The Role of Knowledge Management and Organizational Learning in Mediating Transformational Leadership and Innovation Performance: Social Capital as the Moderator

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Abstract

This study examines the influences of transformational leadership on organizational innovation performance through the dynamic capabilities of knowledge management and organizational learning. It also investigates whether social capital moderates the effect of transformational leadership, knowledge management, and organizational learning on the dependent variables. These influences are tested empirically in large and medium manufacturing firms in Thailand, based on a sample of 400 manufacturing firms conducted through a questionnaire survey. The causal relationship model is tested through structural equation modeling (SEM). The results reveal that: 1) transformational leadership has a positive influence on knowledge management capability; 2) transformational leadership has a positive influence on organizational learning capability, both directly and indirectly through knowledge management capability; 3) knowledge management capability has an insignificantly direct effect on innovation performance, but it has a positive influence on innovation performance through organizational learning capability; 4) organizational learning capability has a positive influence on innovation

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performance; and 5) social capital moderates the effect of transformational leadership, knowledge management, and organizational learning on the dependent variables.

Keywords: *Transformational Leadership, Knowledge Management, Organizational Learning, Innovation Performance, Social Capital*

บทบาทของการจัดการความรู้และการเรียนรู้ขององค์กร ในการส่งผ่านอิทธิพลระหว่างภาวะผู้นำการเปลี่ยนแปลง และผลสัมฤทธิ์ทางนวัตกรรม: ตัวแปรกำกับทุนทางสังคม

*คณิศรา ธัญสุนทรสกุล**

บทคัดย่อ

การวิจัยนี้มีวัตถุประสงค์เพื่อวิเคราะห์อิทธิพลของภาวะผู้นำการเปลี่ยนแปลงที่มีต่อผลสัมฤทธิ์ทางนวัตกรรมขององค์กร โดยส่งผ่านทางความสามารถในการจัดการความรู้และการเรียนรู้ขององค์กร และเพื่อวิเคราะห์ขนาดอิทธิพลกำกับของทุนทางสังคมที่มีต่ออิทธิพลของภาวะผู้นำการเปลี่ยนแปลง การจัดการความรู้ และการเรียนรู้ขององค์กรที่ส่งผลต่อตัวแปรตาม กลุ่มตัวอย่างในการวิจัยครั้งนี้เป็นโรงงานอุตสาหกรรมขนาดกลางและขนาดใหญ่ในประเทศไทย จำนวน 400 โรงงาน โดยเครื่องมือที่ใช้ในการวิจัยเป็นแบบสอบถาม การวิเคราะห์ความสัมพันธ์เชิงสาเหตุในโมเดลวิจัยใช้สถิติวิเคราะห์โมเดลสมการโครงสร้าง ผลการวิจัย พบว่า (1) ภาวะผู้นำการเปลี่ยนแปลงมีอิทธิพลทางบวกต่อความสามารถในการจัดการความรู้; (2) ภาวะผู้นำการเปลี่ยนแปลงมีอิทธิพลทางบวกต่อความสามารถในการเรียนรู้ขององค์กรโดยมีอิทธิพลทั้งทางตรงและทางอ้อมผ่านความสามารถในการจัดการความรู้; (3) ความสามารถในการจัดการความรู้ไม่มีอิทธิพลทางตรงต่อผลสัมฤทธิ์ทางนวัตกรรม แต่มีอิทธิพลทางอ้อมโดยผ่านความสามารถในการเรียนรู้ขององค์กร; (4) ความสามารถในการเรียนรู้ขององค์การมีอิทธิพลทางบวกต่อผลสัมฤทธิ์ทางนวัตกรรม; และ (5) ทุนทางสังคมปรับขนาดอิทธิพลของภาวะผู้นำการเปลี่ยนแปลง ความสามารถในการจัดการความรู้ และการเรียนรู้ในองค์กรที่มีต่อตัวแปรตาม

คำสำคัญ: *ภาวะผู้นำการเปลี่ยนแปลง การจัดการความรู้ การเรียนรู้ขององค์กร ผลสัมฤทธิ์ทางนวัตกรรม ทุนทางสังคม*

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Introduction

This research seeks to explore the impact of several influences on innovation performance; firstly, how transformational leadership affects innovation performance through knowledge management and organizational learning capabilities; secondly, how knowledge management capability influences innovation performance, both directly and indirectly through organizational learning capability; thirdly, how organizational learning capability affects innovation performance; and finally, how social capital moderates the effect of transformational leadership, knowledge management, and organizational learning on the dependent variables.

At present, in order to gain competitiveness and to succeed in the global marketplace, organizations must build their organizational competence and innovativeness in response to ever-changing competitive situations, as well as customer demands and expectations. During the past decades, several organizations in Thailand have responded from an awareness of the crucial role of knowledge management and organizational learning in new business development in order to succeed in an environment of global competition. However, there is relatively little empirical research examining the impact of organizational context factors on organizational innovation within an appropriate framework of knowledge management and organizational learning capabilities.

In order to shape a firm's potential to generate innovation, transformational leaders play a significant role in encouraging an appropriate environment and in making decisions that promote successful knowledge management and organizational learning capabilities (Gumusluoglu and IIsev, 2009). Knowledge management is the complementary processes of knowledge acquisition, conversion, dissemination, and application that are essential to discovering knowledge gaps and unused knowledge, as well as developing knowledge maps in organizations (Liebowitz, 2005). Transformational leaders build a shared vision, challenge mental models, and establish a knowledge infrastructure and system that support their subordinates to find new-problem solving methods and to achieve new forms of competitive advantage (Yeo, 2006; Popper and Lipshitz, 2000) which will result in enhanced innovation (Alegre and Chiva, 2008; Lee and Sukoco, 2007).

Organizational learning is a firm's capability for rapid, decisive action to exploit opportunities and to confront change based on shared experiences, insights, knowledge, and mental models among individuals and groups in the organization (Chiva, Alegre, and Lapiedra, 2007; Goh, 2003). Transformational leaders stimulate their subordinates to explore new alternatives, voice their divergent views, and perform beyond expectation, enhancing their level of motivation and boosting their self-esteem, thus significantly affecting organizational learning capability and innovation (Alegre and Chiva, 2008).

Innovation is the organizational capability to apply newly-learned knowledge so that an organization can manifest competitive market differentiation that will produce future organizational benefits or more highly-valued assets (Ireland et al., 2001). Innovation consists of successfully implementing creative ideas within an organization and is closely linked to organizational learning and knowledge management (Liao and Wu, 2010).

For the sake of the bigger picture, where interrelationships will function so that the innovational performance of a firm is improved through organizational learning and knowledge management, it seems reasonable for transformational leadership to engage in the aforementioned activities. Most past empirical research explored the direct effects of transformational leadership on knowledge management (e.g. Crawford, 2005; Jung, Chow and Wu, 2003) on organizational learning (e.g. Zagor□ek, Dimovski and □kerlavaj, 2009; Shin and Zhou, 2007; Berson et al., 2006; Bryant, 2003) and on innovation performance (e.g. Gumusluoglu and IIsev, 2009; Khan, Rehman and Fatima, 2009; Harbone and Johne, 2003; Dess and Picken, 2000). These research papers discuss such variables separately. Only a few research papers have opened further understanding of the implications of transformational leadership for effective organizational learning or for knowledge management, along with their underlying processes, resulting in leveraged innovation performance (e.g. Hsu et al., 2009; García-Morales, Lloréns-Montes, and Verdú-Jover, 2008; Aragón-Correa, García-Morales and Cordón-Pozo, 2007).

Moreover, past literature reviews mostly show an exploration of previous empirical studies having a direct effect of knowledge management (i.e. Lee and Sukoco, 2007; Jantunen, 2005; Gloet and Terziovski, 2004), and a direct effect of

organizational learning (i.e. Li, Chu and Lin, 2010; Chen, Lin and Chang, 2009; Hsu and Fang, 2009; Alegre and Chiva, 2008) on organizational innovation separately. The indirect interrelations between these two efforts have been neglected. The literature on knowledge management and organizational learning is short of a cohesive theoretical framework to structure and enhance understanding of how these two efforts can impact organizational innovation. Only a few recent papers (i.e. Liao and Wu, 2010; Ju, Li and Lee, 2006) discuss practical results. Thus, more empirical evidence is required to determine the real causal effect of transformational leadership on innovation performance through knowledge management and organizational learning efforts. Attaining these three interrelated drivers has strategically important implications for an organization to improve its innovation performance as a total system.

Furthermore, previous studies have argued that social capital is a major contributor to organizational learning and knowledge management (Tsai, 2001). Networks of strong and crosscutting personal relationships, developed over time, provide the basis for trust, cooperation and collective action that form the foundation for individual, collective, and organizational learning (Liu, Ghauri and Sinkovics, 2009; Levin and Cross, 2004). The quality of social capital affects the way in which knowledge is acquired, created and exploited between individual members and their social unit (Dovey and Singhota, 2005; Merx-Chermin and Nijhof, 2004).

Several recent studies (i.e. Tsai, Chuang and Chen, 2008; Rhodes et al., 2007; Bakker et al., 2006; Tsai, 2006; Manu and Walker, 2006; Inkpen and Tsang, 2005; Yli-Renko, Autio and Tontti, 2002) have emphasized the important role of social capital for enhanced learning and knowledge creation both within and between organizations. Only a few studies have treated social capital as a moderating variable on innovation performance through the influence of knowledge management and organizational learning capabilities (i.e. Stam and Elfring, 2008; Lee and Sukoco, 2007). Therefore, this study seeks to make a necessary investigation into organizations with transformational leadership and greater social capital potentially lead to better innovation performance for their organizations through their knowledge management and organizational learning.

This article is divided into several sections. Section Two introduces the background research and suggests a set of hypotheses within a global model. Section Three presents the research methodology used to achieve an empirical analysis of the hypotheses developed in Section Two. Section Four presents the results obtained. Section Five discusses the results. Finally, Section Six outlines the implications for research and practice and points out some limitations of this study and directions for future research.

Research Background and Hypotheses

The knowledge-based perspective commends knowledge as the most important strategic resource, which is valuable, rare, imperfectly imitable, and not substitutable (Stonehouse et al., 2004). Organizational innovation requires the integration of different and highly-specialized knowledge (Tolstoy; 2009). Transformational leadership, organizational learning, and knowledge management are among the imperative factors most frequently recommended in the literature of innovation, as they influence organizational innovation and performance. The main focus of this study is on the simultaneous and global considerations (direct and indirect) of relevant antecedents to organizational innovation performance.

The Influence of Transformational Leadership on Knowledge Management and Organizational Learning

In today's information society, knowledge management is the key process enabling an organization to create, exploit, renew, and apply knowledge flows in new ways in order to create essential competences for the improvement of organizational innovation (Barrett and Sexton, 2006). Transformational leadership that reflects idealized influence, inspirational motivation, intellectual stimulation, and individualized considerations will significantly affect knowledge management capability and innovation (García-Morales et al., 2008; Jung, Chow and Wu, 2003).

Transformational leaders will function as a role model and guide in the articulation of a shared vision of organizational goals and ways in which learning and knowledge can contribute to those ends (Senge et al., 1994). Effective leaders that adopt transformational roles will seek out good ideas and encourage

members' risk-taking behaviors, developing networks of innovators within their organization (Quinn et al., 2003) by creating a spirit of trust to enable the transmission and sharing of knowledge to a generation whose knowledge is slack (Senge et al., 1994). By stimulating intellectual interests and individualized considerations, they will contribute to intrinsic motivations, inspire and stimulate high-order needs, and establish a knowledge infrastructure and support system in order to facilitate knowledge sharing and application (Bollinger and Smith, 2001).

There is a rising amount of research dedicated to examining the consequences of transformational leadership on knowledge management. For example, Gowen, Henagan, and McFadden (2009) found that knowledge management could mediate the effect of transformational leadership on organizational performance. García-Morales et al. (2008) found that transformational leadership had a positive effect on knowledge slack, absorptive capacity, and tacit meaning. Crawford (2005) found that knowledge management behaviors were significantly predicted by transformational leadership. Taking all into account, this study formulates the following hypothesis:

Hypothesis 1: Transformational leadership influences knowledge management positively.

Transformational leaders have important roles in encouraging organizational learning capability (Yeo, 2006; Popper and Lipshitz, 2000). They attach high value to knowledge, encouraging questions and experimentation through empowerment, building trust, and facilitating the experiential learning of tacit knowledge (Stonehouse and Pemberton, 1999). They have considerable power to create an effective learning environment, and enable employees to develop their knowledge, skills, and abilities through personal development. Transformational leaders are vital links for disseminating knowledge and for learning by solution-seeking from different areas of the organization (Chinowsky and Carrillo, 2007). When best practices are shared across an organization's functions and divisions, the commitment of people to learning strengthens.

A large body of research portrays the roles of leadership for learning. For example, studies by Amitay, Popper, and Lipshitz (2005), Poomontre (2005),

and Chamnannarongsak (2005) found a very high positive correlation between transformational leadership, organizational learning values, and organizational learning mechanisms. Hult et al. (2000) indicated that transformational leadership was one factor that facilitated learning in an organization. Leaders became "transformational" in that they inspired high levels of trust in groups, tasks, and the organization. Ross and Offerman (1997) found transformational leaders to be more self-confident, less aggressive and critical, and more nurturing toward their subordinates in learning and work group performance. Taking all this into account, this study formulated the following hypothesis:

Hypothesis 2: Transformational leadership influences organizational learning positively, both directly and indirectly, through knowledge management.

The influence of knowledge management on organizational learning and innovation performance

From the perspective of organizational capabilities, knowledge management is the continuous process of managing all knowledge in order to anticipate current and future needs, to identify and exploit existing knowledge, as well as to acquire and develop new opportunities (Carrillo et al., 2004). Researchers have adopted different views of what the knowledge management process entails (i.e. Seleim and Khalil, 2007; Cui, Griffthe and Cavusgil, 2005; Gold, Malholtra, and Segars, 2001; Alavi and Leidner, 2001; Bennett and Gabriel, 1999). According to the aforementioned varying views of knowledge management, these researchers view knowledge management activities from the perspective of organizational capabilities. They classify the fundamental dimensions of knowledge management processes as: knowledge acquisition, knowledge conversion, knowledge dissemination, and knowledge application. The process of creating organizational knowledge is the foundation of innovative activities (García-Morales et al., 2007).

Enhancing knowledge acquisition will help people in a firm to improve opportunity recognition, find new ways to solve problems, and further foster innovation activities (Rodan and Garunic, 2004; Gold, Malhortra and Segars, 2001). Knowledge conversion will improve the knowledge stock available to the firm's innovation (Nonaka and Takeuchi, 1995). Knowledge dissemination will

increase the possibility for new combinations of existing and new knowledge that result in innovation development (Spencer, 2003; Tsai, 2001). Knowledge application makes knowledge more active and relevant for the firm in terms of such creative values as redundancy reduction, enhancing performance efficiency and effectiveness, and process improvement and product development (Lin and Lee, 2005; Johannessen, Olsen and Olaisen, 1999).

Knowledge management is viewed as a process in which to capture an organization's knowledge and use it to cultivate innovation through organizational learning (Jerez-Gómez, Céspedes-Lorente and Valle-Cabrera, 2005a, Nonaka and Takeuchi, 1995). This is because organizational learning is a dynamic or changing process of knowledge and insights moving among all levels—individual, collective and organizational—throughout the organization (Wang and Ahmed, 2003; Crossan, Lane and White, 1999). Without knowledge management, an organization cannot develop organizational learning capability (Su, Huang and Hsieh, 2004). The past research of Ke and Wei (2006) found that knowledge is the antecedent and basis for organizational learning. Su et al. (2004) found that organizational learning is positively affected by knowledge management. Taking all this into account, this study formulated the following hypothesis:

Hypothesis 3: Knowledge management influences organizational learning positively.

A number of studies have investigated the relationship between knowledge management and organizational innovation performance. For example, Lee and Sukoco (2007), Ju et al. (2006), Gloet and Terziovski (2004), and Spencer (2003) found that knowledge management processes have a significant impact on a firm's innovation. Moreover, organizational learning plays the role of improving a firm's knowledge base, which contributes to organizational innovation (Tippins and Sohi, 2003). From the perspective of system, the past research of Liao and Wu (2010) showed organizational learning as the mediating variable between knowledge management and organizational innovation. García-Morales et al. (2008) found that the acquisition, transfer, and use of tacit knowledge have an effect on innovation through organizational learning. Taking all this into account, this study formulated the following hypothesis:

Hypothesis 4: Knowledge management influences innovation performance positively, both directly and indirectly, through organizational learning.

The influence of organizational learning on organizational innovation

Organizational learning is defined as "the process of change in individual and shared thought and action, which is affected by and embedded in the institutions of the organization" (Crossan et al., 1999, p. 4). It is conceptualized as the organizational and managerial characteristics that facilitate the organizational propensity to learn (Goh, 2003). The factors fostering organizational learning capabilities consist of experimentation and creativity, interaction with the external environment, risk taking and mistake acceptance, and delegation of and participation in decision making (Chiva et al., 2007). Such conditions can encourage members to share, exchange, interpret, and combine their specialized knowledge, skills, and experiences with others, both within and across units, in order to create new knowledge and understanding from different perspectives.

Innovation, as it consists in finding new ways to solve problems and successfully implementing creative ideas within an organization, is conceived as both individual and collective learning (Alegre and Chiva, 2008). Through a spiral of organizational learning activities, firms capture and use knowledge by means of knowledge management processes that will foster innovation (Zhang, Lim and Cao, 2004; Pablos, 2002; Nonaka and Takeuchi, 1995). Thus, innovation depends on the firm's capability to facilitate learning for individuals and groups so that new knowledge is developed, distributed, and used. Several past research endeavors (i.e. Li et al., 2010; Liao and Wu, 2010; Chen et al., 2009; Hsu and Fang, 2009; Alegre and Chiva, 2008; García-Morales et al., 2008; Aragón-Correa et al., 2007; Ju et al., 2006) showed the importance of organizational learning to enhancing innovation capability. A firm with better organizational learning has greater capability to develop product and process innovation. Taking all this into account, this study formulated the following hypothesis:

Hypothesis 5: Organizational learning positively influences innovation performance.

The moderating effect of social capital

Social capital has been cited by Jacobs (1993) in (Nahapiet and Ghoshal, 1998, p. 243) as "networks of strong, crosscutting personal relationships developed over time that provide the basis for trust, cooperation and collective action in such communities." Social capital contributes to an organization's ability to manage knowledge and learning by affecting the conditions necessary for the exchange and combination of those resources, resulting in value creation (Dovey and Singhota, 2005; Tsai and Ghoshal; 1998). Social ties and interactions of actors in the network that are both trusting and trustworthy facilitate the exchange of knowledge (Adler and Kwon, 2002; Koka and Prescott, 2002) and the flow and acquisition of tacit knowledge (Lane and Lubatkin, 1998). Some have argued that social capital can expedite the efficiency of information diffusion by minimizing redundancy (Walker, Kogut and Shan, 1997). Such social interaction that promotes mutual trust, effective communication, and coordination will support adaptive efficiency that has implications for creativity and the learning organization. In particular, social capital ensures the motivation and capability of organizational members for innovation (Singh, 2005; Levin and Cross, 2004; Rodan and Galunic, 2004; Sivadas and Dwyer, 2000). Organizations with high levels of social capital have more ability to manage knowledge and learning and to create innovation than those with low levels of social capital (Hoffman, Hoelscher and Sherif, 2005). Supported by the study of Lee and Sukoco (2007), it was found that social capital moderates the effect of entrepreneurial orientation and knowledge management capabilities on organizational performance. Brockman and Morgan (2006) found that cohesiveness moderated the effect of knowledge use and new product development. Taking all this into account, this study formulated the following hypothesis:

Hypothesis 6: Social capital moderates the influences of transformational leadership, knowledge management, and organizational learning on the dependent variables.

In conclusion, this study utilizes a system perspective which takes transformational leadership as an important input, knowledge management and organizational learning as the key processes, and organizational innovation as

a critical output. Moreover, this study regards social capital as having a moderating effect on the influence of transformational leadership, knowledge management, and organizational learning on the dependent variables. According to the literature, this study constructs a research framework, as Figure 1 shows.

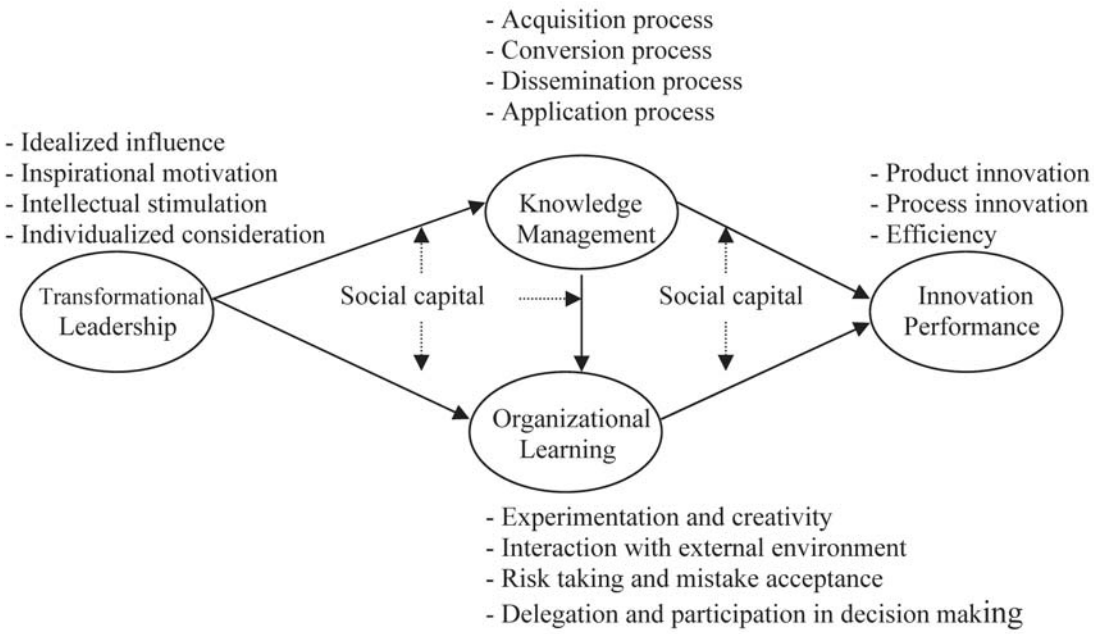

Figure 1: Research Framework

Research Methodology

Sample and Procedure

To test the research hypotheses, this research focused on surveying medium and large manufacturing firms from various industrial sectors in Thailand. Small-sized firms were excluded from this study due to the limited scope of their intelligence gathering processes and learning potential (Richardson, 1996; Sinkula, 1994). This study uses middle managers as the key informants since they play a critical role in determining the nature of organizational learning and knowledge management processes. Middle level managers are the essential drivers of competence developments, and the catalysts in productive organizational learning and knowledge management (Sanchez, 2001). Their attitudes and beliefs provide reliable information regarding

such organizational practices. These respondents were selected on the basis of their availability and willingness to respond. However, in order to gather reliable information, potential respondents had to have been working with the organization for at least one year, with the number of respondents per organization considered both from their total number in the organization and from their willingness to respond.

Surveys were mailed to the middle managers of 954 selected firms, based on the Information of Manufactories in Thailand, Ministry of Industry (2009). Of the 954 manufacturing firms asked to participate, 406 survey responses were submitted. Of those survey responses, 400 were usable, representing a response rate of 41.93%. From these manufacturing firms, usable questionnaires for middle-level management were collected. The characteristics of these samples are described in Table 1-Table 2. The 4,774 respondents had been working in their organization for more than one year and were will representative of the diversity of work environments in an organization. Such potential respondents would provide reliable information about their organizations.

Table 1: The Types of Industries of the Sampling

Type of Industry	Number of Sampling	Percentage in Sampling
Automobile and Auto Parts	47	11.75
Chemicals	55	13.75
Electric, Electronic, and Telecommunication	59	14.75
Food and Beverage	34	8.50
Leather Bags and Footwear	10	2.50
Metallic Products	50	12.50
Pharmaceuticals and Cosmetics	10	2.50
Pulp and Paper	13	3.25
Rubber and Plastics	50	12.50
Textile, Garment, and Fashion	22	5.50
others (i.e. Jewelry, Watches, Toys, Games, Stationery, and Sports)	50	12.50

Table 2: Frequency and Oercentage of Participating Organizations Grouped by Operating Time

Operating Time	Frequency	Percentage
5 to less than 10 years	26	6.50
10 to less than 20 years	195	48.75
Over or equal to 20 years	179	44.75
Total	**400**	**100.00**

Measures

The use of constructs has played an important role in designing survey instruments for management research. The format and content of the questionnaire were initially developed through a literature review. Next, all items of the instrument were reviewed and validated for their contents by nine scholars and practitioners with extensive experience in the organizational learning and knowledge management fields and were reworded according to their suggestions. Then, the questionnaire was refined based on a pilot study conducted with middle managers, and pre-tested with different subjects to those of the pilot.

Transformational Leadership

This study adopts four dimensions from Bass and Avolio (1997). They are: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration. This study draws up a Likert-type 5-point scale, including 12 theory-based items adapted from Bass et al., (2003), Bass and Avolio (1997), and Avolio and Bass (1991) (shown in Appendix A). Using a second-order confirmatory factory analysis, this study validates the scales (χ^2= 76.92 with 46 d.f., NFI = 0.983, GFI = 0.969, CFI = 0.993, IFI = 0.994). Cronbach's alpha coefficient was also computed to test the reliabilities of the transformational leadership scale and they were found to be higher than the 0.7 threshold recommended by Cronbach (1951) as satisfactory (α = 0.892).

Knowledge Management

The dimensions of knowledge management capability consist of knowledge acquisition, knowledge conversion, knowledge dissemination, and knowledge application. This study draws up a Likert-type 5-point scale that includes 12

theory-based items adapted from Lee and Sukoco (2007), Ju et al. (2006), and Gold et al. (2001) (shown in Appendix A). Using a second-order confirmatory factory analysis, this study validates the scales (χ^2 = 112.44 with 45 d.f., NFI = 0.960, GFI = 0.955, CFI = 0.975, IFI = 0.975). Cronbach's alpha coefficient was higher than the 0.7 threshold (α = 0.852).

Organizational Learning

The facilitating factors of organizational learning consist of experimentation and creativity, interaction with the environment, risk taking and mistake acceptance, and delegation and participation in decision making. This study uses the 12 theory-based items developed by Liu et al. (2009), Chiva et al. (2007), and Jerez-Gómez et al. (2005b), drawing up a Likert-type 5-point scale (shown in Appendix A). Using a second-order confirmatory factory analysis, this study validates the scales (χ^2 = 60.60 with 42 d.f., NFI = 0.991, GFI = 0.975, CFI = 0.997, IFI = 0.997). Cronbach's alpha coefficient was higher than the 0.7 threshold (α = 0.926).

Innovation Performance

Innovation performance is measured in three dimensions: product, process, and efficiency. This study uses 12 items adapted from García-Morales et al. (2007), Lee and Sukoco (2007), Ju et al. (2006), Han, Kim and Srivastava (1998), and Hurley and Hult (1998), drawing up a Likert-type 5-point scale (shown in Appendix A). Using a second-order confirmatory factory analysis, this study validates the scales (χ^2 = 62.72 with 38 d.f., NFI = 0.991, GFI = 0.974, CFI = 0.996, IFI = 0.996). Cronbach's alpha coefficient was higher than the 0.7 threshold (α = 0.942).

Social Capital

The three dimensions of Nahapiet and Ghoshal (1998) consist of the structural, the cognitive, and the relational. This study draws up a Likert-type 5-point scale including 6 theory-based items adapted from Liu et al. (2009), Hudspeth (2004), Yli-Renko, Autio and Sapienza (2001), and Tsai and Ghoshal (1998) (shown in Appendix A). Using a first-order confirmatory factory analysis, this study validates the scales (χ^2 = 13.14 with 9 d.f., NFI = 0.983, GFI = 0.989, CFI = 0.995, IFI = 0.995). Cronbach's alpha coefficient was higher than the 0.7

threshold (α = 0.762).

Model and analysis

The LISREL 8.30 program was used to test the theoretical model. This study uses recursive non-saturated models, taking transformational leadership (ξ_1) as the exogenous latent variable, knowledge management (η_1) as the first-grade endogenous latent variable, and organizational learning (η_2) and innovation performance (η_3) as the second-grade endogenous latent variables. The method to test the models and the set of hypotheses in this study was structural equation modeling (SEM), with a two-stage analysis. In terms of a quality measurement model for the full sample, the constructs display satisfactory levels of reliability, as indicated in Table 3, diagonally from 0.852 to 0.942. This study also verifies the presence of good standardized structural coefficients and the reliability of individual construct items, as well as correct composite reliabilities and shared variance for the latent variables. The resulting significant difference of chi-square, as presented in Table 4 and Table 5, indicates good evidence for dimensional discriminant and convergent validity.

Table 3: Validity, Reliability, and Internal Consistency of Scales

Variables	Items	Validity, Reliability, and Internal Consistency			
		λ^{*a}	R^2	A.M.[b]	
TFLEA	LEIA	0.986***(108.854)	0.972	α^c	= 0.892
	LEIM	0.977***(87.388)	0.955	C.R.[d]	= 0.992
	LEIS	0.972***(79.535)	0.945	S.V.[e]	= 0.983
	LEIC	0.998***(f.p.[f])	0.995		
KMCAP	KMACQ	0.857***(34.870)	0.735	α^c	= 0.852
	KMCRE	0.980***(107.396)	0.960	C.R.[d]	= 0.946
	KMDIS	1.000***(f.p.[f])	1.000	S.V.[e]	= 0.904
	KMAPP	0.758***(31.835)	0.574		
OLCAP	OLEXP	0.974***(78.937)	0.948	α^c	= 0.926
	OLEXT	0.993***(f.p.[f])	0.987	C.R.[d]	= 0.995
	OLRIS	0.998***(152.750)	0.996	S.V.[e]	= 0.990
	OLDEC	0.994***(187.783)	0.987		
INNOV	PROD	0.983***(89.156)	0.966	α^c	= 0.942
	PROC	0.989***(f.p.[f])	0.978	C.R.[d]	= 0.992
	EFFI	0.992***(78.422)	0.983	S.V.[e]	= 0.988

***p < 0.001

[a]λ = Standardized structural coefficient

[b]A.M. = Adjustment measurement

[c]α = Cronbach's alpha

[d]C.R. = Composite reliability

[e]S.V. = Shared variance

[f]f.p. = Fixed parameter

Table 4: Discriminant Validity

Construct Comparison	Constrained	Unconstrained	Difference	p-value
TFLEA - KMCAP	282.18	100.53	181.65	0.00
TFLEA - OLCAP	356.61	120.65	235.96	0.00
TFLEA - INNOV	217.61	19.17	198.44	0.00
KMCAP - OLCAP	338.99	208.55	130.44	0.00
KMCAP - INNOV	218.34	115.12	103.22	0.00
OLCAP - INNOV	511.25	223.45	277.80	0.00

Table 5: Convergent Validity

Construct Comparison	Constrained	Unconstrained	Difference	p-value
TFLEA - KMCAP	4430.63	100.53	4430.10	0.00
TFLEA - OLCAP	2188.01	120.65	2067.36	0.00
TFLEA - INNOV	1098.71	19.17	1079.54	0.00
KMCAP - OLCAP	2519.56	208.55	2311.01	0.00
KMCAP - INNOV	1755.91	115.12	1640.79	0.00
OLCAP - INNOV	1048.96	223.45	825.51	0.00

Analysis of Results

For the structural model, Tables 6 and Figure 2 illustrate the parameter estimates and goodness-of-fit indexes. The results indicate that this structure fits the data well because the NFI, PNFI, CFI, RFI, GFI and AGFI are extremely close to the threshold, along with RMSEA and RMR, which are below their threshold. They are adversely affected by sample size; χ^2 does not meet the criteria (p-value = 0.00). However, considering χ^2/df (198.99/100), with its value below 2.00, the fit indices therefore show acceptability in terms of marginal acceptable fitness levels of data to the theoretical model.

Table 6: Parameter, Relationship, and Goodness of fit Statistics

Parameter and Relationship	λ^{*a}	Goodness of Fit Statistics
Direct Effects		
γ_{11} TFLEA -> KMCAP	0.727***(21.950)	χ^2 = 198.99
γ_{21} TFLEA -> OLCAP	0.672***(16.228)	df = 100
β_{21} KMCAP -> OLCAP	0.163***(4.126)	RMSEA = 0.049
β_{31} KMCAP -> INNOV	0.024$^{\text{Not Sig.}}$(1.254)	RMR = 0.037
β_{32} OLCAP -> INNOV	0.908***(39.262)	NFI = 0.991
Indirect Effects		PNFI = 0.944
TFLEA -> OLCAP	0.118***(4.068)	CFI = 0.996
TFLEA -> INNOV	0.735***(22.686)	GFI = 0.938
KMCAP -> INNOV	0.147***(4.107)	AGFI = 0.925
Total Effects		PGFI = 0.781
TFLEA -> KMCAP	0.727***(21.950)	RFI = 0.991
TFLEA -> OLCAP	0.791***(25.788)	
TFLEA -> INNOV	0.735***(22.686)	
KMCAP -> OLCAP	0.163***(4.126)	
KMCAP -> INNOV	0.171***(4.277)	
OLCAP -> INNOV	0.908***(39.262)	

*p < 0.05, **p < 0.01, ***p < 0.001

[a] λ^* = Standardized structural coefficient

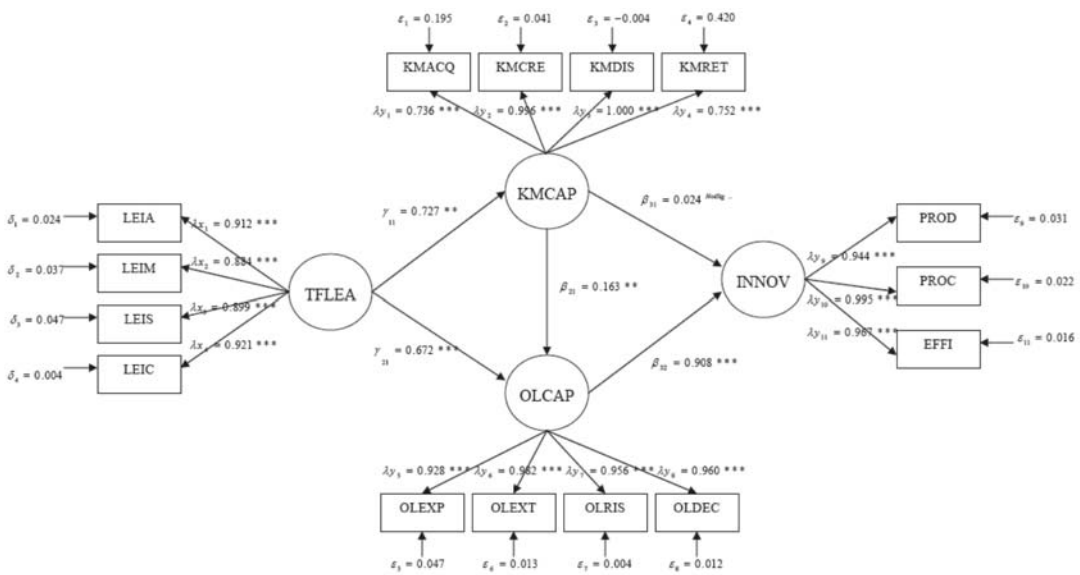

Figure 2: Theoretical Model

Table 6 shows the structural model with standardized coefficients for the research sample. After analysis, this study found transformational leadership to have a significant and positive effect on knowledge management and organizational learning, γ_{11} = 0.727, t = 21.950, p < 0.001 and γ_{21} = 0.672, t = 16.288, p < 0.001, respectively. In addition, transformational leadership has a total effect on organizational learning, with a path coefficient equal to 0.791 (t = 25.788), the result of the indirect effect through knowledge management 0.118 (t = 4.068). The result provides sufficient support for Hypotheses 1 and 2.

Next, this study found knowledge management to have a positive effect on organizational learning, β_{21} = 0.163, t = 4.126, p < 0.001, which supports Hypothesis 3. With unexpected results, this study found knowledge management to have an insignificantly direct effect on innovation performance, β_{31} = 0.024, t = 1.254, p > 0.05, which does not support Hypothesis 4. However, knowledge management has an indirect effect on innovation performance through organizational learning. The total effect of knowledge management on innovation performance was equal to 0.171 (t = 4.277), which is a result of the indirect effect 0.147 (t = 4.107). The indirect effects were shown to be greater than the direct effects. Therefore, this study found that organizational learning mediates the relationship between knowledge management and innovation performance. Regarding the relationship between organizational learning and innovation performance, this study found a positive significant relationship, β_{32} = 0.908, t = 39.262, p < 0.001, which supports Hypothesis 5.

In order to test whether, as hypothesized, social capital moderates the effects of transformational leadership, knowledge management, and organizational learning on the dependent variables, the interaction effects required of the hypothesis by ANOVA (Hair et al., 2006), five separate models were estimated, each testing the joint effects of variables with social capital. The results in Table 7 found the effects of transformational leadership to interact differently with knowledge management and organizational learning under conditions of high and low social capital. These similar results show that under high and low social capital conditions, knowledge management has different effects on organizational learning and innovation performance. Finally, social

capital was seen to influence the effect of organizational learning on innovation performance. In a high and low social capital climate, organizational leaning has different effects on innovation performance.

In summary, with the model's acceptable goodness of fit, it can be concluded that transformational leadership has a significant effect on knowledge management and organizational learning capabilities, resulting in enhanced organizational innovations. If a firm needs to enhance its ability to create new products and services, to increase its effective leadership in transformational roles, this will improve its knowledge acquisition, conversion, dissemination, and application capabilities, and will encourage its members to be proactive and willing to try to do new things and new ways to do old things, resulting in improvement to product, process, and efficient innovation. Knowledge management capability influences organizational learning positively; however, it has an insignificant effect on organizational innovation. Organizational learning capability has a significant effect on organizational innovation and is an important mediator between knowledge management capability and organizational innovation. These findings suggest that social capital moderates the effects produced by transformational leadership, knowledge management, and organizational learning. When social capital is high, an organization tends to have greater improvement in its innovation performance than with low social capital. In the same manner, the effects of transformational leadership, knowledge management, and organizational learning on the dependent variables are also moderated by social capital.

Table 7: Moderating Effects of Social Capital

Transformational Leadership X Social Capital		
Independent X Moderating Variable	**Dependent Variables**	
Group	**Knowledge Management**	**Organizational Learning**
1. High TFLEA		
High SOCAP (n = 77)	3.823	3.890
2. High TFLEA		
Low SOCAP (n = 23)	3.708	3.656
3. Low TFLEA		
High SOCAP (n = 101)	3.597	3.464
4. Low TFLEA		
Low SOCAP (n = 199)	3.372	3.180
F-value	142.30	156.07
P-value	0.000	0.000
Dunnett T3	1, 2 and 3, 4	1,2,3,4

Knowledge Management X Social Capital		
Independent X Moderating Variable	**Dependent Variables**	
Group	**Organizational Learning**	**Innovation Performance**
1. High KMCAP		
High SOCAP (n = 9)	3.929	3.846
2. High KMCAP		
Low SOCAP (n = 224)	3.526	3.523
3. Low KMCAP		
High SOCAP (n = 59)	3.708	3.691
4. Low KMCAP		
Low SOCAP (n = 108)	3.233	3.246
F-value	113.77	83.82
P-value	0.000	0.000
Dunnett T3	1 and 3,2,4	1 and 3,2,4

Table 7: Moderating Effects of Social Capital (Continued)

Organizational Learning X Social Capital	
Independent X Moderating Variable	**Dependent Variable**
Group	**Innovation Performance**
1. High OLCAP	
High SOCAP (n = 46)	3.809
2. High OLCAP	
Low SOCAP (n = 145)	3.629
3. Low OLCAP	
High SOCAP (n = 142)	3.400
4. Low OLCAP	
Low SOCAP (n = 67)	3.101
F-value	332.32
P-value	0.000
Dunnett T3	1,2,3,4

Discussion

Discussion

This study proposes and tests a comprehensive model that explicitly articulates the roles of various key variables that in past research received only partial and independent attention. This model is totally new to former research. Since transformational leadership is an important input, a firm will have to exercise both knowledge management and organizational learning capabilities well in order to lever organizational innovation. The major findings and implications are discussed as follows.

Firstly, the results present transformational leadership as having a significant positive effect on knowledge management and organizational learning capability. This finding is consistent with research by Gowen et al. (2009), García-Morales et al. (2008), and Crawford (2005), showing that transformational leaders have a significantly positive effect on knowledge management. This is also consistent with research by Yeo (2006), Ke and Wei (2006), and Aksu and Ozdermir (2005), indicating that transformational leaders have a significantly positive effect on organizational learning. Effective leaders in transformational roles will create a spirit of trust,

enable transmission and sharing of knowledge, seek out good ideas, and encourage risk-taking behavior in their members. They will also empower their members by developing a shared vision, delegating authority, and establishing a knowledge infrastructure and support system that engender creativity. Such leaders are vital links for knowledge creation by seeking solutions from different areas of the organization. In this way, organizations are more likely to develop the cognition and communication processes that lead to the improvement of knowledge management and organizational learning capability.

Secondly, the results of the structural equation model indicate that knowledge management affects organizational learning positively. This finding shows that with more knowledge management in organizations, there is more organizational learning capability. This finding is consistent with research by Liao and Wu (2010), Jerez-Gómez et al. (2005b), and Lin and Lee (2004), which indicate that knowledge management affects organizational learning. While the complementary knowledge management processes capture and develop an organization's knowledge, organizational learning plays the role of improving a firm's knowledge-base, which contributes to organizational innovation.

Thirdly, the main theoretical contribution of this study to organizational learning is the mediation of knowledge management and organizational innovation. After empirical analysis, knowledge management was deemed a first-order capability in enhancing organizational learning, and resulting in organizational innovation outcomes. This finding is consistent with research by Liao and Wu (2010), Chen et al. (2009), and García-Morales et al. (2008). However, empirical evidence in this study failed to support a direct relationship between knowledge management capability and organizational innovation. An unexpected result can be understood by the concept of "knowledge inertia" in which people usually use prior knowledge and experience for solutions. Generally, people increasingly focus on activities in which they are more competent with greater frequency than those in which they are less competent (Liao, 2002; Levinthal and March, 1993), thus their attention is led away from other bases of experience and knowledge. Although exploitative activities help firms to quickly learn and adapt in the short term, those same activities may eventually inhibit organizational responsiveness to major

environmental changes (Sharifirad, 2010; Liao, Fei and Liu, 2008), resulting in less competence being built into their firm. Support for this explanation in a study by Sharifarad (2010) finds that there is a higher tendency for learning through exploitation rather than exploration. This research has shown that when a member of an organization has less learning inertia, the performance of the organizational learning will be better. A study by Darroch (2003) finds knowledge acquisition to have a more indirect effect on innovation than it does a direct effect. Thus, the results of this study contribute to the view that organizational learning plays a bridging role to connect knowledge management and organizational innovation. In order to balance exploitative and exploratory innovations under different environmental conditions, organizational learning practices streamline organizational activities, improve efficiency, and exacerbate resistance to change.

Fourthly, the results indicate that there is sufficient evidence to support a relationship between organizational learning and organizational innovation. The empirical evidence in this study implies that organizational learning affects organizational innovation. This concurs with study by Liao and Wu (2010), Liao et al. (2008), and Weerawardena, O'Cass and Julian, (2006), showing that the more organizational learning, the more organizational innovation. Organizational learning capability plays an important role in encouraging members to share, exchange, interpret, and integrate their specialized knowledge, skills, and experiences in order to create new knowledge and understanding from different perspectives. Organizational learning sustains creativity, inspires new knowledge and ideas, and increases the ability to understand and apply these. Accordingly, this study encourages organizational learning by its mutual inclusion of organizations and members with each other in order to increase organizational innovation.

Finally, social capital moderates the effects produced by transformational leadership, knowledge management and organizational learning. These findings suggest that where a firm promotes a spirit of mutual trust, effective communication, cooperation, and collective action through its empowerment of individuals and groups to explore and exploit new knowledge, this will facilitate more shared learning and knowledge flows among its members, leading to increased organizational innovation. Such social network ties enhance explicit and

implicit knowledge exchange among individuals and/or groups. This will help them to address both the undersupply and oversupply of knowledge and transform such knowledge into product and service offerings. In addition, processes of interaction and communication will foster shared meaning, understanding, and learning among individuals and groups. They share the belief that innovative ideas are a valuable aspect of staying competitive in the marketplace. Thus, social capital is necessary for sustaining both knowledge management and organizational learning.

Practical Implications

On the basis of these findings, it is suggested that managers strengthen efforts to promote their members' on willingness to act, risk taking, initiative, freedom, and anticipation of the future. In addition, they ought to perform as a role model for innovation and risk taking, and they ought to hold their organization together in commitment to experimentation and innovation. Also, they ought to build a shared vision, challenge mental models, and encourage organizational learning activities at all times. Furthermore, a firm must implement knowledge management thoroughly, accompanied by organizational learning, so that organizational innovation will expand. If an organization ignores organizational learning, knowledge management will not promote organizational innovation directly. Finally, it is suggested that managers strengthen their efforts to promote mutual trust, and effective communication and coordination with their subordinates, based on the willingness of their staff to ensure the motivation and capability of organizational members for innovation.

Potential Limitations

There are some limitations to this study, in particular its single source, the self-reporting style. The use of cross-sectional data with questionnaires was another limitation to the study. In addition, due to time constraints and data availability, viable longitudinal research was not conducted. At some time in the future, this limitation should be overcome by using longitudinal data. Aside from the limitations of self-reported research, sampling generality was another limitation of the study, with its application to one specific national context only—that of

medium to large manufacturing firms in Thailand. Readers should note the need for caution when generalizing results in application to other, differently-sized cultural contexts. Future research will profitably overcome this limitation by examining different phenomena in the context of a wide variety of organizations, expanding the scope of this kind of research.

Future Work

This study examines transformational leadership as an antecedent influence on knowledge management and organizational learning. Future research should investigate other antecedents, such as organizational structure, strategy, and knowledge type. For additional study, the model could include such moderating variables as industry type, firm-size, and knowledge management strategies. Furthermore, the interrelations among knowledge management, organizational learning, and organizational innovation could also be investigated in greater detail.

Conclusions

This study demonstrates the important role of transformational leadership in promoting knowledge management and organizational learning capabilities. It also studies the relationship between knowledge management, organizational learning, and organizational innovation. The moderating effect of social capital was additionally investigated. Based on the 400 valid subjects, this paper has implemented a structural equation model to test the research framework and hypotheses. Results show that transformational leadership is an important input for organizations that desire to enhance their knowledge management and organizational learning capabilities. Knowledge management has an insignificant direct effect on organizational innovation. However, through organizational learning, knowledge management impacts organizational innovation. Therefore, managerial organization should occur on the way towards organizational learning. By thoroughly engaging in knowledge management and organizational learning implementation, organizational innovation will result. Finally, the results indicate that social capital moderates the effects of transformational leadership, knowledge management, and organizational learning on the dependent variables.

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Appendix A

Transformational Leadership

Idealized Influence

1. In your organization, leaders always listen to others' opinions in making decisions for the good of the group.
2. In your organization, leaders always respect the opinions and abilities of members to function creatively.
3. In your organization, leaders actively express new ideas.

Idealized Motivation

4. In your organization, leaders talk about what needs to be accomplished to reach organizational goals through organizational learning and knowledge strategies.
5. In your organization, leaders clearly design various programs/projects to support organizational learning and knowledge strategies.
6. In your organization, leaders insist that members should have continuous learning in order to achieve individual and organizational goals.

Intellectual Stimulation

7. In your organization, leaders purposefully seek different perspectives when solving problems.
8. In your organization, leaders always encourage experimentation and reflect on new knowledge with members so that it can be used.
9. In your organization, leaders always suggest that members seek new ways to complete assignments.

Individualized Consideration

10. In your organization, leaders take on the roles of coaches, mentors, and facilitators for members' learning development.
11. In your organization, leaders consider an individual as having different needs, abilities, and aspirations in learning.
12. In your organization, leaders always support members to continuously develop their skills, knowledge, and expertise.

Knowledge Management

Acquisition Process

1. Your organization has directories or e-mail to support people to find an internal expert on a specific issue.
2. In your organization, people can easily access and call for the specialized knowledge held by others.
3. In your organization, people easily access knowledge generated/modified during a particular task from another functional area via formal supporting mechanisms (e.g. intranet or knowledge-base).

Conversion Process

4. In your organization, people within and across units have meetings (both formal and informal) to share and exchange their knowledge/experiences.
5. Your organization supports meetings, sharing, exchanging and interpreting knowledge/experiences with each other to generate the best practices that people can apply to their tasks.
6. Your organization has the systems (such as mentoring, coaching, and on-the-job-training) to support people in sharing, exchanging, and interpreting knowledge/experiences with supervisors/experts within and across units.

Dissemination Process

7. Your organization creates a work environment using job rotation, training, or special assignments to make individuals aware of other people or department duties.
8. Your organization has functional units or individuals responsible for collecting, assembling, and distributing up-to-date information and knowledge to people throughout the organization.
9. Your organization uses the storytelling or case study technique to share and distribute organizational success and failure to its people.

Application Process

10. In your organization, knowledge/experiences that are shared, exchanged, and interpreted in meetings are documented for others to access and utilize later.
11. Your organization has various formal mechanisms for supporting people within and across units to share, exchange, and interpret knowledge/experiences (e.g. knowledge base, web technology, blog, e-learning and e-communities).
12. In your organization, people can clearly see how different pieces of knowledge combine and fit together.

Organizational Learning

Experimentation and Creativity

1. In your organization, people are always supported and encouraged to present new ideas or approaches for work performance improvement.
2. In your organization, new initiatives are praised or rewarded.
3. In your organization, new ideas or approaches that people present will be responded to and applied in their work.

Interactive with External Environment

4. In your organization, people receive information about environmental trends (i.e. competitors, customers, markets, and others) in order to adjust their work practices properly.
5. In your organization, people have the chance to learn the work practices of outside organizations in order to exploit in their tasks.
6. In your organization, it is the part of the work to collect, bring back and report information to supervisors about what is going on outside the organization.

Risk Taking and Mistake Acceptance

7. In your organization, people have the chance to solve problems and make decisions about tasks by themselves.
8. In your organization, people are given time to share and exchange information about their past mistakes and successes with each other.

9. In your organization, people always have the chance to undertake new and challenging projects or assignments.

Delegation and Participation in Decision Making

10. In your organization, people are given the chance to know the gaps between their current and expected performance in order to adjust their work practices properly.
11. In your organization, people are encouraged to question and provide feedback about working with each other.
12. Your organization provides the chance for people to present different perspectives in order to obtain to the best solution.

Innovation Performance

Product Innovation

1. Your organization launches new products or services frequently.
2. The rate of introduction of new products or services in your organization has grown rapidly.
3. In comparison to the major competitor, your organization has become much more product innovative.
4. In comparison to the past year, you organization has become much more product innovative.

Process Innovation

5. Your organization adopts new management practices to improve operating performance frequently.
6. The rate of the introduction new methods of production or rendering of services in your organization has grown rapidly.
7. In comparison to the major competitor, your organization has become much more process innovative.
8. In comparison to the past year, your organization has become much more process innovative.

Efficiency

9. The success rate of launching new products or services is high.
10. Your organization has the ability to improve products or process innovation to be responsive to new market demands.
11. Your organization has the ability to rapidly commercialize new innovations.
12. Your organization has the ability to anticipate potential market opportunities for new products or services.

Social Capital

1. In your organization, people spend a lot of time listening to problems and seeking solutions with each other.
2. In your organization, people help each other by putting themselves in others' positions or situations.
3. In your organization, whenever people state their view, they also ask what others think.
4. In your organization, people are open to criticism from each other.
5. In your organization, people believe that they will get answers from their colleagues when they have work problems.
6. In your organization, people have respect for each other.