

The Role of Middle Managers in Knowledge Management Implementation for Innovation Enhancement

Laith Ali Yousif AL-Hakim and Shahizan Hassan

Abstract—Understanding the role of middle managers in the context of knowledge management and innovation is crucial for contemporary organizations. In today's business environment, knowledge management has become as a lifeline of organizations. However, the complexity of knowledge management implementation has increased gradually due to unclear relationship between the role of middle managers and successful KM implementation. Furthermore, there is also a lack of an integrated framework for KM implementation. With this in mind, we attempted to provide a theoretical framework for understanding the relationships among middle managers role, knowledge management implementation and innovation. The research framework of the present study is developed based on holistic theory of knowledge, and resource-based view and knowledge-based view theories. In addition, this study seeks to ascertain the influence of knowledge management implementation on innovation. The study found that middle managers role is indeed very imperative in determining the successful implementation of knowledge management, which is directly correlated to innovation enhancement.

Index Terms—Middle managers role; knowledge management implementation; critical success factors of knowledge management; knowledge management strategies; knowledge management processes and innovation.

I. INTRODUCTION

In the knowledge-based economy era, the superior organizations depends more on its knowledge-based resources [1], [2], [3], [4]. Therefore, effective Knowledge Management (KM) implementation has become increasingly important to enhance innovation [5], [6]. However, Anderson revealed that although contemporary organizations have spent billions of dollars to implement KM, its implementation has yielded only marginal results. The percentage of failure in the implementation ranges from 50 to 70% [7]. Because there are risks of failure in KM implementation [8] [9], many researchers seek to understand why this is so.

Although there is a large number of KM implementation frameworks, organizations still face difficulty with KM implementation due to a lack of an integrated framework of

KM implementation [10], [11], [12], [13]. Current KM frameworks have neglected the nature of the relationship between workers and successful KM implementation, which is reflected in the limited studies that investigated the relationship between middle managers role and successful KM implementation [14], [15], [16], [17], [18], [19], [20], [21]. Furthermore, there is limited KM frameworks that focused on integrating the core requirements of successful KM implementation, which include Critical Success Factors (CSFs) of KM, KM processes and KM strategies [5], [8], [22], [23], [24], [25], [26], [27]. Therefore, it cannot be denied that the lack of understanding the core requirements of successful KM implementation leads to the lack in studies, which attempt to investigate the relationship between KM implementation and innovation [5], [6].

Due to the above mentioned gaps, the issue of the relationships among middle managers role, successful KM implementation and innovation remains unclear, and there are very limited studies in this area. Therefore, this study contributes to the previous studies by investigating these relationships in two aspects (i) the direct relationship between middle managers role and successful KM implementation, and (ii) the direct relationship between KM implementation and innovation.

II. MIDDLE MANAGERS CONCEPT

The middle managers could be defined as “managers occupying positions that fall within a range of two levels below the head of the organization and one level above supervisory staff or professional workers” [67], [19].

III. THE ROLE OF MIDDLE MANAGERS IN KNOWLEDGE MANAGEMENT IMPLEMENTATION

In order to achieve successful KM implementation, organizations need to determine the crew members responsible for it. Therefore, this section discusses the responsible crew members for KM implementation and how they are identified.

Nonaka and Takeuchi are among the first to coin the term “Knowledge Crew”. This concept refers to the crew members responsible for the identification, promotion and creation of knowledge within the organization. The knowledge crew consists of three key people in the organization: the knowledge officers (top management), the knowledge engineers (middle managers), and the knowledge

Laith Ali Yousif AL-Hakim , PhD Candidate, College of Business, Universiti Utara Malaysia, 06010 UUM Sintok, Kedah, Malaysia. s91869@student.uum.edu.my

Assoc. Prof Dr. Shahizan Hassan, College of Business, Universiti Utara Malaysia, 06010 UUM Sintok, Kedah, Malaysia. shahizan@uum.edu.my

practitioners (front-line employees) [29]. Table 1 briefly describes the roles of the knowledge crew

TABLE 1: COMPARISON OF THE THREE MANAGEMENT MODELS REGARDING KNOWLEDGE CREATION

	Top-down	Bottom-up	Middle-up-down
Who Agent of knowledge Creation	Top management	Entrepreneurial Individual	Team (with middle Managers as Knowledge engineer
Top management role	Commander	Sponsor/mentor	Catalyst
Middle management role	Information processor	Autonomous Entrepreneur	Team leader
What Accumulated Knowledge	Explicit	Tacit	Explicit and tacit
Knowledge conversion	Partial conversion Focused on Combination/Internalization	Partial conversion Focused on Socialization/Externalization	Spiral conversion of Internalization/Externalization/Combination/Socialization
Where Knowledge storage	Computerized Database/manuals	Incarnated in Individuals	Organizational Knowledge base
How Organization	Hierarchy	Project team and Informal network	Hierarchy and task Force(hypertext)
Communication	Orders/instructions	Self organizing Principles	Dialogue and use of Metaphor/analogy
Tolerance for Ambiguity Weakness	Chaos/fluctuation not allowed High dependency on Top management	Chaos/fluctuation Premised Time consuming cost of coordinating individuals	Create and amplify Chaos/fluctuation Human exhaustion Cost of redundancy

Source: Nonaka and Takeuchi [28:130]

According to Nonaka and Takeuchi, knowledge creation generally starts from middle managers who are considered the true “knowledge engineers” of creating new knowledge in the organization. They are responsible for synthesizing tacit knowledge of top management and front-line employees, and transfer it into explicit knowledge. They are also able to create a spiral of knowledge across different functional areas in the organization structure. Accordingly, middle managers play a central role in KM implementation [19].

In recent years, several studies have been conducted to measure the effective role of middle managers in creating various new knowledge perspectives. All of these studies have agreed that the role of middle managers has shifted from just being a link between top management and operational supervisors to a new role that seeks to create knowledge and utilize knowledge through the provision of innovative work, which is reflected in the OP [14] [15] [16] [17] [18] [19].

Janczak explored the dynamics and new roles of middle managers in the creation and integration of knowledge. The author noted that the middle managers used three behavioral roles, which are analytic, intuitive and pragmatic, which are integrated with knowledge modes to create new knowledge [16]. Table 2 below summarizes the relationship between middle managers roles and knowledge modes.

TABLE 2: THE RELATIONSHIP BETWEEN MIDDLE MANAGERS ROLES AND KNOWLEDGE MODES

	Analyst	Intuitive	Pragmatic
Development time	Short term	Medium/long term	Long term
How people are influenced	Authoritarian logic	Emotional logic	Conciliatory logic
Result	Delivering a solution	New work method	Repositioning
Change orientation	Stability/planned	Renewal	Adaptation/incremental
Action process	Reactive	Proactive	Interactive
Nature of knowledge	Explicit	Tacit and explicit	Tacit and explicit
Knowledge initiative	Implementing imported solution	Experimenting new options	Adaptation
Knowledge approach	Collecting external knowledge	Creating and pursuing new opportunities; supporting workers' initiatives	Linking dispersed knowledge, skills, and best practices internal to or across departments.
Nature of results	Technical conformity/standardization	Satisfaction and professional creativity	Satisfying
Feedback/evaluation	No feedback	At the end	Continuous
Knowledge goal	Truth	Pleasure	Utility
Preferred knowledge roles	Problematic searcher, passive filter	Radar, catalyst, active filter	Opportunistic searcher, connector, missionary

Source: Janczak [17: 221]

Based on the above, the modern role of middle managers has become a source of knowledge and leaders of knowledge worker [19], [28]. Thereby, the aim of middle managers is not a mere focal creation of new knowledge and transferring it between top management and the front line workers, but their aim is to achieve success of KM implementation.

IV. KNOWLEDGE MANAGEMENT CONCEPT

In the literature, the main aim of KM is achieving innovation, so there are many researchers who have given definition of KM as a systematic methodology to innovation. According to Payakpate, KM is referred to “the debate and systematic coordination of an organization's people, technology, processes and organizational structure, in order to add value through reuse and innovation.” [29: 38]. In addition, it is referred to “specific routines that shape the knowledge base of the organization and make it accessible in the innovation process.” [22: 55].

V. THE CORE REQUIREMENTS OF KM IMPLEMENTATION

Numerous studies have shown that KM implementation is able to help achieve or maintain success of contemporary organizations. KM implementation is said to be the best way to improve organization's ability in various aspects such as innovation [30], [31], [32], [33], [34], [35].

Therefore, researchers have resorted to the development of several frameworks to achieve successful KM

implementation. But these frameworks differ in their orientation depending on the different viewpoints of the researchers [12]. The KM framework is defined as a guide to implement knowledge management in an organized way [11], [36].

There are many KM implementation frameworks in the literature. Despite this, many organizations are still not able to implement KM successfully. This may be due to the limited comprehensive framework in this area [10], [11], [12], [13], [37]. Review of literatures identifies 23 frameworks of KM implementation that involves three main elements which are critical success factors (CSFs) of KM, KM strategies and KM processes. These three elements have been widely acknowledged in the literature as core requirements of successful KM implementation [38], [39], [40], [41], [42], [43]. Table 3 provides a summary of the core requirements of KM implementation frameworks.

TABLE 3: CORE REQUIREMENTS OF KM IMPLEMENTATION FRAMEWORKS

Requirement	Framework
CSFs of KM	A basic discipline underlying knowledge management and its enabling factors [44].
	A factor model of knowledge management system implementation [45].
	A framework of factors influencing KM initiatives in a project-based context [38].
	A success model of KM implementation [46].
	A generic knowledge management framework [22].
KM strategies	A framework of KM enablers [39].
	A strategic framework for mapping knowledge [47].
	A process oriented KM approach [48].
	A knowledge management system dependency model (KMSDM) with defined relationships [43].
	A practical framework for knowledge [49].
KM processes	A strategic knowledge management framework [40].
	The knowledge value proposition strategy (KVSP) framework [50].
	A knowledge creating company [28].
	Building blocks of knowledge management [51].
	A KPMG knowledge management framework [52].
	The tasks of knowledge management [53].
	A knowledge management event chain [54].
	A knowledge management process framework [55].
	A process model [56].
	A process model [57].
A knowledge chain model [58].	
A knowledge management process model [41].	
A knowledge life cycle [42].	

Table 4 provides a summary of definitions and dimensions of the core requirements of KM implementation.

TABLE 4: DEFINITIONS AND DIMENSIONS OF THE CORE REQUIREMENTS OF KM IMPLEMENTATION

Requirement	Definition	Dimension	Resource
CSFs of KM	Are managerial and organizational factors that	Human resource management	[13],[60],[61],[62],[63],[64],[65],[66],[67],[68]
		Information	[6],[13],[44],[60],

need to be effectively addressed in order to further the likelihood of successful knowledge management implementation [59]	technology	[61],[62],[63],[65],[69],[70],[71],[72],[73],[74],[75],[76],[77]	
	Leadership	[13],[44],[60],[61],[69],[75],[76],[78]	
	Organizational learning	[6],[44],[66],[69],[73],[78]	
	Organizational strategy	[13],[27],[61],[69],[70],[65],[75],[79],[80]	
	Organizational structure	[6],[27],[44],[70],[71],[72],[62],[63],[64],[65],[78],[79],[80]	
KM strategies	Organizational culture	[6],[13],[62],[63],[64],[65],[69],[70],[71],[72],[75],[76],[77],[78],[80],[81],[82]	
	Codification	[6],[48],[83],[84],[85],[86],[87],[88],[89]	
KM processes	Personalization	[6],[48],[83],[84],[85],[86],[90],[91]	
	Knowledge creating	Knowledge organizing	[52],[77],[94],[95],[96],[97],[98]
		Knowledge storage	[94],[97],[99]
		Knowledge sharing	[68],[96],[100],[101]
	Knowledge utilization	[68],[76],[96],[97],[96],[98],[100]	

VI. INNOVATION

In the literature, innovation is defined in many different ways. However, it is defined as “the creation of new knowledge and ideas to facilitate new business outcomes, aimed at improving internal business processes and structures and to create market driven products and services” [103:21]. In addition, it is defined as “innovation is a process wherein knowledge is acquired, shared and assimilated with the aim to create new knowledge, which embodies products and services” [10: 341]. Thereby, this study adopts the definition of innovation as a knowledge-based process to create new ideas, markets, products and services toward overall OP improvement.

VII. TYPES OF INNOVATION

Literatures on innovation indicate a variety of types of innovation [105], [106], [107], ranging from incremental to radical, for example. Some researchers group the types of innovation into three main categories: administrative and technical, product and process, and radical and incremental [108]. The reasons why organizations adopt different types of innovations are because of environmental conditions, organizational factors, generation processes of innovation, and organizational sector. Table 5 provides a summary of the different types of innovation organizations adopt.

TABLE 5: TYPES OF INNOVATION

Types of innovation	Author and year
Incremental innovation and radical innovation	[35], [108], [109], [110], [111], [112], [113]
Administrative innovation and technical innovation	[32], [108], [114], [115], [116], [117], [118], [119]
Product innovation, process innovation, administrative innovation, marketing innovation and service innovation	[120]
Product and process innovations	[108], [121], [122], [123],
Service innovation, technological process innovation, and administrative process innovation	[105]
Incremental innovation, innovation changes and innovation destroys	[109]

Despite innovation is a multi-type activity, this study will adopt the results of previous studies that considered the technological innovation, administrative innovation, radical innovation and incremental innovation as main reasons to the survival and growth of organizations [119], [124], [125], [126], [127], [128].

Technical innovation is the knowledge that links methods, components, and techniques with processes to create a product or service [129]. Administrative innovation refers to the changes in organizational structure and processes, like the authority, tasks structuring, personnel recruitment, resources allocation and rewards [120]. Radical innovation is the main change that represents a new technological pattern [130], and requires more organizational capabilities and superior profundity of knowledge [110], [112]. Incremental innovation is defined as small technological changes in organization to create products or services [130]. As such, unlike radical innovation, it does not require much organizational capability [110], [112].

VIII. KNOWLEDGE MANAGEMENT IMPLEMENTATION AND INNOVATION

The main objective of this section is to identify studies that have investigated the relationship between KM and innovation. To do so, the researchers classify previous works into three categories based on the core requirements of KM implementation: (1) the relationship between critical success factors of KM and innovation; (2) the relationship between KM strategies and innovation; and (3) the relationship between KM processes and innovation.

A. Critical Success Factors of KM and Innovation

For the first category, the researchers have identified seven critical success factors of KM, and they are human resource management, information technology, leadership, organizational learning, organizational strategy, organizational structure and organizational culture. These factors are important for successful KM implementation to create, support and enhance innovation.

Gloet and Terziovski indicate that the success of innovation performance, which includes new process, product and service, depends highly on the integration of KM processes with soft HRM activities and hard information technology activities. It is considered the main CSFs of KM. The results show that there is a positive relationship between KM processes-based on IT and HRM, and innovation [131].

Merx-Chermin and Nijhof pointed out that the CSFs of knowledge creation are regarded as a major motive and main resource for innovation processes in the organization. These factors include strategy, organizational climate leadership, system and procedures, personal characteristics and organizational structure [132].

Lin examined the relationship between knowledge sharing and innovation capability. The results show that an increasing innovation capability to create new service, new product and new idea depends on the effectiveness of knowledge sharing processes, which consist of donating and collecting knowledge. In this regard, the researcher indicates that the top management support, helping others and self-efficacy are considered the main CSFs of knowledge sharing effectiveness. However, the researcher noted that there is a gap between the CSFs of knowledge sharing and innovation. Therefore, the researcher recommended future researchers to examine other CSFs that could affect knowledge sharing processes to enhance innovation capability [133].

Brachos et al. indicate the few studies that have examined the relationships among organizational context, knowledge transfer and innovation. The results show organizational factors, which include trust, motivation to transfer knowledge, management support and learning orientation which have a positive effect on knowledge transfer in order to enhance innovation [134].

Rhodes et al. stated that there is a lack of substantial empirical studies that have examined the relationships between critical organizational factors, knowledge transfer strategies and innovation. They noted that the IT systems, learning strategies, trust culture, and flexible structure and design have positive effect on knowledge transfer strategies. In addition, the consistence of strategy codification and personalization of knowledge transfer have positive effect on product innovation and process innovation. Apart from that, the researchers have suggested examining these factors in the future with different sectors and cultures [6].

Chang and Lee argued that enhancing administrative and technical innovation could come from knowledge accumulation capability, which includes accumulation, storage, obtainment, selection, expansion and establishment. They also noted that organizational culture and external entailment are regarded as a permanent source of knowledge

accumulation capability. Therefore, the results indicate that knowledge obtainment capability has a positive effect on administrative and technical innovation. In addition, knowledge expansion capability also has a positive effect on administrative innovation. Furthermore, organizational culture and external entailment have a positive effect on knowledge accumulation capability, which is reflected on innovation [32].

Sáenz et al. highlighted the role of CSFs of knowledge sharing in increasing innovative capability. The results showed that information technology, employees and processes have a positive effect on knowledge sharing effectiveness. Subsequently, knowledge sharing has a positive effect on enhancing innovation capability in many aspects such as new ideas, innovation projects and cost efficiency. They further noted there is a lack of empirical studies that examined the CSFs effect of knowledge sharing on the innovational capability of organizations. Hence, they recommended that future studies should be conducted to test these factors with other samples [35].

Chen and Huang concluded that the HRM practices have indirect effect on innovation performance through KM capacity. They found that HRM practices, which include performance appraisal, compensation, staffing, participation, and training have a positive effect on KM capacity. They also revealed a positive relationship between acquisition, sharing and application, which are considered KM capacity, and innovation performance, measured as administrative and technical innovation [31]. In a similar vein, Liao and Wu found that organizational learning capabilities contribute to the success of KM practices, which in turn lead to the creation of innovation [34].

Based on the above, there is an agreement among the previous studies with the opinion of the researchers in selecting the CSFs of KM to investigate the relationship between KM implementation and innovation.

B. KM Strategies and Innovation

The second category is related to the relationship between KM strategies and innovation. The literature indicates two strategies of KM which are codification and personalization. Darroch and McNaughton emphasized that increased innovation requires different knowledge resources and hence different KM strategies [109]. Forcadell and Guadamillas illustrated that KM implementation is a strategy to improve innovation. KM as a strategy consists of creation, storage, distribution and application to create new knowledge [135].

Rhodes et al. noted the effect of strategy codification and personalization, which is regarded as a knowledge transfer strategy, on innovative capabilities, which include product innovation and process innovation, due to the lack of empirical studies that investigated the relationship between KM strategies and innovation. They suggested that there is a need for further research on other industries. Based on this recommendation, the present study is undertaken [6].

Based on the above, there is an agreement in the previous studies with the opinion of the researchers in selection of KM strategies to investigate the relationship between KM implementation and innovation.

C. KM Processes and Innovation

The third category focuses on the relationship between KM processes and innovation. The literature identifies five KM processes, which are knowledge creation, knowledge organization, knowledge storage, knowledge sharing, and knowledge utilization. Cardinal et al. indicate that the knowledge accumulation capabilities, which include storage, obtainment, selection, expansion and establishment, could improve organizational innovation [136].

Darroch and McNaughton revealed that there is a lack of empirical studies that examined the relationship between KM and innovation. The researchers find that the effective incremental types of innovation are changed and destroyed depending on the effectiveness of KM processes, which include acquisition, dissemination and responsiveness. However, they found that knowledge dissemination does not affect innovation, contrary to what they hypothesized. Because of this finding, they recommended further research to be conducted to confirm further the results obtained [109].

Jantunen emphasized that an organization can be more innovative when it can create new knowledge. He measured knowledge processes in terms of acquisition, dissemination and utilization to enhance innovation in the organization. The results indicate that KM processes have a positive relationship to effective innovation activities [102].

Ju et al. developed a strategic contingency model to investigate the relationship between KM processes and innovation. They found a direct effect of KM processes, which include acquisition, conversion and application, on organizational innovation, measured in terms of product innovation and processes innovation. The researchers noted the lack of empirical studies that investigated the relationship between KM capability processes and innovation. They suggested applying this model in different industries and under different cultural environments [137].

Deyong et al. analyzed the relationship between tacit knowledge and innovation capability. They emphasized the organization must know about the effect of internal factors on tacit knowledge. These factors are knowledge bacterial strain, knowledge body, knowledge enzyme, knowledge environment, knowledge tools, and knowledge fermenting bar. The results indicate that improving innovation capability depends on the degree of exploiting tacit knowledge in organizations [138].

Jiang and Li investigated the relationship between knowledge sharing and creation and innovation performance. They found that knowledge sharing, creation, and interaction have direct relationships to innovative performance. In addition, the interaction of knowledge sharing and creation is more important to improve innovation performance [139].

Tan & Nasurdin augured that the best way to improve technological innovation is to continually effectiveness of KM processes. The study results show the effectiveness of acquisition, sharing and application have positive relation with product and service innovation [140].

In the literature, the previous studies agree with the opinion of the researchers in the selection of KM processes to investigate the relationship between KM implementation and innovation.

To sum up, based on previous works, it appears that KM implementation is important to create more innovation [32], [35], [102], [134]. Forcadell & Guadamillas described the relationship between KM and innovation in a few words: ‘Innovation as a goal and KM as a method’ (p.168) [135]. But despite the aims of KM in creating, supporting and enhancing innovation, there is a lack of empirical studies that examined the relationship between KM and innovation [6], [35], [109], [137], [133].

IX. CONCEPTUAL FRAMEWORK

From the previous arguments, the middle managers role that consists of analyst, intuitive and pragmatic is regarded as the best way to implement KM [16], [17]. On the other hand, the successful KM implementation is reflected on improvement of innovation [110], [112], which consist of technological innovation, administrative innovation, radical innovation and incremental innovation [85], [119], [128], [141].

Based on the above, the conceptual framework is developed based on holistic theory of knowledge, which explains that the individual behavior has direct effect on successful KM implementation [4]. Furthermore, it is developed based on resource based-view and

knowledge-based view theories, which explain that organizational knowledge leads to enhance innovation [85], [119], [128], [141]. Figure 1 shows the conceptual framework of the relationships among study's variables; middle managers role, core requirements of KM implementation and innovation.

X. CONCLUSION

This study has revealed the importance of middle managers role in KM implementation, which directly affect innovation enhancement. Therefore, this study contributed to the previous studies through the conceptual framework, which is based on holistic theory of knowledge, and resource based-view and knowledge-based view theories. The conceptual framework explains the direct relationship between middle managers role (consist of analyst, intuitive and pragmatic) and core requirements of KM implementation (CSFs of KM, KM strategies and KM processes). In addition, it shows the direct relationship between core requirements of KM implementation and innovation (consisting of technological innovation, administrative innovation, radical innovation and incremental innovation). Furthermore, the future is wide open for further empirical research in this area.

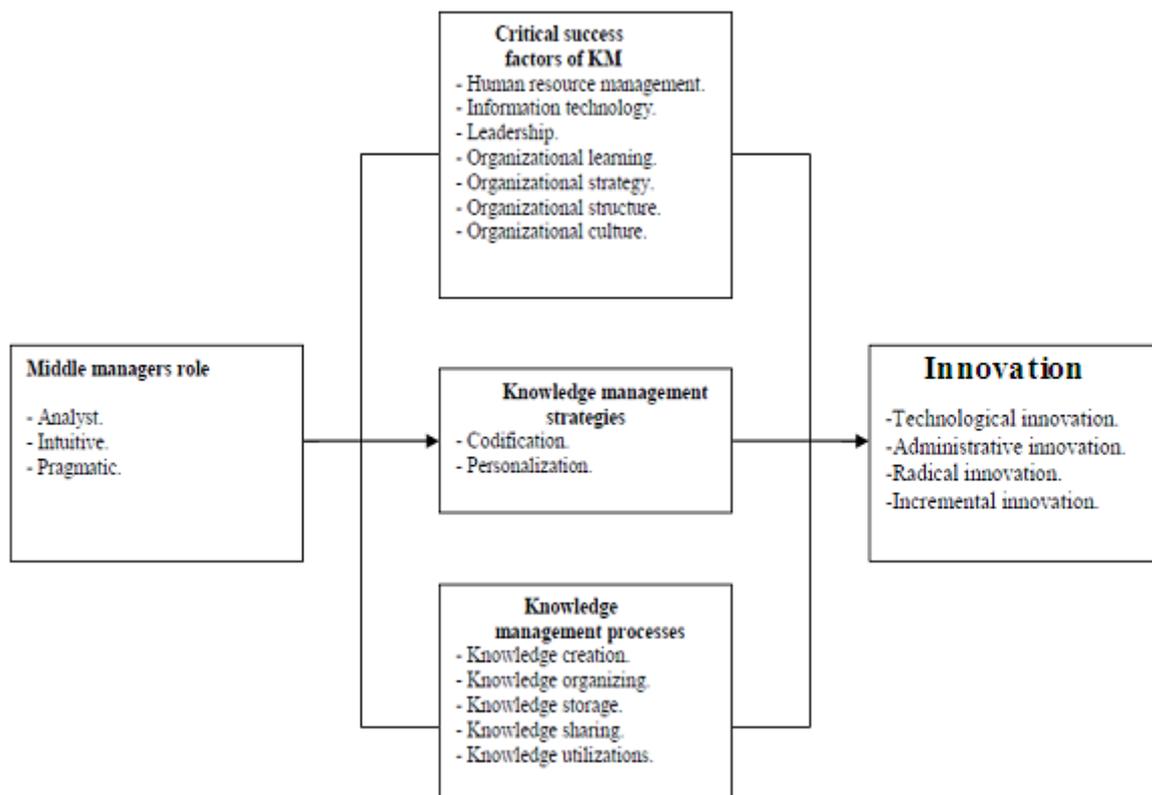


Fig. 1: Conceptual framework

REFERENCE

- [1] Choi, B., Poon, S. K. & Davis, J. G. (2008). Effects of knowledge management strategy on organizational performance: A complementarity theory-based approach. *Omega*, 36(2), 235-251.
- [2] Ho, L. A. (2008). What affects organizational performance? The linking of learning and knowledge management. *Industrial Management & Data Systems*, 108 (9), 1234-1254.
- [3] Kim, H. & Gong, Y. (2009). The roles of tacit knowledge and OCB in the relationship between group-based pay and firm performance. *Human Resource Management Journal*, 19(2), 120-139.
- [4] Yang, B., Zheng, W. & Viere, C. (2009). Holistic Views of Knowledge Management Models. *Advances in Developing Human Resources*, 11 (3), 273-289.
- [5] Darroch, J. (2005). Knowledge management, innovation and organization performance. *Journal of knowledge management*, 9 (3), 101-115.

- [6] Rhodes, J., Hung, R., Lok, P., Lien, B. Y. H. and Wu, C. M. (2008). Factors influencing organizational knowledge transfer: implication for corporate performance. *Journal of Knowledge Management*, 12 (3), 84-100.
- [7] Anderson, K. K. (2009). Organizational capabilities as predictors of effective knowledge management: an empirical examination. Unpublished doctoral dissertation, Southeastern University, US.
- [8] Razi, M. J. M. & Abdul Karim, N. S. (2010). An Instrument to Assess Organizational Readiness to Implement Knowledge Management Process. *Knowledge Management: theory, research & Practice, Proceedings Knowledge Management 5th International Conference*, 323-328.
- [9] Zack M., McKeen J. & Singh S. (2009). Knowledge management and organizational performance: an exploratory analysis. *Journal of Knowledge Management*, 13 (6), 392-409.
- [10] Daud, R. A. M. & Hassan, S. (2008). Knowledge Management Systems for Decision Makers in Public Universities Malaysia. *Proceedings of the Knowledge Management International Conference (KMICE '08)*, 339-348.
- [11] Kim, M. (2009). Paths to knowledge management in small and medium-sized hotels. Unpublished doctoral dissertation, RMIT University, Australia.
- [12] Shahrokhi, N. (2010). Designing a Model for Implementing Knowledge Management in Project-based Organizations: Case Study of PATSA Co.. *Knowledge Management: theory, research & Practice, Proceedings Knowledge Management 5th International Conference*, 355-359.
- [13] Wong, K. Y. & Aspinwall, E. (2005). An empirical study of the important factors for knowledge-management adoption in the SME sector. *Journal of Knowledge Management*, 9 (3), 64-82.
- [14] Gunther-McGrath, R. (2001). Exploratory learning, innovative capacity and managerial oversight. *Academy of Management Journal*, 44(1), 118-131.
- [15] Huy, Q. N. (2001). In praise of middle managers. *Harvard Business Review*, 80(8), 72-79.
- [16] Janczak, S. (2004). How Middle Managers Integrate Knowledge Within Projects. *Knowledge and Process Management*, 11(3), 210-224.
- [17] Janczak, S. M. (1999). Knowledge integration: a new approach to the role of middle management. Unpublished doctoral dissertation, University of Montréal, Canada.
- [18] Lee, Z. (1999). Knowledge management, innovation and information technology: revitalizing roles of middle managers in large hierarchical organizations. Unpublished doctoral dissertation, University of Southern California, US.
- [19] Richards, G. S. (2004). A multi-level examination of the role of middle management in developing absorptive capacity: towards a theory of knowledge utilization in organizations. Unpublished doctoral dissertation, Carleton University, Canada.
- [20] Theriou, G. N. & Chatzoglou P. D. (2008). Enhancing performance through best HRM practices, organizational learning and knowledge management: A conceptual framework. *European Business Review*, 20 (3), 185-207.
- [21] Yang, C. C., Marlow P. B. & Lu, C. S. (2009). Knowledge management enablers in liner shipping. *Transportation Research Part E*, 45 (2), 893-903.
- [22] Abdullah, Dte, H. & Sinha, R. R. (2009). Knowledge management and intellectual capital emerging perspectives (Eds.), *Critical factors for KM implementation: An L&T, E&C division case study* (pp. 53-71). In *Institute of management technology, Ghaziabad*.
- [23] Garavelli, C., Gorgoglione, M. & Scozzi, B. (2004). Knowledge Management Strategy and Organization: A Perspective of Analysis. *Knowledge and Process Management*, 11(4), 273-282.
- [24] Hwang, A. S. (2003). Training strategies in the management of knowledge. *Journal of knowledge management*, 7(3), 92-104.
- [25] Maier, R. & Remus, U. (2002). Defining process-oriented knowledge management strategies, *Knowledge and Process Management*, 9 (2), 103-118.
- [26] Tasmin, R. & S., Y. L. (2010). Determining Factors of Knowledge Management Implementation in Knowledge-Based Organizations. *Knowledge Management: theory, research & Practice, Proceedings Knowledge Management 5th International Conference*, 49-54.
- [27] Wei, C. C., Choy, C. S. & Yew, P. H. P. (2009). Is the Malaysian telecommunication industry ready for knowledge management implementation? *Journal of knowledge management*, 13 (1), 69-87.
- [28] Nonaka, I. & Takeuchi, H. (1995). *The knowledge creating company: How Japanese companies create the dynamics of innovation*. Oxford University Press: New York.
- [29] Payakpate, J. (2008). Knowledge management platform for promoting sustainable energy technologies in rural Thai communities. Unpublished doctoral dissertation, Murdoch University, Australia.
- [30] Brachos, D., Konstantinos, K., Soderquist, K. E. & Prastacos, G. (2007). Knowledge effectiveness, social context and innovation. *Journal of knowledge management*, 11(5), 31-44.
- [31] Chen, C. & Huang, J. (2009). Strategic human resource practices and innovation performance-The mediating role of knowledge management capacity. *Journal of Business Research*, 62(1),104-114.
- [32] Chang, S. C. & Lee, M. S. (2008). The linkage between knowledge accumulation capability and organizational innovation. *Journal of knowledge management*, 12(1), 3-20.
- [33] Jiang, X. & Li, Y. (2009). An empirical investigation of knowledge management and innovative performance: The case of alliances. *Research Policy*, 38(2), 358-368.
- [34] Liao, S. H. & Wu, C. (2010). System perspective of knowledge management, organizational learning, and organizational innovation. *Expert Systems with Applications*, 37 (2), 1096-1103.
- [35] Sáenz, J., Aramburu, N. and Rivera, O. (2009). Knowledge sharing and innovation performance A comparison between high-tech and low-tech companies. *Journal of Intellectual Capital*, 10 (1), 22-36.
- [36] Elashaheb, M. S. (2005). A knowledge management framework for the telecommunication industry: the KMFTI model. Unpublished doctoral dissertation, University of Salford, United Kingdom.
- [37] Mehta, N. (2008). Successful knowledge management implementation in global software companies. *Journal of knowledge management*, 12 (2), 42-56.
- [38] Ajmal, M., Helo, P. & Keka, T. (2010). Critical factors for knowledge management in project business. *Journal of Knowledge Management*, 14(1),156-168.
- [39] Anantatmula, V. S. & Kanungo, S. (2010). Modeling enablers for successful KM implementation. *Journal of Knowledge Management*, 14(1),100-113.
- [40] Jafari, M., Rezaeenour, J., Akhavan, P. & Fesharaki, M. N. (2010). Strategic knowledge management in aerospace industries: a case study. *Aircraft Engineering and Aerospace Technology: An International Journal*, 82(1), 60-74.
- [41] Kucza, T. (2001). Knowledge Management Process Model. Technical Research Centre of Finland. Finland: VTT Publications 455.
- [42] McElroy, M. (2002). *The New Knowledge Management, Complexity, Learning, and Sustainable Innovation*. Burlington, England: Butterworth-Heineman.
- [43] McLaughlly, S. & Paton, R. A. (2008). Defining a Knowledge Strategy Framework for Process Aligned Organizations: An IBM Case. *Knowledge and Process Management*, 15 (2), 126-139.
- [44] Stankosky, M. & Baldanza, C. (2001). A systems approach to engineering a KM system. unpublished manuscript.
- [45] Butler, T., Heavin, C. & O'Donovan, F. (2007). A Theoretical Model and framework for understanding Knowledge Management System Implementation. *Journal of Organizational and End User Computing*, 19(4), 1-21.
- [46] Gai, S. & Xu, C. (2009). Research of Critical success factors for implementing knowledge management in China. *International Conference on Information Management, Innovation Management and Industrial Engineering*, 561-564.
- [47] Zack, M. H. (1999). Developing a Knowledge Strategy. *California Management Review*, 41 (3), 125-145.
- [48] Maier, R. & Remus, U. (2003). Implementing process-oriented knowledge management strategies. *Journal of knowledge management*, 7 (4), 62-74.
- [49] Casselman, R. M. & Samson D. (2007). Aligning Knowledge Strategy and Knowledge Capabilities. *Technology Analysis & Strategic Management*, 19(1), 69-81.
- [50] Helmi, A. (2010). The Articulation of Knowledge Management Strategy in Public Sector Organizations. *Knowledge Management: theory, research & Practice, Proceedings Knowledge Management 5th International Conference*, 329-334.
- [51] Probst, G., Raub, S. & Romhard, K. (1997). *Wissen Managen*. Wiesbaden: Gabler Verlag.
- [52] Alavi, M. (1997). KPMG Peat Marwick U.S.: One Giant Brain. *Harvard Business School Case Publishing*, Boston, MA, 9-397-108.
- [53] Allweyer, T. (1998). *Modellbasliertess Wissensmanagement*. IM Information Management and Consulting, 13 (1), 37-45.
- [54] Despres, C. & Chauvel, D. (1999). Knowledge Management(s). *Journal of Knowledge Management*, 3 (2), 110-120.
- [55] Bukowitz, W. R., & William, R. L. (2000). *The knowledge management fieldbook*. London: Prentice Hall.

- [56] Rastogi, P. N. (2000). Knowledge Management and Intellectual Capital - The New Virtuous Reality Of Competitiveness. *Human Systems Management*, 19 (1), 15-39.
- [57] Tannenbaum, S. & Alliger, G. (2000). Knowledge Management: Clarifying the Key Issues. *IHRIM*.
- [58] Holsapple, C. W. & Singh, M. (2001). The Knowledge Chain Model: Activities for Competitiveness. *Expert Systems with Applications*, 20, 77-98.
- [59] Carneiro, A. (2000). How does knowledge management influence innovation and competitiveness? *Journal of Knowledge Management*, 4 (2), 87-98.
- [60] Choi, Y. S. (2000). An Empirical Study of Factors Affecting Successful Implementation of Knowledge Management. Unpublished doctoral dissertation, University of Nebraska, Lincoln, NE.
- [61] Chourides, P., Longbottom, D. & Murphy, W. (2003). Excellence in knowledge management: an empirical study to identify critical factors and performance measures. *Measuring Business Excellence*, 7 (2), 29-45.
- [62] Chuang, S. H. (2004). A resource-based perspective on knowledge management capability and competitive advantage: an empirical investigation. *Expert Systems with Applications*, 27,459-465.
- [63] Hung, Y. C., Huang, S. M., Lin, Q. P. & Tsai M. L. (2005). Critical factors in adopting a knowledge management system for the pharmaceutical industry. *Industrial Management & Data Systems*, 105 (2), 164-183.
- [64] Chong, S. C. (2006). KM critical success factors A comparison of perceived importance versus implementation in Malaysian ICT companies. *The Learning Organization*, 13 (3), 230-256.
- [65] Al-Mabrouk, K. (2006). Critical Success Factors Affecting Knowledge Management Adoption: A Review of the Literature. *IEEE Xplore*, 1-6.
- [66] Lin, C. Y. & Kuo, T. H. (2007). The mediate effect of learning and knowledge on organizational performance. *Industrial Management & Data Systems*, 107 (7), 1066-1083.
- [67] Akhavan, P., Jafari, M. & Fathian, M. (2006). Critical success factors of knowledge management systems: a multi-case analysis. *European Business Review*, 18 (2), 97-113.
- [68] Ling, T. N. & Shan, L. Y. (2010). Knowledge Management Adoption among Malaysia's SMEs: Critical Factors. *Knowledge Management: theory, research & Practice, Proceedings Knowledge Management 5th International Conference*, 269-276.
- [69] Skyrme, D. (2000). Knowledge Management: Making Sense of an Oxymoron. Available at: <http://www.skyrme.com/pubs/knwstrat.htm>. Accessed 13 November 2001.
- [70] Garavelli, C., Gorgoglione, M. & Scozzi, B. (2004). Knowledge Management Strategy and Organization: A Perspective of Analysis. *Knowledge and Process Management*, 11 (4), 273-282.
- [71] Gold A. H., Malhotra A. & Segars A. H. (2001). Knowledge management: an organizational capabilities perspective. *Journal of Management Information Systems*, 18(1),185-214.
- [72] Nemati, H. R., (2002). Global knowledge management: exploring a framework for research. *Journal of Global Information Technology Management*, 5 (3), 1-11.
- [73] Lee, H. & Choi, B. (2003). Knowledge management enablers, processes, and organizational performance: an integrative view and empirical examination. *Journal of Management Information Systems*, 20 (1), 179-228.
- [74] Chong, C.W., Choy, C.S. & Wong, K.Y. (2007). Implementation of KM strategies in the Malaysian telecommunication industry an empirical analysis. *the journal of information and knowledge management systems*, 37(4), 2007,452-470.
- [75] Yeh, Y. J., Lai, S. Q. & Ho, C. T. (2006). Knowledge management enablers: a case study. *Industrial Management and Data Systems*, 106 (6),793-810.
- [76] Asoh, D.A., Belardo, S. & Crnkovic, J. (2007). Assessing Knowledge Management: Refining and Cross Validating the Knowledge Management Index Using SEM Techniques. *International Journal of Knowledge Management*,3(2),1-30.
- [77] Chong, C. W. & Yeow, P. H. P. (2005). An empirical study of perceived importance and actual implementation of knowledge management process in the Malaysian Telecommunication Industry. *Proceedings of ICTM 2005 Challenges and Prospects, Faculty of Business and Law, Multimedia University, Melaka*, 182-92.
- [78] Slagter, F. (2007). Knowledge management among the older workforce. *Journal of Knowledge Management*, 11 (4), 82-96.
- [79] Wei, C. C., Choy, C. S. & Yew, P. H. P. (2006). KM implementation in Malaysian telecommunication industry An empirical analysis. *Industrial Management & Data Systems*, 106 (8), 1112-1132.
- [80] Zheng, W., Yang, B. & McLean, G. N. (2010). Linking organizational culture, structure, strategy, knowledge management in higher education and organizational effectiveness: Mediating role of knowledge management. *Journal of Business Research*, 63 (7), 763-771.
- [81] Chait, Laurence P. (2000). Creating a Successful KM System. *IEEE Engineering Management Review*, 28(2), 92-95.
- [82] Grover, V. & Davenport, T. H. (2001). General perspectives on knowledge management: fostering a research agenda. *Journal of Management Information Systems*, 18 (1), 5-21.
- [83] Xie, Y. (2009). An empirical analysis of the antecedents of knowledge management strategies. Unpublished doctoral dissertation, Nova Southeastern University, US.
- [84] Hansen, M., Nohria, I. & Tierney, H. (1999). What's your strategy for managing knowledge? *Harvard Business Review*, 77(2), 106-116.
- [85] Edvardsson, I. R. (2008). HRM and knowledge management. *Employee Relations*, 30 (5), 553-561.
- [86] Ewing, M. T. & West, D. C. (2000). Advertising knowledge management: strategies and implications. *International Journal of Advertising*, 19(2), 225-243.
- [87] Sobahle, S. (2005). Knowledge Management as a management tool. Unpublished master thesis, University of Johannesburg, South Africa.
- [88] Greiner, M. E., Böhmman T. & Krcmar, H. (2007). A strategy for knowledge management. *Journal of Knowledge Management*, 11(6), 3-15.
- [89] Schulz, M. & Jobe, L. A. (2001). Codification and tacitness as knowledge management strategies An empirical exploration. *Journal of High Technology Management Research*, 12 (1),139-165.
- [90] Smith, A. D. (2004). Knowledge management strategies: a multi-case study. *Journal of knowledge management*, 8 (3), 6-16.
- [91] Al-Alawi, A. I., Al-Marzooqi, N. Y. & Mohammed, Y. F. (2007). Organizational culture and knowledge sharing: critical success factors. *Journal of Knowledge Management*, 11 (2), 22-42.
- [92] Ramachandran, S. D. (2010). Knowledge management in higher education: a case study in Malaysia. Printed and Published in Malaysia by: Univerisiti Teknikal Malaysia Melaka.
- [93] Yanga, C., Fang, S. & Linc, J. L. (2010). Organizational knowledge creation strategies: A conceptual framework. *International Journal of Information Management*, 30 (3), 231-238.
- [94] Snis, U. (2000). Knowledge is Acknowledged? A Field Study about People, Processes, Documents and Technologies. *Proceedings of the 33rd Hawaii International Conference on System Sciences*, 1-10.
- [95] Bhatt, G., Gupta, J.N.D. & Kitchens F. (2005). An exploratory study of groupware use in the knowledge management process. *The Journal of Enterprise Information Management*,18(1), 28-46.
- [96] Asare, A. K. (2008). The role of the supplier in marketing process innovation and value creation. Unpublished doctoral dissertation, University of Massachusetts Amherst, US.
- [97] Singh, S. K. (2008). Role of leadership in knowledge management: a study. *Journal of Knowledge Management*, 12 (4), 3-15.
- [98] Supyuenyong, V. & Islam, N. (2009). Influence of SME characteristics on knowledge management processes The case study of enterprise resource planning service providers. *Journal of Enterprise Information Management*, 22 (1/2), 63-80.
- [99] Alavi, M., & Leidner, D. E. (2001). Review: Knowledge management and knowledge management systems: Conceptual foundations and research issues. *MIS Quarterly*, 25(1), 107-136.
- [100] Theriou, G. N. & Chatzoglou, P. D. (2009). Exploring the best
- [101] HRM practices-performance relationship: an empirical approach. *Journal of Workplace Learning*, 21 (8), 614-646.
- [102] Liao, S. H. & Wu, C. C. (2009). The Relationship among Knowledge Management, Organizational Learning, and Organizational Performance. *International Journal of Business and Management*, 4 (4), 64-76.
- [103] Jantunen, A. (2005). Knowledge-processing capabilities and innovative performance: an empirical study. *European Journal of Innovation Management*, 8(3), 336-349.
- [104] Plessis, M. (2007). The role of knowledge management in innovation. *Journal of knowledge management*, 11 (4), 20-29.
- [105] Herkema, S. (2003). A complex adaptive perspective on learning within innovation projects. *The Learning Organization*, 10 (6), 340-6.
- [106] Damanpour, F., Walker, R. M. & Combinative, C. N. A. (2009). Effects of Innovation Types and Organizational Performance: A Longitudinal Study of Service Organizations. *Journal of Management Studies*, 46(4),650-675.
- [107] Garcia, R. & Calantone, R. (2002). A critical look at technological innovation typology and innovativeness terminology: a literature review. *Journal of Product Innovation Management*, 19,110-32.

- [108] Syvertsen, C. (2008). What is the future of business schools? *European Business Review*, 20 (2), 142-151.
- [109] Yang, Y. (2007). Workplace diversity, high performance work system, and organizational innovation. Unpublished doctoral dissertation, University of Western Ontario, Canada.
- [110] Darroch, J. & McNaughton, R. (2002). Examining the link between knowledge management practices and types of innovation. *Journal of Intellectual Capital*, 3(3), 210-22.
- [111] Darroch, J. & McNaughton, R. (2003). Beyond market orientation – Knowledge management and the innovativeness of New Zealand firms. *European Journal of Marketing*, 37(3/4), 2003, 572-593.
- [112] Lin, C. Y. & Chen, M. Y. (2007). Does innovation lead to performance? An empirical study of SMEs in Taiwan. *Management Research News*, 30 (2), 115-132.
- [113] Roberts, D. M. (2008). The Integration of Service Innovation Into an Existing Model for Volume & Variety. Unpublished doctoral dissertation, Rensselaer Polytechnic Institute, US.
- [114] Subramaniam, M. & Youndt, M. A. (2005). The influence of intellectual capital on the types of innovative capabilities. *Academy of Management Journal*, 48 (3), 450-63.
- [115] Birkinshaw, J., Mol, M. & Hamel, G. (2008). Management innovation. *Academy of Management Review*, 33(4), 825-45.
- [116] Carmen, C. and José, G. (2008). The role of technological and organizational innovation in the relation between market orientation and performance in cultural organizations. *European Journal of Innovation Management*, 11(3), 413-434.
- [117] Damanpour, F., Szabat, K. A. & Evan, W. M. (2007). The relationship between types of innovation and organizational performance. *Journal of Management Studies*, 26(6), 587-602.
- [118] Fernández, Á. M. (2001). Innovation processes in an accident and emergency department. *European journal of innovation management*, 4(4), 168-178.
- [119] Lam, A. (Ed.). (2005). Organizational innovation. In Fagerberg, J., Mowery, D. C. and Nelson, R. R., *The Oxford Handbook of Innovation*, Oxford University Press, New York.
- [120] Oke, A. (2007). Innovation types and innovation management practices in service companies. *International Journal of Operations & Production Management*, 27 (6), 564-587.
- [121] Lin, R. J., Chen, R. H. & Chiu, K. K. S. (2010). Customer relationship management and innovation capability: an empirical study. *Industrial Management & Data Systems*, 110 (1), 111-133.
- [122] Akgün, A. E., Keskin, H., Byrne, J. & Eng, J. (2009). Organizational emotional capability, product and process innovation, and firm performance: An empirical analysis. *Technol. Manage*, 26(3), 103-130.
- [123] Aragón-Correa, J. A., García-Morales, V. J. & Cordon-Pozo, E. (2007). Leadership and organizational learning's role on innovation and performance: Lessons from Spain. *Industrial Marketing Management*, 36(3), 349-359.
- [124] Meeus, M. T. H. & Edquist, C. (Eds). (2006). Introduction to Part I: Product and process innovation. In Hage, J. and Meeus, M., *Innovation, Science, and Institutional Change*. Oxford: Oxford University Press.
- [125] AL-Enzi, H. O., (2008). The capabilities of information technology and its role in strategic innovation: case study in a sample of the mobile companies in Iraq. Unpublished master thesis, University of Mussel, Iraq.
- [126] Blazevic, V., Lievens, A. & Klein, E. (2003). Antecedents of project learning and time-to-market during new mobile service development. *International Journal of Service Industry Management*, 14(1), 120-147.
- [127] Forge, S. & Bohlin, E. (2008). Managed Innovation in Korea in telecommunications-Moving towards 4G mobile at a national level. *Telematics and Informatics*, 25(4), 292-308.
- [128] Gruber, H. (2001). Competition and innovation: The diffusion of mobile telecommunications in Central and Eastern Europe. *Information Economics and Policy*, 13(1), 19-34.
- [129] Jaspers, F., Hulsink, W. & Theeuwes, J. (2007). Entry and Innovation in Maturing Markets: Virtual Operators in Mobile Telecommunications. *Jules Technology Analysis and Strategic Management*, 19(2), 205-225.
- [130] Popadiuk, S. & Choo, C. W. (2006). Innovation and knowledge creation: how are these concepts related?. *International Journal of Information Management*, 26, 302-312.
- [131] Pedersen, C. & Dalum, B. (2004). Incremental Versus Radical Change – The Case of the Digital North Denmark Programme. Paper for the International Schumpeter Society Conference, Bocconi University, Milan, 9-12.
- [132] Gloet, M. & Terziovski, M. (2004). Exploring the relationship between knowledge management practices & innovation performance. *Journal of Manufacturing Technology Management*, 15(5), 402-9.
- [133] Merx-Chermin, M. & Nijhof, W. J. (2005). Factors influencing knowledge creation and innovation in an organization. *Journal of European Industrial Training*, 29 (2), 135-147.
- [134] Lin, H. (2007). Knowledge sharing and organization innovation capability: an empirical study. *International Journal of Manpower*, 28 (3/4), 315-332.
- [135] Anantatmula, V. S. (2007). Linking KM effectiveness attributes to organizational performance. *VINE: The journal of information and knowledge management systems*, 37(2), 133-149.
- [136] Forcadell, F. J. & Guadamillas, F. (2002). A Case Study on the Implementation of A Knowledge Management Strategy Oriented to Innovation. *Knowledge and Process Management*, 9(3), 162-171.
- [137] Cardinal, L.B., Alessandri, T. M. & Turner, S. F. (2001). Knowledge codifiability, resources, and science based innovation. *Journal of Knowledge Management*, 5(2), 195-204.
- [138] Ju, T.L., Li, C.Y. and Lee, T.S. (2006). A contingency model for knowledge management capability and innovation. *Industrial Management & Data Systems*, 106 (5/6), 855-77.
- [139] Deyong, X., Xiangyun, Z. & Qiuyue, Z. (2007). Empirical Study on Innovation Competence Based on Tacit Knowledge. *IEEE Xplore*, 5860-5863.
- [140] Freeman, J. & Engel, J. S. (2007). Models of innovation: startups and mature corporations. *California Management Review*, 50 (1), 94-119.
- [141] Tan, L. C. & Nasurdin, A. M. (2010). Knowledge Management Effectiveness and Technological Innovation: An Empirical Study in the Malaysian Manufacturing Industry. *Journal of Mobile Technologies, Knowledge and Society*, Available at <http://www.ibimapublishing.com/journals/JMTKS/jmteks.html>.
- [142] Picot, A. (Eds). (2006). *The Future of Telecommunications Industries*. Heidelberg, Germany: Springer.

Mr Laith Ali Yousif AL-Hakim is currently a PhD candidate at Universiti Utara Malaysia undertaking a research in the area of organizational KM and innovation.

Dr. Shahizan Hassan, a PhD degree holder from the University of Newcastle upon Tyne, U. Kingdom, is an Associate Professor in Information Systems at the College of Business, University Utara Malaysia (UUM). He is the editor for *Malaysian Management Journal (MMJ)* and has published four books, fifteen articles in national and international journals, and more than 40 articles in seminar and conferences. His research projects are in the area of Information Systems, Web design and evaluation, Knowledge Management, electronic government, and wireless applications. To date, he had completed ten research projects funded by various agencies. He has vast teaching experiences in IT-related subjects including Knowledge Management, IT for Managers, Management Information Systems, User Interface, Database Systems, and Multimedia Networking. He has supervised more than 100 undergraduate and post-graduate students' projects in various IT disciplines