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Relationships among organizational culture, knowledge acquisition, organizational learning, and organizational innovation in Taiwan's banking and insurance industries

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This article investigates the relationships among organizational culture (OC), knowledge acquisition (KA), organizational learning (OL), and organizational innovation (OI) in Taiwan's banking and insurance industries. We use the top 100 financial enterprises in Taiwan published by *Common Wealth Magazine* in 2005 as the population and 23 of them are chosen as the sample in this study. A total of 785 questionnaires were issued and 449 valid replies were received. The research results indicate that OL serves as a partial mediator between OC and OI. In addition, this article finds that OC affects OL and innovation through KA. Furthermore, OL has a full mediation effect on KA and OI.

Keywords: knowledge acquisition; organizational culture; organizational innovation; organizational learning; structural equation modeling

Introduction

Since the Organization for Economic Cooperation and Development (OECD) first proposed the concept of a knowledge-based economy in 1996, the competitions among enterprises have turned land, labor, and capital from the past over to knowledge today as an input resource. In the twenty-first century, with increasing specialization and individualization, the changes of industry and technology have become more significant. Knowledge is no doubt the key resource while in such changeable processes. According to Quinn, Anderson and Finkelstein (1996), the key ingredient for organizational success in the post-industrial era has gradually shifted from physical asset management to intellectual capital and knowledge asset. This is because the economic growth of industry mostly comes from the knowledge creation by professionals. The objectives of business today have focused on seeking various channels/sources to obtain new knowledge to maintain sustained competitive advantages (SCAs). Therefore, knowledge acquisition (KA) has become an important issue in today's business management.

Organizational culture (OC) is believed to be the most significant input to effective knowledge management (KM) and organizational learning (OL) because corporate culture determines values, beliefs, and work systems that could encourage or impede both learning (knowledge creation) and knowledge sharing (Leonard 1995; Alavi and Leidner 2001; Gold, Malhotra and Segars 2001). OC will affect OL and organization's capabilities and can guide it to change and innovate (Lynn 1999). Learning through

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individuals and the organization will lead to organizational innovation (OI), especially in knowledge-intensive industries (KIIs), and that may be the only real source of SCA (Stata 1989). As can be seen, the purpose of KM is to pursue innovation so that an organization maintains SCAs and to make an organization change and innovate through OL. Acquiring knowledge successfully in management processes will affect OI, while different styles of OC will directly influence OL and OI. Therefore, this study explores (1) whether KA through various channels and sources can effectively improve OL and affect OI and (2) the moderated effects of various OC on the relationship between OL and OI.

According to the OECD's definition, there are two types of KIIs: the first type is high-tech manufacturing industries, including the electronics, aerospace, and biotechnology industries; the second type is knowledge-intensive services, which include education, communications, and information services industries. Since the liberalization of Taiwan's banking system in 1991, the rapid expansion of private banks has resulted in the wear-saturation of the financial markets. Meanwhile, after Taiwan's entrance to the World Trade Organization (WTO) in 2002, foreign insurance companies have entered the insurance market by buying Taiwanese insurance companies or setting up their own branches. To maintain their market status and expand their market share, these banking and insurance companies devote themselves to absorbing new knowledge, developing a favorable culture for learning, promoting the organization toward learning progress, and introducing new products or services to adapt to the competitive environment. Since banking and insurance are both financial and KIIs, this study therefore selects them as our research subjects to investigate the KA through various channels and sources to see if they can effectively improve OL and affect OI and to explore the moderated effects of various OC on the relationships between KA, OL, and OI.

Theoretical background

Relationship between OC and OL

Schein (1996) suggested that OL failures may be caused by lack of communication among the organization's different cultures. OC could serve as a standard of cognitions or interpretations and so would affect the effectiveness of OL and behavior (Mahler 1997). According to Kululunga et al. (2001), OL acts as a catalyst for implementing an OL culture and the learning culture systematically improves OL. OC can be seen as a knowledge repository with the capabilities for storing and processing information, whereas OL plays an important part in ensuring that the knowledge repository is continually replenished and updated to enable efficient responses to changes in its competitive environment (Lemon and Sahota 2004). Brian and Pattarawan (2003) suggested that OC is positively related to OL. To analyze how the OC impacts KM, OL, and business performance, Susana, José and Camilo (2004) argued that collaborative culture influences OL, which in turn influence business performance. In addition, Czerniewicz and Brown (2009) found that OC has a positive effect on OL. However, a few articles, no different types of OC been investigated on this relationships. Based on the statements mentioned earlier, we conclude that OC will affect OL. Thus, the following hypothesis is formulated.

Hypothesis 1: OC is related to OL.

Relationships between KA and OL

From the knowledge-based perspective, Bates (1998) argued that knowledge is the basis of learning. An organization cannot compete with others in this changeable environment if it lacks adequate knowledge and renewal capability. Therefore, OL represents a mix of all knowledge-related processes, including knowledge generation, knowledge refinement, knowledge promotion, and knowledge diffusion. All these processes are composed of two parts: KA and KM. Learning occurs as soon as knowledge is generated by an internal or external organization. Huber (1991) identifies four learning constructs related to OL: KA, information distribution, information interpretation, and organizational memory. KA is a method to acquire knowledge by talent, accumulation of experiences, guided learning, knowledge transfer, and searching. Hsieh and Su (2005) defined KM as acquisition, storage, diffusion, and application. The analytical results indicated that (1) both KM and organizational knowledge institutionalization in universities are positively related to OL capacity and (2) KM plays a major and moderating role in OL capacity. Based on these statements, we conclude that KA is closely related to OL while KA is the first requisite for OL. Thus, the following hypothesis is formulated.

Hypothesis 2: KA is positively related to OL.

Relationships between OC and KA

According to Khalil, Claudio and Seliem (2006), a company should devote itself to developing KM strategies, creating a supportive culture, and adopting proper IT tools and techniques to enhance the implementations of KM (i.e., KA, documentation, transformation, creation, and application). Chang and Lee (2007) examined the effects of OC and KM mechanisms on OI, finding that supportive culture and innovative culture had a significantly positive effect on KA. As DeLong and Fahey (2000) argue, OC has been widely seen as a critical barrier to knowledge creation. The basic problem for managers is to determine which characteristic of culture can quickly acquire and allocate new knowledge. Tai (2005) stated that a culture that encourages knowledge sharing and openness is more conducive to the implementation of KM (e.g. KA, transformation, creation, accumulation, and diffusion). Based on these statements, we conclude that OC will affect KA. Thus, the following hypothesis is formulated.

Hypothesis 3: OC is related to KA.

Relationships between OL and OI

Under the same organizational conditions, OL will enhance OI organization's capability in the future (Argyris and Schon 1978). Individual learning and OL will lead to OI, especially in KIIs, and this may be the only source of SCA (Stata 1989). Therefore, a firm's learning capabilities play a crucial role in generating innovation (Sinkula, Baker and Noordewier 1997). Lin (2003) argues that OL may have direct influence on technological and administrative innovation, the influence on the latter being greater than that on the former. Weerawardena, O'Cass and Julian (2006) examine the role of industry structure and OL in innovation and brand performance, showing that OL in different industry structures can positively impact OI. We conclude that OL may affect OI. Thus, the following hypothesis is formulated.

Hypothesis 4: OL is positively related with OI.

Relationships between OC and OI

Kotter and Heskett (1992) identified that the optimal culture for organizations pursuing long-term innovation and performance in a dynamic environment is an adaptive, learning culture – a culture that fosters and nurtures innovation. As Muffatto (1998) suggests, in the innovation process, the creation of an innovative climate and related professional knowledge and capabilities are needed to support innovation activities. According to Chang and Lee (2007), both innovative culture and supportive culture have a significantly positive effect on administrative and technical innovation. Bates and Khasawneh (2005) examined the relationship between OL culture, learning transfer climate and OI, showing that OL culture predicted learning transfer climate and both these factors accounted for significant variance in OI. Accordingly, we conclude that OC will affect OI and formulate the following hypothesis.

Hypothesis 5: OC is related to OI.

The relationship between KA and OI

According to Moorman and Miner (1998), the success of KA is the key to an organization's overall performance. KA in the IT industry is the determinant factor of knowledge integration and the basis of competitiveness (Zahra and George 2002). In a long-term dynamic environment, such environment situations would have organization proceed to acquire knowledge and to integrate this knowledge into existing one. Facing changing business environment, a company has to constantly develop and utilize extent knowledge to innovate, maintain, and update its competitiveness (Rastogi 2002). Knowledge acquired from the external relationships is critical to technology development for it would improve the depth and width of organization's knowledge and thereby let the organization have distinct technology knowledge from its competitors. Thus, the greater the depth of knowledge – especially knowledge acquired by the interactions with external organizations – the better the capabilities of thinking and product differentiation improve (Zahra, Ireland and Hitt 2000). Accordingly, we conclude that KA will affect OI and formulate the following hypothesis.

Hypothesis 6: KA is positively related to OI.

Relationships among OC, OL, and OI

A culture encouraging change is a critical feature to support OL. Especially in such competitive environments, an organization needs stronger adaptive culture to encourage mutual cooperation and learning by its members (Daft 2001). Weiling and Kwok (2006) conclude that effective learning depends on a culture of openness and mutual trust. According to Hurley, Tomas and Hult (1998), higher levels of innovativeness in the firm's culture are associated with greater capacity for innovation to develop competitive advantage. Innovativeness is part of OL, which is the antecedent to innovation. Lynn (1999) suggested that OC would affect OL and organization's capabilities and thereby lead to innovation and change. Accordingly, we conclude that OC will affect OI through OL, and thus propose the following hypothesis.

Hypothesis 7: The relationship between OC and OI is mediated by OL.

Relationships among KA, OL, and OI

KA is a part of KM, whose objective is to achieve OL. Weiling and Kwok (2006) propose a framework that describes how organizational factors affect the four constructs of OL in an enterprise system (ES) implementation context: KA, information distribution, information interpretation, and organizational memory. Furthermore, the firm's IT vision will affect the amount of resources dedicated to OL in the ES implementation, and KA will also affect the information distribution within organizations. Huber (1991) argues that the breadth and depth of OL are positively related to the same four constructs, that is, KA, information distribution, information interpretation, and organizational memory. In a learning organization, learning can enhance innovation capabilities (Senge 1990) and these capabilities are gradually shaped by OL (Bessant, Caffyn and Gilbert 1996). Therefore, we consider that KA will affect OI through OL and propose the following hypothesis.

Hypothesis 8: The relationship between KA and OI is mediated by OL.

Relationships among OC, KA, and OI

Zahra et al. (2000) argued that the knowledge acquired from external relationships is critical to the development of technology. Thus, KA is positively associated with OL, OI, organizational growth, and competitive advantage (Claudette 2003). Chang and Lee (2007) conclude that supportive culture and innovative culture had significantly positive effect on KA as well as on OI. Furthermore, KA is also significantly positively associated with OI. Accordingly, we conclude that OC will affect OI through KA and propose the following hypothesis.

Hypothesis 9: The relationship between OC and OI is mediated by KA.

Interrelationship among KA, OC, OL, and OI

The empirical study, employing a sample high-technology ventures based in the UK, by Helena, Erkkö and Harry (2001) indicates that the social interaction and network tie dimensions of social capital are indeed associated with greater KA, but that the dimension of relationship quality is negatively associated with KA. Furthermore, KA is positively related to new product development and technological distinctiveness but negatively related to sales costs. Hsieh and Su (2005) identified KM activities as KA, knowledge storage, knowledge diffusion, and knowledge application. The empirical findings of their study showed that (1) both KM and organizational knowledge institutionalization in universities had positive influences on OL capacity and (2) KM acted as main and moderate enactor to OL capacity. According to Weiling and Kwok (2006), organizational factors affect the four constructs of OL in ES implementation context: KA, information distribution, information interpretation, and organizational memory. The firm's IT vision will affect the amount of resources dedicated to the OL in ES implementation. Guided by this vision, the organization determines the amount of resources to be committed to the project, which leads to different approaches to KA, and the KA directly affects the amount of knowledge that is distributed in the organizations.

Gold et al. (2001) argue that a knowledge infrastructure consisting of technology, structure, and culture along with a knowledge process architecture of acquisition, conversion, application, and protection are essential organizational capabilities, and these

capabilities will have a direct and positive association with organizational effectiveness. In the survey by Lin and Lee (2005), the analytical results show that OL factors and KM processes are closely related to the level of e-business systems adoption. Claudette (2003) suggests that KA is positively associated with OL, OI, organizational growth, and competitive advantage, while OC plays a moderating role in KA–OI relationship. Su and Tsai (2006) present a survey that explored the impact of the social capital of Taiwanese universities on KA and knowledge innovation (KI) behavior based on the perspective of external networks.

Sarros, Gray and Densten (2002) argue that leadership style interacts positively with OC. The findings of Chien (2004) indicate that OC would affect an employer's responsibility and commitment to the organization, the leader will directly utilize OC to indirectly influence his subordinates, and OC will also affect OI. OL culture predicted learning transfer climate, and both these factors accounted for significant variance in OI (Bates and Khasawneh 2005). Daft (2001) argued that a culture encouraging organizational change, especially in a rapidly changing environment, is an important characteristic to OL. Thus, a strongly adaptive culture to encourage members within an organization to mutually learn and cooperate is required. In addition, effective learning also depends on a culture of openness and mutual trust (Weiling and Kwok 2006).

Brian and Pattarawan (2003) examine information system organizations in the US and Canada. They found that both organizational climate and autonomy had positive impact on the degree of cooperative learning in teams and this in turn had a positive impact on members' work satisfaction and teams' work performance. Collaborative culture encourages the development of OL which, at the same time, has a significant effect on business performance (Susana et al. 2004). An empirical study by Lin (2005) showed that not only does having more OC shared values directly incur higher managerial performance, but also firms having an abundance of intellectual capital are more likely to indirectly raise their managerial performance through sharing OC. This showed that OC includes accentuating process, concern for employees, sharing common values, cultivating trust, coordinating socialization, and motivating inspiration. Entrepreneurship is an important factor in SCA and, though market-focused learning capability leads to higher degrees of innovation, marketing capability enables SCA (Weerawardena and O'Cass 2004). The empirical study by Michael and Ravipreet (2003) indicated that OL plays a significant role in mediating the effects of IT competency on firm performance. According to Llorens-Montes, Moreno and Garcia-Morales (2005), OL and teamwork cohesion affect organizations' capacity to implement innovation (technical and administrative) for meeting the changing needs of their environment. The findings indicate that (1) support leadership encourages teamwork cohesion, OL, and technical and administrative innovation; (2) teamwork cohesion promotes OL and this, in turn, encourages both technical and administrative innovation; and (3) organizational performance is improved through teamwork cohesion, OL, and technical and administrative innovation. Garcia-Morales, Llorens-Montes and Verdu-Jover (2006) argue that strategic capabilities will affect OL and OI while OL and OI are positively related to organizational performance.

In addition, the empirical survey by Weerawardena et al. (2006) indicates that OL in different industry structures will positively impact OI, and more OI will lead to higher brand performance. Lin, Huang and Tung (2004) point out that (1) market orientation (MO) has positive impact on OL and OI; (2) MO has positive impact on administrative innovation or technical innovation; (3) OL has a direct relationship with administrative and technical innovation; and (4) OL has an indirect relationship with organizational performance through OI. The empirical results of Chang and Lee (2007) show that (1) both

supportive and innovative culture cause significantly positive influence on KA and knowledge diffusion, and innovative culture has the greatest influence; (2) both innovative and supportive culture cause significantly positive influence on administrative and technical innovation; and (3) KA, knowledge storage, and knowledge diffusion all have significantly positive influence on administrative innovation, though KA and knowledge diffusion have significantly positive influence on technical innovation. The research map in Figure 1, which is based on the literature review, describes the inter-relationships among KA, OC, OL, and OI.

Research design

Research framework

This study primarily explores the relationships among OC, KA, and OI in Taiwan's banking and insurance industries. We further regard OL as a mediator to examine the interrelationships among OC, KA, and OI. Based on a literature review, together with a research map and hypotheses, this study constructs a research framework as shown in Figure 2.

Operational definitions and questionnaire design

Based on Wallach's (1983) concept of OL categories, this study defines OC to include bureaucratic culture, innovative culture, and supportive culture. According to the definition of Gold et al. (2001), KA can be divided into two dimensions: internal creation and external acquisition. We adopt the scope of Sinkula et al. (1997) and consider that OL is comprised of three dimensions: commitment to learning, shared vision, and

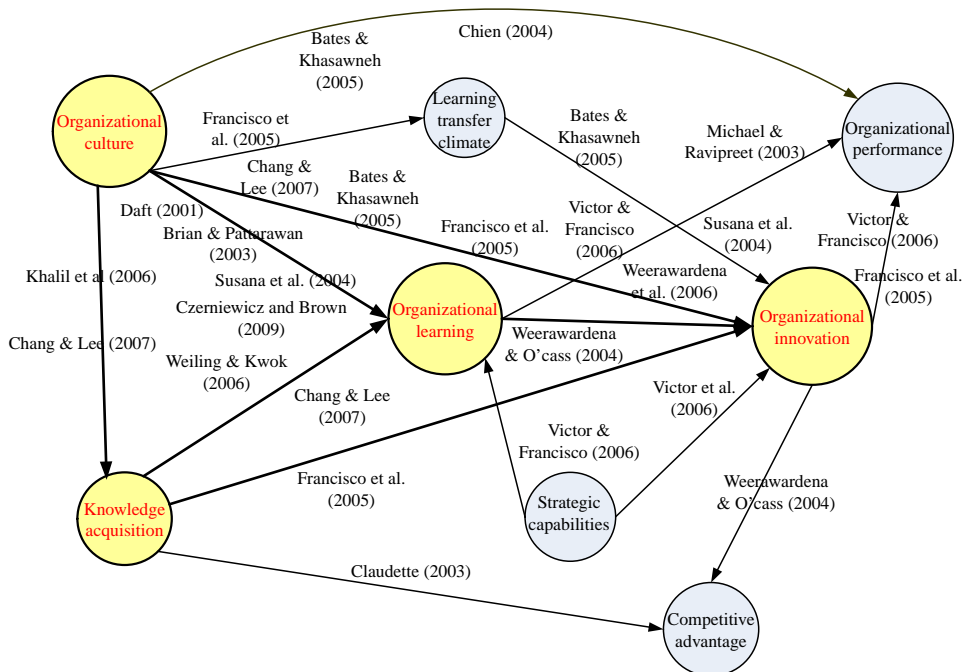


Figure 1. Research map.

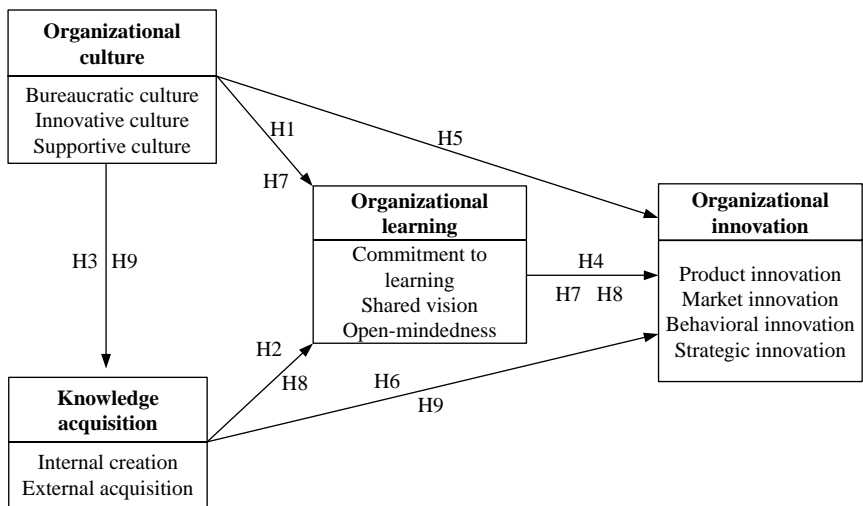


Figure 2. Research framework.

open-mindedness. For OI, this study employs the five dimensions of Wang and Ahmed (2004), combining the aspects of product, market, process, behavior, and strategy. All these operational definitions, items, and the original sources of each variable are summarized in Table 1.

For the needs of this study, a pre-test questionnaire was revised after discussion with respondents from the banking and insurance industries. First, we randomly selected 10 managers from each industry to pilot test the questionnaire to check where the semantic and syntax structure could be improved. After having partly modified the wording of some items, the next stage was a pre-test, which selected three companies from each industry to receive a total of 60 questionnaires, from which a total of 52 valid responses were received, for an effective response rate of 86.67%.

Analyses and results

Sample structure

A convenient sampling method was used to test 13 companies from banking and 10 companies from insurance in Taiwan, for a total sample of 23 companies is in this study. The formal questionnaire was administered from April 2007 to July 2007. A total of 785 questionnaires were sent, including 675 by paper and 110 by email, and a total of 546 questionnaires were returned including 79 online questionnaires. Excluding 97 invalid questionnaires, a total of 449 valid responses were received for an effective response rate of 57.2%. There were 256 questionnaires from banking (57%), 193 from insurance (43%), 391 from paper delivery (87.1%), and 58 online questionnaires (12.9%).

Measurement model

Confirmatory factor analysis (CFA)

The confirmatory factor analysis (CFA) primarily explores the fit between a variable's factor and its measurement item in this questionnaire. The initial model for this study was

Table 1. Operational definition of variables.

<i>Variables</i>	<i>Dimensions</i>	<i>Operational definition</i>	<i>Items</i>	<i>Source</i>
OC	Bureaucratic culture	Hierarchical and compartmentalized. There are clear lines of authority, with standardized and systematic work.	4	Modified from Wallach's (1983)
	Innovative culture	Provides a creative place to work, imbued with challenge and risk.	4	
	Supportive culture	Described as trusting, encouraging, relationship-oriented, and collaborative.	4	
KA	Internal creation	Provides an open, harmonious, and warm place to work.	6	Gold et al. (2001)
	External acquisition	To strengthen the capacity of staff and their collaboration to create new knowledge.	6	
OL	Commitment to learning	To search for the externally useful knowledge and to acquire new knowledge through self-absorption, sharing, and exchanges among members within value chains.	6	
	Shared vision	The organization regards learning as the primary core value. Managers of the organization will share the development vision in the future with their employees.	6	Baker and Sinkula (1999) modified the research of Sinkula et al. (1997)
	Open-mindedness	The organization will not be restricted to familiar ways of thinking but uses innovative way of thinking to go beyond the rules.	6	
OI	Product innovation	The novelty and meaningfulness of new products introduced to the market in a timely fashion.	4	Wang and Ahmed (2004)
	Market innovation	The newness of approaches that companies adopt to enter and exploit the targeted market.	4	
	Process innovation	To promote the introduction of new production methods, new management approaches, and new technology to improve production and management processes.	4	
	Behavioral innovation	Individuals, teams, and management enable the foundation of a creative culture, with internal receptivity to new ideas and innovation.	4	
	Strategic innovation	Measuring an organization's ability to manage ambitious organizational objectives and creatively identify mismatch of these ambitions and existing resources.	4	

Note: A five-point Likert scale (1, totally disagree; 5, totally agree) was used to measure the constructs.

modified because of incomplete model fit by considering the modification indices. In addition, this study deleted two items of KA, two items of OC, six items of OL, and seven items of OI in order to achieve good model fit. Table 2 lists the final model fits after deleting some items based on these two criteria.

Table 3 shows that the model fit is good: GFI and NNFI are greater than 0.90, CFI is greater than 0.95, SRMR ranges from 0.029 to 0.043, and all are smaller than 0.08. In addition, RMSEA ranges from 0.06 to 0.073, which means the range of model fit is between good and acceptable. Although the normed χ^2 ranges from 2.63 to 3.42, the questionnaire still shows consistency by contrast to the scope of Anderson and Gerbing (1988), which suggests that it is better to have a coefficient of normed χ^2 smaller than 3. Thus, all these criteria of this study are acceptable except for the normed χ^2 .

Reliability

This study adopts SPSS 12.0 to measure the reliability of the formal questionnaire and it is quite acceptable (Table 3).

Theoretical model

Figure 3 shows the path diagram of variables in this study. It indicates that the *T*-value of these paths including OC–KA, OC–OL, KA–OL, and OC–OI are significant; the parameter estimates are -0.81 , -0.36 , 0.64 , and -0.89 ; whereas the *T*-value of other paths such as KA–OI and OL–OI are not significant.

According to the standard parameter estimates shown in Figure 3, the relationship of OC–KA and OL–OI is negative. This result is inconsistent with that in the literature summarized earlier in this article (Kotter and Heskett 1992; Schein 1996; Muffatto 1998; DeLong and Fahey 2000; Brian and Pattarawan 2003; Susana et al. 2004; Bates and Khasawneh 2005; Khalil et al. 2006; Chang and Lee 2007). Thus, adopting this value may lead to distortions. This study therefore explores the relationship between variables and these three types of OC, respectively (i.e. bureaucratic, innovative, and supportive). Furthermore, the path of KA–OI ($\beta_{13} = 0.18$, $P > 0.05$) indicates that the relationship between these two variables is not significant. By doing so, we delete the relationship of KA–OI before the analysis of competitive model to facilitate better understanding of the relationships among variables.

Hypotheses testing

This study estimates the γ and β of the theoretical model by MLE to test whether each hypothetical path has achieved a significant level. Basically, an optimal sample size for MLE to estimate structural model is at least ranging from 100 to 150 (Ding, Velicer and Harlow 1995). In this study, our sample size is 449, which is in accordance with this requirement. The testing results are shown in Table 4.

According to the LISREL output of total and indirect effects, the effect of innovative culture on the OL–OI relationship can be seen: (1) the total effect of bureaucratic culture on OI is -0.73 and its indirect effect is -0.37 ; (2) the total effect of innovative culture on OI is 0.88 and its indirect effect is 0.32 ; (3) the total effect of supportive culture on OI is 0.83 and its indirect effect is 0.41 . Based on these results, this study indicates that OL acts as a partial mediator in the OC–OI relationship. Thus, Hypothesis 7 is supported.

Table 2. Indices of measurement model.

	KA		OC		OL		OI	
	Initial	Final two items deleted	Initial	Final two items deleted	Initial	Final six items deleted	Initial	Final seven items deleted
GFI	0.91	0.96	0.92	0.96	0.86	0.95	0.86	0.96
SRMR	0.045	0.035	0.048	0.043	0.054	0.040	0.061	0.029
RMSEA	0.097	0.065	0.096	0.072	0.099	0.073	0.098	0.060
NNFI	0.97	0.98	0.97	0.98	0.96	0.98	0.96	0.99
CFI	0.97	0.99	0.97	0.99	0.97	0.98	0.97	0.99
χ^2	277.53	98.73	211.78	79.72	621.11	140.11	666.66	89.51
DF	53	34	41	24	116	41	125	34
Normed χ^2	5.23	2.90	5.16	3.32	5.35	3.42	5.33	2.63

Table 3. Reliability.

Variables	Dimensions	Items	Item no.	Cronbach's α
KA	Internal creation	5	1,2,3,7,9	0.87
	External acquisition	5	4,5,6,11,12	0.83
OC	Bureaucratic culture	3	1,2,3	0.65
	Innovative culture	3	4,5,6	0.90
OL	Supportive culture	3	8,10,11	0.84
	Commitment to learning	5	1,2,3,14,15	0.84
OI	Shared vision	4	4,5,6,11	0.85
	Open-mindedness	2	7,9	0.61
	Product innovation	3	5,6,11	0.82
	Market innovation	2	13,14	0.73
	Process innovation	2	1,7	0.61
	Behavioral innovation	2	4,9	0.74
	Strategic innovation	2	16,17	0.71

With respect to the relationships among KA, OL, and OI, the total effect of KA to OL, which is in the bureaucratic culture model, is 0.88 and the total effect of OL to OI is 0.65. In the innovative culture model, the total effect of KA to OL is 0.75 and the total effect of OL to OI is 0.41. In the supportive culture model, the total effect of KA to OL is 0.76 and the total effect of OL to OI is 0.51. Based on these results, this study suggests that the relationship between KA and OI is mediated by OL. Thus, Hypothesis 8 is supported.

After investigating the relationships among OC, KA, and OI, Figure 3 indicates that OC will affect KA. However, the *T*-value of the KA–OI relationship from the theoretical model analysis is not significant. Therefore, the relationship between OC and OI cannot be mediated by KA and so this result does not support Hypothesis 9.

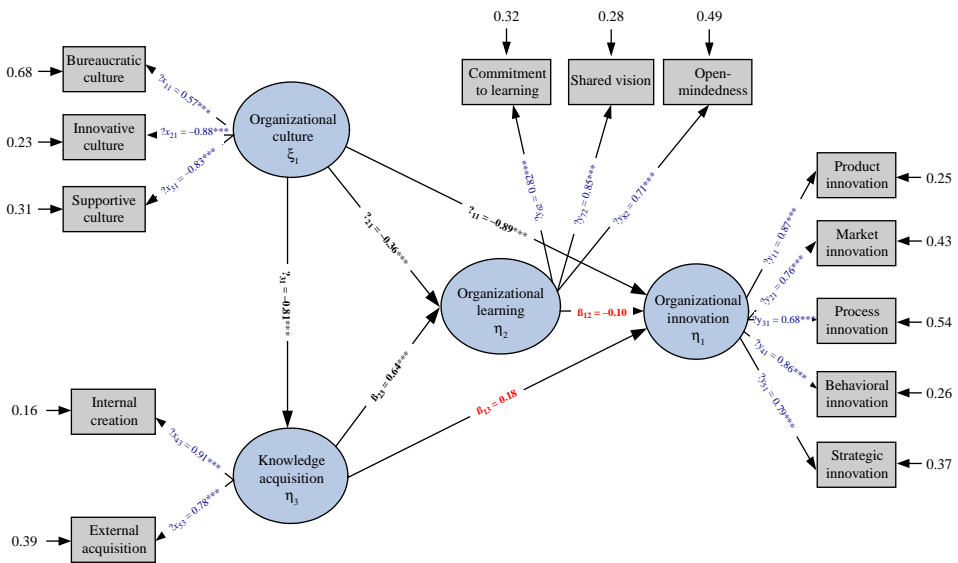


Figure 3. Path analysis diagram. Note: Chi-square = 282.02; df = 59; *p*-value = 0.00000; RMSEA = 0.092.

Table 4. Path analysis of partial mediation model.

<i>Path</i>	<i>Relation</i>	<i>Parameter estimate^a</i>	<i>SD</i>	<i>T-value^a</i>	<i>Empirical result</i>
Bureaucratic culture → OL (γ_{21})	–	–0.12	0.05	–2.58	Supported
Innovative culture → OL (γ_{21})	+	0.24	0.06	4.13	Supported
Supportive culture → OL (γ_{21})	+	0.23	0.06	3.91	Supported
KA → OL (B) (β_{13})	+	0.88	0.06	15.89	Supported
KA → OL (I) (β_{13})	+	0.75	0.07	11.59	Supported
KA → OL (S) (β_{13})	+	0.76	0.07	11.45	Supported
Bureaucratic culture → KA (γ_{31})	–	–0.51	0.06	–8.69	Supported
Innovative culture → KA (γ_{31})	+	0.75	0.05	16.09	Supported
Supportive culture → KA (γ_{31})	+	0.75	0.05	15.96	Supported
OL → OI (B) (β_{12})	+	0.65	0.05	12.58	Supported
OL → OI (I) (β_{12})	+	0.41	0.06	6.83	Supported
OL → OI (S) (β_{12})	+	0.51	0.07	7.72	Supported
Bureaucratic culture → OI (γ_{11})	–	–0.36	0.05	–7.07	Supported
Innovative culture → OI (γ_{11})	+	0.56	0.06	9.15	Supported
Supportive culture → OI (γ_{11})	+	0.42	0.07	6.40	Supported

Note: The symbol ‘+’ refers to positive effect.

^a Values in this row refer to the absolute value of *T*, which is greater than a threshold value of 95% significant level.

Model competition

Based on the three types of OC in this study, we divide the competitive model into bureaucratic culture model, innovative culture model, and supportive culture model. The model competition of each model is listed in Table 5. Among these three culture models, the innovative culture model has the highest GFI of 0.92, while its SRMR and RMSEA are the lowest, 0.038 and 0.088, respectively. Thus, the best-fit model of this study is the innovative culture model.

The path diagram of the best-fit model (i.e. innovative culture model) is shown in Figure 4 indicating that all the paths between variables are significantly positive. The standard parameter estimate of innovative culture–OL and innovative culture–KA are 0.24 and 0.75, respectively, and that of innovative culture–OI is 0.56. The standard parameter estimate of KA–OL is 0.75 and that of OL–OI is 0.41. Based these results, the effect of KA on OL is greater than that of innovative culture on OL, while the effect of internal creation is higher than that of external acquisition. Thus, innovative culture can directly affect OI, and it can further enhance the degree of influence on OI by means of OL. In addition, innovative culture will also have great impact on KA, and it can further enhance the degree of influence on OI and OL via KA.

Table 5. Model competition of three types of OC.

<i>Model \ Index</i>	<i>GFI</i>	<i>NNFI</i>	<i>CFI</i>	<i>SRMR</i>	<i>RMSEA</i>	χ^2 (<i>df</i>)	<i>Normed χ^2</i>
Bureaucratic culture	0.90	0.96	0.97	0.054	0.100	327.58 (60)	5.46
Innovative culture	0.92	0.98	0.98	0.038	0.088	267.32 (60)	4.46
Supportive culture	0.91	0.98	0.98	0.041	0.091	280.37 (60)	4.67

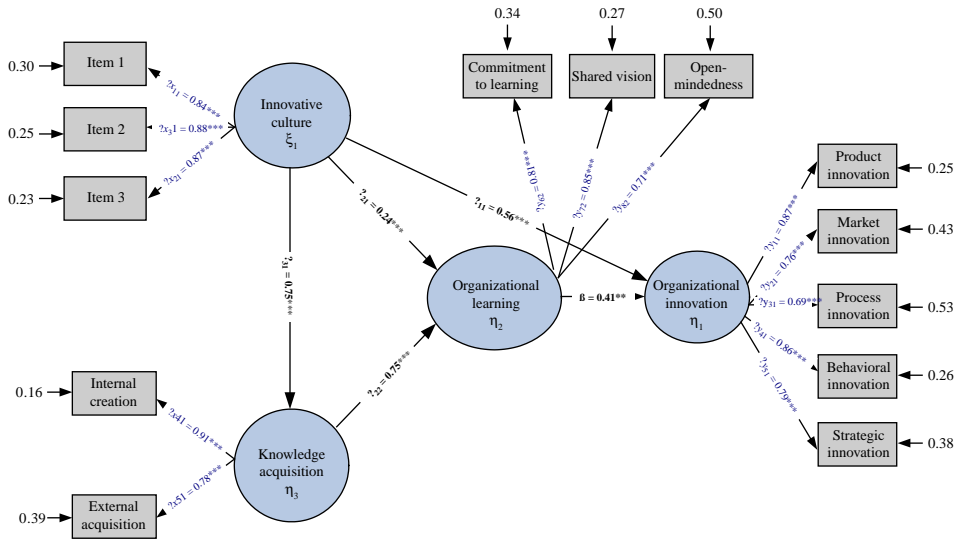


Figure 4. Path diagram of innovative culture. Note: Chi-square = 267.32; df = 60; p -value = 0.00000; RMSEA = 0.088.

Discussion and managerial implications

Discussion

From an empirical analysis, KA in Taiwan's banking and insurance firms is positively related to OL, while OL is positively associated with OI. This outcome strongly supports the views of Claudette (2003), Hsieh and Su (2005), and Weerawardena et al. (2006); but it does not support Hypothesis 6, which is inconsistent with that of Su and Tsai (2006) and Chang and Lee (2007). Such an inconsistent result probably results from a different sample and measurement scale. Research results show that OL acts as a complete mediator in the KA–OI relationship. In a word, an enterprise needs to learn, while acquiring knowledge to achieve OI. Zahra et al. (2000) argue that the knowledge acquired from an external relationship is critical to the development of technology, because it can enhance the depth and width of organization's knowledge and help the organization develop technology distinct from its competitors. Thus, with greater depth of knowledge, especially when this knowledge is acquired by interactions with external organizations, the capabilities of thinking and product differentiation will improve. This study argues that whether the knowledge is acquired from inter-organization or from intra-organization, mutual trust, interactions among members, and learning from mental model are needed to achieve OI. Therefore, it will be conducive to OI, in terms of product, process, and management, if an enterprise can devote itself to KA and creation from internal or external sources to support learning and sharing among its members.

On the other hand, Freitas (2008) showed that differences over time in the patterns of use of OI are related to changes in the characteristics of the innovation in terms of its functionality and relative complementarities with other innovations, as well as to changes in the needs and capabilities of firms in the case of UK. Thus, KA and OL might be forced to shape and enhance functionalities and capabilities of handling change both from inside and from outside environments to firms.

Managerial implications

Based on the research framework and empirical analyses, this study facilitates a better understanding of the causal relationships among KA, OC, OL, and OI. This study thus has value as a reference for domestic banking and insurance companies in Taiwan for their establishment of OC, implementation of KM and OL, and development of OI. This study presents several managerial implications as follows:

- (1) Research results show that OC in Taiwan's banking and insurance firms has a significant impact on OI, and innovative culture and supportive culture are positively associated with OI, whereas bureaucratic culture is negatively related to OI. This is consistent with Bates and Khasawneh (2005) and Chang and Lee (2007) in the education and the banking samples, which suggest that the type of OC an organization adopts will influence the organization's implementation of OI. Kotter and Heskett (1992) argued that a supportive and an innovative culture support an organization in pursuing goals of long-term innovativeness and performance in a dynamic environment. OC, a certain norm of behavior, is a set of shared values and beliefs within an organization and is shaped by the interactions between its members. Its existence within an organization will directly or indirectly affect members' behavior and the implementation of change. Therefore, how to eliminate a long-standing bureaucratic culture and establish an innovative and supportive one has become a crucial issue for Taiwanese banking and insurance industries.
- (2) The empirical results of this study show that OC in Taiwan's banking and insurance firms may have a significantly positive relationship with OL and affect OI through OL. This result is consistent with previous research discussed above (Brian and Pattarawan 2003; Lin et al. 2004; Susana et al. 2004; Weerawardena et al. 2006). Furthermore, we find that an innovative culture has a greater influence than a supportive culture, that is, OC plays a crucial role in the process of OL and OI. Furthermore, Liao, Fei and Chen (2007) described innovations that include product, procedure, and management innovation and show that these innovations will be improved by KM activities. Thus, this study argues that an enterprise can create an innovative culture and a supportive culture to not only enhance the OI, including product, market, process, behavior, and strategy, but also create innovation of business management through the influences of commitment to learning, open-mindedness, and shared vision.
- (3) Empirical results indicate that OC in Taiwan's banking and insurance will significantly affect KA, especially when the bureaucratic culture is negatively associated with KA; both innovative culture and supportive culture are positively related to KA. This result is consistent with that of Khalil et al. (2006) and Chang and Lee (2007). Moreover, OC will affect OI via KA and OL, which means that OC plays an important role in a company. OC not only can improve KA, but also can achieve OL and OI. According to Claudette (2003), KA is positively associated with OL, OI, organizational growth, and competitive advantage. This study argues that OC is not only positively related to KA, OL, and KI, but also affects the organizational growth and competitive advantage. Thus, our research results can be seen as an extension of Iles and Yolles (2002), Claudette (2003), and Bercovitz and Feldma (2007). Bercovitz and Feldma (2007) considered that the ability to tap external sources of knowledge has become increasingly important for firms seeking to gain competitive advantage through innovation, and OL is the main external source of KA.

- (4) From empirical analysis, the model fit of the innovative culture model for Taiwan's banking and insurance is good. This indicates that adopting innovative culture is conducive to KA from external/internal sources and the implementation of OL and OI. In the innovation process, the creation of an innovative climate and related professional knowledge and capabilities are needed to support innovation activities (Muffatto 1998; Currie and Kerrin 2003; Dougherty 2004; Naveh, Meilich and Marcus 2006; Jiménez-Jiménez and Sanz-Valle 2008). Furthermore, higher levels of innovativeness in the firm's culture are associated with greater capacity for innovation to develop competitive advantage (Hurley et al. 1998; Tzabbar, Aharonson, Amburgey and Al-Laham 2008). Therefore, we suggest that the culture of Taiwan's banking and insurance in financial industries is innovative and this innovative culture will help them to absorb the influences from OC, KA, and OL and thereby strengthen OI. This result can be used as a benchmark for development of other industries in Taiwan.
- (5) This study attempts to consider both KA and OL as mediators to examine whether these two variables in a theoretical model will have different mediating effects on the OC–OI relationship. However, this result is not confirmed. In sum, OL not only acts as a mediator in the OC–OI relationship, but also has a mediating effect on the KA–OI relationship. Thus, we suggest that both OC and KA will be positively related to OI through OL, whereas OC can directly affect OI via OL, instead of KA. Such a theory and model validation has not been mentioned by previous researchers yet and it can serve as a reference for related research in the future.
- (6) In terms of the research subject, the theoretical models and empirical results show that in both the banking and insurance industries of Taiwan, most of the interrelationships among OC, KA, OL, and OI are positive. This indicates that knowledge-intensive aspects of the banking and the insurance industries are suitable for implementation of KM activities. Therefore, those functions similar to KM, such as knowledge transfer, knowledge sharing, and absorptive capacity that occur within/between organizations, can be used as a theoretical basis for further discussion of OC–OI relationship. In addition, we tested the theoretical models from the banking and the insurance. Since the result of each hypothesis is so similar, this study does not compare these two samples by model generalization and model extension; instead, we merge them and explain the results of theory verification. The theoretical models and empirical results in this study are useful references for other Taiwan's financial industries.

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