational and individual knowledge, creates a context for social interaction and shapes processes for the creation and adoption of new knowledge (De Long and Fahey, 2000.A culture that supports knowledge sharing is one which problems, errors, omissions, successes and disasters are shared and not penalized or hidden while problems and conflicts are solved through constructive debate (Tiwana, 2002).

Prior studies have found that the clan culture, based on Cameron and Quinn (1999)'s competing values framework, positively affects knowledge sharing in organizations (Lawson, 2003; Suppiah and Sandhu, 2011). A clan culture is characterized by people sharing a lot about themselves, teamwork, involvement programs, corporate commitment to employee and employee commitment, while its leadership is characterized by mentoring or nurturing. Culture has been widely recognized in literature and the industry as having an important effect on knowledge sharing because, it influences how people behave in the organization including whether they share knowledge or not.

Trust: Trust is about accepting vulnerability (Newell *et al.*, 2002), thus enabling access to other persons. The less boundaries exist between individuals, the more freely information and knowledge can be shared. Trust is also described as implicit set of beliefs that the other party will behave in a dependent manner (Gefen *et al.*, 2003; Kumar, 2008) and that they will not take advantage over a particular situation.

Many researchers have suggested that trust is a key enabler of knowledge sharing in organisations (Newell *et al.*, 2002; Von Krogh *et al.*, 2000; Plessis, 2006). Chow and Chan (2008) postulate that trust in an organization enhances communication between colleagues such that people will want not only to learn but to share knowledge as well. In addition, Swift and Hwang (2013) articulate that trust is a determinant of one's desire to be part of the knowledge. The confidence that an individual has over other counterpart as well as the concern of others' need will influence the preference to interact and share knowledge with the

others. Moreover, high levels of trust create a safer environment for knowledge sharing (Leistner, 2010) as an individual's nature is to hoard knowledge based on assumptions that knowledge is useful for job security, respect among peers and compensation rewards (Tiwana, 2002). Prior studies have also supported the notion that trust enables knowledge sharing in organisations (Al-Alawi *et al.*, 2007; Gruber, 2000). Where trust is absent, knowledge will be hoarded by an individual.

Reward system: Reward system has been said to be important in encouraging knowledge sharing in an organization (Plessis, 2006). This is because, knowledge to an individual is a source of competitive advantage and to share it with others would mean reducing one's own value to the organization and job security (Davenport and Prusak, 2000). In addition, people may see knowledge as useful to gain respect among peers and some organizations unintentionally encourage knowledge hoarding by rewarding people with the most knowledge (Tiwana, 2002). All these serve to show that sharing knowledge is not something natural that people will do.

Prior studies have mostly found that reward system linked to knowledge sharing have positively influenced the sharing of knowledge in organizations (Al-Alawi *et al.*, 2007; Gruber, 2000). In most industries, incentives, evaluation and promotion system are designed to recognize those who do the best jobs of knowledge sharing and penalize those who do not, while accumulation of skills in addition to performance is often rewarded (Tiwana, 2002). In certain organizations, consultants are evaluated based on contribution to and utilization of the knowledge asset of the firm. Partners are even evaluated based on how much direct help they have given colleagues (Akerkar and Sajjr, 2010).

Information system: There has been a rising trend on the use of database or repository by organizations to increase knowledge sharing among employees (Ruggles, 1998). The use of information system and technologies permits not only the sharing of knowledge but as well as the contribution of knowledge. By utilizing database or repository, employees can search for and retrieve information and contribute in providing information and knowledge. Prior studies have supported the claim that technology positively influences knowledge sharing in organisations (Al-Alawi *et al.*, 2007; Rhodes *et al.*, 2008). Technology plays a central role in accomplishing everyday work and communication. Subsequently, many

organisations employ technological tools like wiki to store common information, sharepoint to share files as well as skype and yammer to ease communication.

Information facilitates knowledge sharing in the way that information can be accessed at the convenience of the party in need as well as it is well suited for individuals who prefer to avoid face-to-face interactions (Connelly and Kelloway, 2003). With the advancement of technology and information system, employees who are geographically distant will have the opportunity to share and disseminate knowledge. This further facilitates knowledge sharing among employees in the organization. As such, information system also provides multinational companies a platform to share knowledge regardless of their geographical locations.

Structure: Organizations come in various forms from flat organizations (matrix or project-based structure) to highly structured organizations (functional or silo based structures) (Gray and Larson, 2000). An uncomplicated structure supports knowledge sharing in organizations because information would then flow much easily through the organization as there are fewer boundaries between departments (Plessis, 2006; Syed-Ikhsan and Rowland, 2004). Specifically, reducing the number of departments may help to alleviate the not-invented-here syndrome, where people in one department reject ideas or knowledge shared by those in other departments, in favour of those founded internally (Davenport and Prusak, 2000; Tiwana, 2002). Prior research done has found that a less complicated organizational structure indeed supports knowledge sharing in an organization (Al-Alawi *et al.*, 2007; Zhang, 2005). In the industry, some organizations create centres of competence by identifying companies with expertise in a certain area and get them to provide support to other companies in need (Desouza and Paquette 2011; Probst *et al.*, 2000). Some stage in-person events to create connections among employees and used cross functional teams to create strong ties, providing structure for employees to connect and share knowledge (Desouza and Paquette, 2011).

Knowledge sharing and team performance: The increase of knowledge sharing activities are said to result in an increase of performance as well as improved decision makings (Faraj and Sproull, 2000; Davenport *et al.*, 1996). In the context of information technology industry, knowledge sharing permits the sharing of lessons learnt from the past mistake as well as the decisions about what form of technology or methods that maybe useful as compared to the rest.

Knowledge sharing in teams is thought to improve problem solving skills as well (Kogut and Zander, 1992; Salisbury, 2001). Knowledge sharing allows the sharing of ideas and thoughts among team member which results in the definition of problem from different angles and perspectives thus, making problem solving solution more coherent. Following through, efficacy in problem solving leads to an improved performance.

Finally, knowledge sharing enhances collective performance through the development of creativity in teams. When knowledge is shared in a team, it passes through the knowledge framework of each individual in a team, whose members have been exposed to different experiences and insights that might give birth to novel ideas (Nonaka and Takeuchi, 1995). Novel ideas generated from team knowledge sharing permits creativity on both problem solving or strategy formulation to enhance performance. As such, knowledge sharing leads to increase of team performance.

Underlying theories: The effect of the preceding organizational factors on knowledge sharing and subsequently team performance in organizations can be supported by various social theories, as knowledge sharing is a social behaviour. One theory that supports most of the factors above is the social capital theory. Social capital refers to action and cooperation in a social network that brings mutual benefit, facilitated by features of social organizations such as networks, norms and trust (Putnam, 1993). The action and cooperation in the context of this study is knowledge sharing and when a social entity (or organization) practises this, it benefits the community as a whole because the whole community gains knowledge. This once again corresponds to the community view of the knowledge management process that was discussed earlier which holds that knowledge is embedded in and constructed through social relationships and interactions (Blackler, 1995; Desouza and Paquette, 2011; Nonaka and Takeuchi, 1995).

There are three dimensions of social capital: structural, content and relational (Nahapiet and Ghoshal, 1998). The structural dimension points to the overall social network configuration, which considers factors such as structure or centralization. This dimension concerns access to other actors, individual and corporate (Widen-Wulff and Ginman, 2004). This supports the notion that structure can have an influence on how employees in an organization share knowledge as it can determine how easily employees can have access to people with knowledge or can form invisible barriers resulting in the not-invented-here syndrome.

The relational dimension describes relationships in the network. Particularly, it concerns interpersonal trust existence of shared norms and identification with other individuals in the network (Nahapiet and Ghoshal, 1998). This supports the notion that trust and the appropriate culture or norm can facilitate actions related to knowledge sharing in an organization.

The content dimension, or communication, refers to information exchange, problem identification, behaviour regulation and conflict management which are necessary for the utilization of social capital. A key area to take note of is information exchange which refers to the ability to gather, interpret, organize, store and disseminate information to relevant components. This can be supported by information technology (Widen-Wulff and Ginman, 2004), implying that information system should support knowledge sharing in the organization.

Underpinning reward system is the social exchange theory which holds that individuals regulate their interactions with other individuals based on a self-interested analysis of costs and benefits (Blau, 1964). The benefits may be tangible and intangible and include status, job security, promotional prospects and even monetary rewards. This theory is applicable to knowledge sharing as the act involves two or more people. Based on this theory, it can be predicted that employees will not share knowledge unless there are some form of reward in return for sharing knowledge.

Framework and hypothesis: Based on the research objectives and review of the literature, the conceptual framework is constructed as shown in Fig. 1. While knowledge sharing serves as the focal construct of the study, organization culture, trust, reward system, information system and structure as predictor constructs and team performance as outcome construct. Team performance is added to provide more explanation to the role of knowledge sharing in the organization.
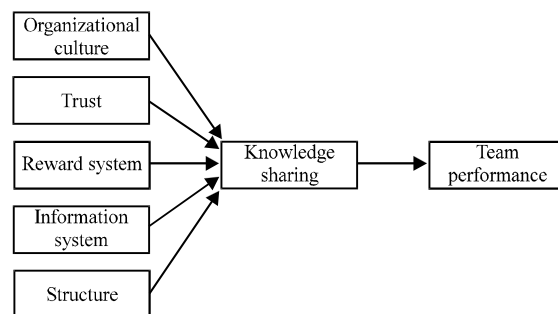

Fig. 1: Conceptual framework

The hypotheses of the study are formulated as follows:

- H_1; there is a positive relationship between organizational culture and knowledge sharing
- H_2; there is a positive relationship between trust and knowledge sharing
- H_3; there is a positive relationship between reward system and knowledge sharing
- H_4; there is a positive relationship between information system and knowledge sharing
- H_5; there is a positive relationship between structure and knowledge sharing
- H_6; there is a positive relationship between knowledge sharing and team performance

METHODOLOGY

The fundamental research philosophy adopted in this study is that of positivism where the researcher makes objectives interpretation of data using statistical analysis (Saunders *et al.*, 2003). The main reason why positivism was adopted is because, the research is done mainly to understand a single reality of the phenomenon under investigation. With that in mind, a positivism stance approaches subjects based on empirical inquiry as opposed to philosophical speculation (Gray, 2004), giving a more concrete foundation of which to base recommendations and business decisions from.

This study fits the methodology of a case study as the research is conducted in one organization. Moreover, a survey technique is practical for collecting data in a case study (Saunders *et al.*, 2003). Such method can be applied when there are theoretical hypotheses based on available literature on the subject, selection of samples of individuals from known populations and measurement on a small number of the variables.

The study was conducted using employees of a software development company in Malaysia as sample respondents. It was established in mid-1990s and has a global workforce. Nevertheless, the development work is centralized in Sarawak, one of the biggest states in Malaysia. It is engaged in developing and providing software to enable its clients to record daily operational information and produce reports, primarily in the oil and gas industry. The total employee population for the company is 150 indicating that the sampling frame or the list of employees is available. Questionnaire was used to gather responses on the subject matter. Statements of all constructs in the study were adopted from past studies. All of them were measured using a 5-point Likert scale except for items pertaining to demographic factors.

Census sampling method was used, which means that 150 sets of questionnaire were distributed to the employees due to relatively small population. At the end of the data collection period, a total of 94 copies were collected. The 4 copies, however were omitted due to serious item non-response. This yields a response rate of 60%. The SPSS software was used to perform descriptive and inferential analyses to examine the proposed relationships.

RESULTS

Table 1 presents the descriptive statistics of respondent's demographics. Table 2 on the other hand, reports on the bivariate correlations as well as the Cronbach alpha's for the variables in this study. Prior to the inferential statistics, collinearity test to assess multi-collinearity issue was conducted. The VIF values are lower than the suggested threshold values of 10 and 5 (Sarstedt and Mooi, 2014; O'Brien, 2007; Rogerson, 2001), indicating that there is no issue with multicollinearity. To investigate issue with self-report bias, common method variance using Harman's single factor test was carried out. Since, the first factor explains only 37% of total variance which is lower than the threshold value of 50%, it implies that self-report bias is not a concern (Harman, 1976).

A multiple regression analysis was conducted to test the five hypotheses developed in the first section of the model. The result of the regression analysis suggests that the model is statistically significant (F $(5, 50)$ = 4.246, p<0.01). Overall, 29.8% of the variances in knowledge sharing is accounted by the five predictors (organizational factors). On the other hand, a simple linear regression analysis was conducted to assess the hypothesis developed in the second section of the model. The result of the regression analysis indicates that the model was also statistically significant (F $(1, 54)$ = 5.817). About 9.7% of the variance in team performance is accounted by knowledge sharing.

Table 1: Respondent demographics

Variables	Frequencies	Percentage
Gender		
Male	37	41.1
Female	53	58.9
Department		
Help desk	10	11.1
Development	7	7.8
Quality control	11	12.2
System analysis	11	12.2
Capabilities	8	8.9
Network	7	7.8
Sales	8	8.9
Projects	8	8.9
Administration	13	14.4
Others	7	7.8

Table 2: Descriptive statistics and bivariate correlations

Parameters	Mean	SD	1	2	3	4	5	6	7
Knowledge sharing	3.92	0.67	(0.71)						
Trust	3.44	0.88	0358**	(0.81)					
Information system	3.73	0.81	0460**	0441**	(0.80)				
Reward system	2.78	0.99	0300*	0167	0296*	(0.88)			
Structure	3.02	0.87	0452**	0564**	0613**	0581**	(0.66)		
Organizational culture	3.37	0.85	0488**	0482**	0565**	0627**	0737**	(0.91)	
Team performance	4.46	0.75	0312*	159	0460**	0240	0186	0261	(0.93)

Figures in parentheses are cronbach's alpha; *, **$p<0.05, 0.01$

Table 3: Summary of linear regression analysis (N = 90)

Predictors	Model 1 Knowledge sharing ß	Model 2 Team performance ß
Independent variables		
Trust	0.358**	-
Information system	0.460**	-
Reward system	0.300*	-
Structure	0.452**	-
Culture	0.488**	-
Knowledge sharing	-	0.312*
R^2	0.298	0.097
F	4.246	5.817

*, **$p<0.05, 0.01$

The first hypothesis postulates that there is a significant relationship between organizational culture and knowledge sharing. The hypothesis is supported ($\beta = 0.488$, $p<0.01$) because an increase in one unit of trust will result in an increase of 0.358 unit of knowledge sharing. Similar conclusions are drawn for relationship between trust and knowledge sharing ($\beta = 0.358$, $p<0.01$), information system and knowledge sharing ($\beta =0.460$, $p<0.01$), reward system and knowledge sharing ($\beta = 0.300$, $p<0.05$) and structure and knowledge sharing ($\beta = 0.452$, $p<0.01$). As such, the second to fifth hypotheses are all supported.

In the second section of the model, knowledge sharing is found to be positively associated with team performance ($\beta = 0.312$, $p<0.05$). The beta value of the result suggests that an increase in one unit of knowledge sharing will result in an increase of 0.312 unit of team performance. As such, the sixth hypothesis is also supported. The results are summarized as in Table 3.

DISCUSSION

This study sets out to evaluate organizational factors that would have a significant effect on knowledge sharing and the subsequent effect of knowledge sharing on team performance in a software development company in Malaysia. This is in response to problems identified by the management such as low productivity and confidence in executing work, repeating mistakes that have been made in the past and 're-inventing' the wheel. Such perennial situations not only affect individual performance but also team performance in the long run.

Results of the analysis show significant positive relationship between each organizational variable under study and knowledge sharing as well as between knowledge sharing and team performance. It validates the applicability of social capital theory and thus underscores the importance of knowledge sharing in organizations.

Firstly, the results show a significant relationship between organizational culture and knowledge sharing. This confirms prior studies on the matter citing that organizational culture, in particular the clan culture, positively affects knowledge sharing (De Long and Fahey, 2000; Suppiah and Sandhu, 2011). In the software development company, the clan culture is evident in the sense that employees treat the office like a home where dressing is casual and no shoes are to be worn in the office. Therefore, it provides for a relaxed atmosphere, where people feel more at ease and ready to communicate. In contrast, wearing a tie and suit to work could make one feel uptight and professional, therefore making them less approachable or superior to others and more inclined to withholding knowledge.

Secondly, the results also show a significant relationship between trust and knowledge sharing. This confirms ideas in existing literature that states that trust is a key enabler of knowledge sharing (Newell *et al.*, 2002; Von Krogh *et al.*, 2000; Plessis, 2006). As reviewed in the literature, trust is a basic human need and is universal. Without trust, it is impossible to have transparent and honest communication or relationship with another person, let alone sharing knowledge with another person. It can only be done through extensive communication and interaction. In a highly technical and competitive organization like the software development company, trusting another person with knowledge also means to know that the person to whom knowledge is being shared would not use that knowledge for malicious intent. This applies to the recipient of the knowledge who must trust the source in order to believe and accept the knowledge being shared.

Thirdly, it is found that reward system is positively related to knowledge sharing. The findings correspond to earlier views that reward system is important in encouraging knowledge sharing (Al-Alawi *et al.*, 2007;

Plessis, 2006). However, this also lends weight to the fact that knowledge sharing is a social activity in which employees must willingly engage and is not one that can be incentivised through reward system (Lucas and Ogilvie, 2006). This might explain why the relationship between reward system and knowledge sharing is the weakest. Employees in software development company, regardless which department they belong to have to come together to accomplish tasks. Therefore, individuals in the team have no other choice but to share knowledge and this becomes second nature to them. Another factor that may explain this weak relationship is the strong organizational culture. Specifically, the clan culture in the company might well suggest that employees have a high sense of commitment to the organization and each other, thus not minding the size of rewards and the manner it is delivered.

Fourthly, there is also a significant relationship between information system and knowledge sharing. The findings are in-line with the cognitive model of managing knowledge (Cole-Gomolski, 1997) which emphasizes the use of IT applications as well as past studies supporting the claim that technology positively influences knowledge sharing in an organization (Al-Alawi *et al.*, 2007; Rhodes *et al.*, 2008). In organizations like software development company, huge amount of data such as findings of problems, documentation on analysis and methods that lead to decisions, database dumps, internal and external communications have to be shared. This sharing is currently made possible through technologies such as email, central repository and project management system. In addition, as various people often work together, the use of instant messengers are crucial for employees to communicate and share knowledge in the organization instantaneously.

Fifthly, in the same vein, the results show there is a significant relationship between structure and knowledge sharing. It corresponds with past literature stating that knowledge sharing flourishes in uncomplicated structures (Al-Alawi *et al.*, 2007; Plessis, 2006; Syed-Ikhsan and Rowland, 2004; Zhang, 2005). Although the software development company of the studyhas functional departments, their adoption of the matrix structure where cross functional teams are created, helps to ensure knowledge flows in and out of departments easily, thereby eliminating the 'silo' effect. The adoption of the matrix structure is common in information technology industry due to the agile development methodology where people need to come together to work in teams.

While all organizational factors have positive relationship with knowledge sharing, team performance is found to be a significant outcome of knowledge sharing. This is in line with literature that suggests team performance being positively affected by the level of knowledge sharing (Davenport *et al.*, 1996; Kogut and Zander, 1992; Nonaka and Takeuchi, 1995; Salisbury, 2001). When dealing with technology and pioneering technological development, it is common yet imperative to realize that knowledge is so widespread in the organization that no one person knows everything. Therefore, in order to make the right decisions as a team, it is essential that knowledge is shared among one another and ideas are put through more experienced or knowledgeable people who can provide better input or comment on the decision.

CONCLUSION

Knowing what affects knowledge sharing behaviour in highly innovative organizations is critically important to productivity and success. Given the dynamism and complexity of the contemporary business environment, it is no longer possible for any organization and individual to survive and grow without being attached to others. The present study confirms such belief by underlying the positive effect of various organizational factors on knowledge sharing and team performance in a highly technical and competitive company. Hence, the onus is on the managers to manage and utilize social capitals in the organizations effectively, so as to create the culture of knowledge sharing between employees.

Despite having meaningful results, using just one company in information technology industry as sample limits the generalizability of the findings. Moreover, other organizational factors such as leadership are more likely to play pivotal role in highly innovative companies. Furthermore, demographic factors such as generations, ethnicity and level of experience or tenure in the organization are possible moderators in assessing the intention and actual behaviour to share knowledge. As Malaysia embraces collectivist culture, comparative studies would likely provide more insights into the phenomenon, thus extending knowledge on the subject matter.

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