KNOWLEDGE MANAGEMENT ADOPTION AND DIFFUSION USING STRUCTURAL EQUATION MODELING

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ABSTRACT

Knowledge management facilitates the firms and employees to deliver better products and services and hence achieve competitive advantages and profits. The issues of knowledge management have drawn much attention form industry and academia. However, few reports have been found available investigating how knowledge management is adopted and diffused in organizations. This paper adopts structural equation modeling to investigate employees' cognitions pertaining to knowledge management and their impacts on knowledge management activities based on Innovation Diffusion and Technology Acceptance Model with empirical data collected among the life insurance enterprises in Taiwan. The results indicate that perceived usefulness and subjective norm significantly influence the employees' attitudes toward knowledge management, and the attitudinal factor significantly affects knowledge management practice. The findings assist organizations to recognize the value and associated obstacles of knowledge management. This paper also presents the instrument and comprehensive model which provides directions for future research.

JEL: D83, M10

KEYWORDS: Knowledge Management, Structural Equation Modeling, Life Insurance

INTRODUCTION

In owledge can be the essential resources to create sustained competitive advantages since it is closely related to specific organizational structure and culture, and intrinsically difficult to imitate (Alavi and Leidner, 2001). Davenport and Prusak (1998) define knowledge as a fluid of framed experience, values, contextual information and expert insight that provides a framework for evaluating and incorporating new experiences and information. The knowledge-based view argues that firms are the enablers of knowledge creation and applications, and organizational capabilities or competencies are seen as clusters of knowledge sets and routines that are translated into distinctive activities (Grant, 1996; Teece, Pisano and Shuen, 1997). Much research views knowledge management (KM) as a matter of extracting the right knowledge from employees' memories and storing it in networked computers for later distribution (Kuo, 2008; Tiwana, 2001). However, hoards of information or knowledge are of little worth (Alavi and Leidner, 1999). Yang and Wu (2008) indicate that people owing specific knowledge could enjoy some benefits and unique positions and people who share their knowledge with others might lose their unique positions accordingly.

A hallmark in the contemporary knowledge-intensive economy is the ability of organizations to realize the economic value from their collection of knowledge and the associated assets (Gold and Segars, 2001). Whereas a number of organizations have launched extensive KM efforts, many of their projects are simply information projects in reality, and when these projects yield some consolidation of data but little innovation in products and services, the value of KM is cast in doubt (Gold and Segars, 2001). Yang (2004) signifies that the life insurance industry in Taiwan mostly put emphases on developing IT for supporting KM, whilst the recognition among the employees, who play important roles in embarking on KM, has not been reached extensively.

Consumers could purchase life insurance as a means of managing risk (Omar, 2007). Ostaszewski (2003) advocates that life insurance is designed to protect individuals against the risks of premature death and superannuation. Different from other industries, the products sold by the life insurance business are relatively "invisible" and "untouchable" (Hsiao, 2003). The employees play an important role in conveying the knowledge and services to the customers in the life insurance industry. Life insurance services possess experience and credence properties due to a large amount of expertise and professional knowledge (Chen, 2009). Bargas-Avila, et al. (2009) reported validation of Intranet satisfaction questionnaire implementing online survey in cooperation with an international insurance company employing about 6000 people. Yang (2004) conducted case studies in two major life insurance companies in Taiwan to explore their practical operations in applying KM. The two companies were chosen since they represented the leading companies in local life insurance companies and foreign life insurance companies respectively. Nevertheless, few researchers have examined the processes and main factors in KM adoption and diffusion, particularly in the life insurance sector.

In comparison with other business, the life insurance industry in Taiwan can be seen as in the infant stage of KM applications. As innovation is suggested by Rogers (1995) as an idea, practice, or object that is perceived as new by an individual or another unit of adoption, KM is viewed in this research as an innovation for the life insurers and their employees. The theory of Innovation Diffusion (ID) has been widely discussed in several areas, e.g., internet (Wolcott, et al., 2001), electronic commerce (Kendall, 2001) and KM system (Xu and Quaddus, 2005). However, there is a genuine lack of literature on addressing KM adoption and practice utilizing ID. This study thus lays emphasis on the adoption and diffusion of innovation to develop a KM model identifying motivations and barriers among the employees in accepting the concepts of KM and related methods, as well as in undertaking KM activities. Our main concerns are as follows: (i) what are the employees' cognitions regarding KM? (ii) what would motivate the employees to adopt and apply KM? (iii) what should hinder the employees from KM adoption and implementation? and (iv) how the cognitions affect employees behavior in KM activities.

The next section presents the literature review with theoretical background and related research. Followed are the hypotheses development section and methodology, in which research procedures and instrument development are described. The data analysis and results section presents the measurement model assessment and the structural model assessment. Finally, discussion and conclusion with limitation and future research directions are presented.

LITERATURE REVIEW

The Theory of Reasoned Action (TRA), drawn from social psychology, has been proposed as a primary theoretical foundation and gone through rigorous testing in diverse disciplines predicting human behaviors (Ajzen and Fishbein, 1980; Sheppard, Hartwick and Warshaw, 1988; Venkatesh, et al., 2003). Ajzen and Fishbein (1980) suggest that a person's behavior is a function of the person's intention determined by the attitude toward the act and the beliefs about the expectations of others, namely social normative beliefs. The person's attitude toward the behavior is affected by the beliefs that the behavior will lead to certain outcomes and by his or her evaluation of the outcomes. The subjective norms are influenced by the beliefs that specific referents that the person should or should not perform the behavior and by the motivations to comply with the specific referents (Ajzen and Fishbein, 1980). Davis's (1986) Technology Acceptance Model (TAM) proposes that a person's intention to use technology is determined by perceived usefulness and perceived ease of use. Perceived usefulness refers to the degree to which a person believes that using a particular system would enhance his or her job performance, while perceived ease of use refers to the degree to which a person believes that using a particular system would enhance his or her job performance.

effort (1989). Davis, Bagozzi and Warshaw (1992) suggest that an individual's intention to use computers is influenced by extrinsic motivations, perceiving an activity to be instrumental in achieving valued outcomes, as well as intrinsic motivations, referring to the performance of an activity for no apparent reinforcement other than the process of performing the activity per se. TAM has been extensively used and accepted as a robust model to investigate IT acceptance and usage (Venkatesh, et al., 2003). Cheng and Yeh (2011) utilized a revised TAM and demonstrated that perceived ease of use, perceived usefulness and the social norm had effects on acceptance intention.

Alavi and Leidner (1999) defined KM as "a systemic and organizationally specified process for acquiring, organizing and communicating both tacit and explicit knowledge for employees so that other employees may make use of it to be more effective and productive at work". The activities of KM included knowledge capture, documentation, retrieval and reuse, creation, transfer and sharing of its knowledge assets integrated in its operational and business processes (Dayan and Evans, 2006). In this study, KM is defined as "the process of identifying, managing and leveraging individual and collective knowledge to support the firm becoming more competitive" (Carlsson, 2001).

Abril (2007) examined a global consulting organization, DataCon, and indicated that a successful implementation of a knowledge enablement program involving agents as facilitators of attitudinal change, including action research components that were of help harvesting knowledge assets from tacit knowledge, and perceived value that would moderate the motivation of associates to participate in the knowledge enablement program. Hung, Chou and Tzeng (2010) adopted Multiple Criteria Decision Making (MCDM) approaches, ranking the gaps of the KM aspects in control items to achieve the aspired level of performance, found that the KM gaps within the service industry were higher than the gaps within the IC (Integrated Circuit) and banking industries. Tan and Lim (2010) suggested the critical success factors (CSFs) that influences KM processes in small and medium enterprises (SMEs) are culture, leadership, employee participation, information and communications technology, as well as organizational structure.

Although the topic of KM and its adoption has been discussed by some researchers, why the employees would accept KM and how their attitudes affect KM practice are not well examined in the past studies. The TRA helps explaining why an employee would accept and employ KM. The suggestions of TAM can be applied in examining what benefits KM would bring to the employees in increasing their job performance and whether KM projects with relevant IT usage are easy or complicated for the employees. According to Rogers's (1995) ID, the role of KM in the life insurance industry can be examined by five characteristics of innovations, i.e., relative advantage, compatibility, complexity, trialability and observability. This study adopted the TRA, TAM and ID as the theoretical background and extended the applications to knowledge management adoption and diffusion via reviewing the relevant KM studies.

HYPOTHESES DEVELOPMENT

Figure 1 presents the research conceptual model developed according to the above theoretical background. This research suggests that, employees' perceptions of KM will influence their attitudes toward KM adoption, and the attitudinal factor will have effects on the practice of KM vie their activities pertaining to KM.

A person's beliefs that the behavior leads to certain outcome and his or her evaluation of the outcome would influence his or her attitude toward the behavior (Ajzen, 1980). Davis, Bagozzi and Warshaw (1992) referred extrinsic motivation to the performance of an activity because it was perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself, such as improved job performance, pay, or promotions. Davis, Bagozzi and Warshaw (1989) indicated that perceived usefulness was a major determinant of people's intention to use computer. Gefen and Straub (1997)

reported that perceived usefulness played an essential role in the intended use and self-reported usage by stating that people's intentions to use computers in an organization were based mainly on a cognitive appraisal of how the systems would help them achieve enhanced performance.

Figure 1: Research Conceptual Model of Knowledge Management Adoption and Practice



Figure 1 presents the research conceptual model of KM practice identifying the perceptive factors that influence KM practice via attitude toward KM adoption. Perceived usefulness refers to the perception that employees believe that KM will lead to certain outcome. Complexity is the degree to which KM is perceived as difficult to understand and use. Subjective norm is an employee's beliefs that other people (e.g. colleagues and managers) think that he or she should adopt and apply KM.

Moore and Benbasat (1991) identified relative advantage as "the degree to which using an innovation is perceived as being better than using its precursor". People would tend to adopt KM when they perceived that KM was better than it superseded (Rogers, 1995). According to Davis (1989), and Davis, Bagozzi and Warshaw (1989), the dimensions of perceived usefulness can be as follows: using a system would (i) enable an individual to accomplish tasks more quickly; (ii) improve his or her job performance; (iii) increase his or her productivity; (iv) enhance his or her effectiveness on the job; (v) make it easier to do his or her job; and (vi) let the individual find the system useful in his or her job. Venkatesh, et al. (2003) reported that outcome expectations, consisting of performance expectations (job-related) and personal expectations (individual goals), were related to the consequences of the behavior. Thus, this study proposes the first hypothesis as follows:

H1: Perceived usefulness positively influences the attitude toward knowledge management adoption.

Complexity is defined in this study as "the degree to which KM is perceived as difficult to understand and use" (Rogers, 1995). Some innovations are readily understood by most members of a social system, while others are more complicated and will be adopted more slowly. According to Rogers (1995), new ideas that are simpler to understand are adopted more rapidly than innovations that require the adopter to develop new skills and understandings.

Complexity was also used by Thompson, Higgins and Howell (1991) to identify the degree to which a system was perceived as relatively difficult to understand and use. The opposite of the concept of complexity can be referred to the perceived ease of use widely used in TAM studies. Perceived ease of use was defined as "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1993). Moore and Benbasat (1991) addressed that the concept of complexity in the theory of Innovation Diffusion and perceived ease of use in TAM resembled each other in referring to the perceptions regarding how difficult or easy an innovation was to understand, learn and use.

Considering that complexity is an essential determinant in innovation adoption and diffusion, and perceived ease of use has been shown to have direct effects on the actual use, this research model proposes that complexity has negative influences on the attitude toward KM adoption. Complexity in the theory of Innovation Diffusion is adopted in this study and considered more appropriate for explaining the complicatedness involved in KM. Thompson, Higgins and Howell (1991) used the following items to measure the construct of complexity: (i) using the system takes too much time from my normal duties; (ii) working with the system is so complicated; it is difficult to understand what is going on; (iii) using the system involves too much time doing mechanical operations (e.g., data input); and (4) it takes too long to learn how to use the system to make it worth the effort. The hypothesis is thus suggested as follows:

H2a: Complexity negatively influences the attitude toward knowledge management adoption.

Davenport and Glaser (2003) pointed out that the programs which were especially designed for knowledge sharing often failed for the reason that those schemes made it harder, rather than easier, for people to perform their tasks. The direct impact of perceived ease of use on the perceived usefulness have been commonly reported in the previous research, such as Adams, Nelson and Todd (1992), Davis (1986, 1989, 1992), Davis, Bagozzi and Warshaw (1989, 1992), as well as Venkatesh and Davis (2000), among many others. It was indicated that, the easier a system was to use, the less effort was required to perform a particular job tasks and then the more effort could be contribute to other tasks and result in better performance at job (Davis, Bagozzi and Warshaw, 1989). The perceived ease of use was also proved to have positive effect on users' perceived usefulness toward the electronic system in a study of IT diffusion in the life insurance company (Liu, 2004).

To be useful, it should be easy to retrieve and capture knowledge (Alavi and Leidner, 2001). Knowledge emerges and evolves over time and today's knowledge may become tomorrow's ignorance. As a result, creation of easy to use and easy to remember retrieval mechanisms is the important aspect of organizational KM strategies. Accordingly, the following hypothesis is suggested:

H2b: Complexity negatively influences the perceived usefulness.

Subjective norm was defined as "the person's beliefs that specific individuals or groups think he should or should not perform the behavior" (Ajzen and Fishbein, 1980). A person who believed that most referents with whom the person was motivated to comply thought he or she should perform the behavior would perceive social pressure to do so (Ajzen and Fishbein, 1980). According to Ajzen and Fishbein (1980), subjective norm and the person's attitude toward the behavior, which referred to the person's judgment that performing the behavior was good or bad, determined a person' behavior intention. Rogers (1995) also identified that social system was an element in the diffusion of innovations. A social system was a set of interrelated units that were engaged in joint problem solving to accomplish a common goal. Therefore, the subjective norm in an organization is proposed to have impacts on people's adopting and applying KM.

Regarding who or what establishes the subjective norm for the members of a social system, Ajzen and Fishbein (1980) developed a standard question as follows: "most people who are important to me think I should..." Venkatesh, et al. (2003) used the question that, "people who influence my behavior think that I should ...", to observe subjective norm. Examining the construct of subjective norm in an organizational scenario, Thompson, Higgins and Howell (1991) adopted the following items: "(i) I use the system because of the proportion of co-workers who use the system; (ii) the senior management of this business has been helpful in the use of the system; (iii) my supervisor is very supportive of the use of the system for my job; and (iv) in general, the organization has supported the use of the system." Hence, the following hypothesis is proposed.

H3: Subjective norm positively influences the attitude toward knowledge management adoption.

"Attitude toward the behavior" was identified by Ajzen and Fishbein (1980) to be the personal factor that played an essential role in influencing a person's intention which was viewed to be good predictors of behavior. The attitudinal factor was the individual's positive or negative evaluation of performing the behavior. A person's attitude referred to his or her judgment that performing the behavior was good or bad and that he or she was in favor of or against performing the behavior (Sheppard, Hartwick and Warshaw, 1988). Davis, Bagozzi and Warshaw (1992) suggested that the potential user's attitude using an information system determined the system's actual use. "Affect toward use" (i.e., the feelings of joy, elation, or pleasure associate by an individual with a particular act) was adopted by Thompson, Higgins and Howell (1991) in examining personal computing utilization. Ajzen and Fishbein (1980) proposed the measurement format for attitude as follows: (i) harmful/beneficial; (ii) good/bad; (iii) rewarding/punishing; and (4) unpleasant/pleasant." The "attitude toward technology usage" was examined by asking: "(i) using the system is a bad/good idea; (ii) the system makes work more interesting; (iii) working with the system is fun; and (iv) I like working with the system (Venkatesh, et al., 2003).

KM processes, including acquisition, conversion, application, and protection, along with a knowledge infrastructure of technology, structure and culture, were identified as critical organizational capabilities that would positively and significantly influence the organizational effectiveness (Gefen and Straub, 1997). Santos (2003) suggested one possible organizing framework according to different knowledge processes, i.e., processes of sourcing, transfer and integration of knowledge. Knowledge sourcing refers to the mechanisms for identification and obtaining access to relevant new knowledge. Knowledge transfer signified the mechanisms through which tacit or complicated knowledge was transferred to the organizational group. Knowledge integration indicated the mechanisms via which specialized knowledge was combined within or across organizations, enabling the application of knowledge into new products and processes (Eisenhardt and Santos, 2002). Shin, Holden and Schmidt (2001) proposed a KM value chain, which consisted of four major activities: knowledge creation, knowledge storage, knowledge distribution and knowledge application. Accordingly, this study proposes the following hypothesis.

H4: The attitude toward knowledge management adoption positively influences knowledge management.

METHODOLOGY

Research Procedures

By using the mixed method (Tashakkori and Teddlie, 2003), this research was carried in the following steps. First, we identified the factors and associate variables pertaining to KM adoption and diffusion via comprehensive literature review. Second, a qualitative field study with ten interviews was conducted to modify the factors via content analysis (Huang, et al., 2011). The research questionnaire was then designed combining the literature and the results from the field study. Third, back translation, pre-test and pilot test were administered to refine the research instrument (Cooper, 1995). An empirical pilot study was undertaken to detect any errors, oversights and problems in design and instrumentation of the revised questionnaire (Copper, 1995). This study employed an empirical pilot study among 40 employees who possessed various positions and worked in different sections of a life insurance company in Taiwan. The results from the pilot study showed that the internal consistency of the scales were acceptable with relatively high Cronbach's alpha values. Only minor amendments were undertaken for the research instrument to be further utilized in the main survey.

Finally, the nation-wide survey was administered to 605 subjects in Taiwan's life insurance companies in 2005. With the approach of cross-sectional studies, various segments of Taiwan life insurance industry

were sampled at a single point in time and the selected companies varied in terms of history, size and location (Zikmund, 2000). The participating companies were approached via phone to obtain their approvals and identify the contact persons. The contact persons were then given the information regarding the purpose of the study, the instruction and the target sample before they distributed the questionnaires. They were requested to distribute the questionnaires randomly across departments and divisions and the research subjects were the office managers and staff, who worked full time and were involved in knowledge work to some extent in the company. In the main survey, 362 valid responses were collected, yielding a 59.8% effective response rate, and considered satisfactory.

Constructs and Items		Sources			
		Literature	Field Study		
Perceive	d Usefulness				
PU1	Work and service quality	Compeau and Higgins, 1995; Compeau, Higgins and Huff, 1999; Hung, 2004	\checkmark		
PU2	Making it easier to work	Gefen and Straub, 1997; Glazer, 1998; Gold and Segars, 2001	\checkmark		
PU3	Meeting the needs at work	Gefen and Straub, 1997; Glazer, 1998; Venkatesh and Dais, 2000	✓		
PU4	Effectiveness	Compeau and Higgins, 1995; Compeau, Higgins and Huff, 1999; Gold and Segars, 2001; Gefen and Straub, 1997; Hung, 2004	√		
PU5	Professional competency	Compeau and Higgins, 1995; Compeau, Higgins and Huff, 1999	✓		
PU6	Reducing the duplicate work		\checkmark		
Complex	ity				
CM1	Not friendly to use	Rogers, 1995; Thompson, Higgins and Howell, 1991; Glazer 1998	✓		
CM2	Not simple, clear and short enough	Glazer, 1998	\checkmark		
CM3	No assistance in time		\checkmark		
CM4	Lack of accessibility		\checkmark		
Subjectiv	ve Norm				
SN1	Senior management	Thompson, Higgins and Howell, 1991: Venkatesh and Davis 2000	\checkmark		
SN2	Opinion leader	Rogers, 1995	\checkmark		
SN3	Requirement of company	Thompson, Higgins and Howell, 1991; Venkatesh and Davis, 2000	\checkmark		
Attitude	toward KM Adoption				
AT1	Interesting	Thompson, Higgins and Howell, 1991; Venkatesh and Davis, 2000	\checkmark		
AT2	Fun	Thompson, Higgins and Howell, 1991; Venkatesh and Davis, 2000	\checkmark		
AT3	Likes	Compeau and Higgins, 1995; Compeau, Higgins and Huff, 1999; Venkatesh and Davis, 2000	√		
KM Prac	ctice				
KP1	Gathering knowledge	Hung, 2004; Teece, 1998	\checkmark		
KP2	Organizing knowledge	Hung, 2004; Teece, 1998	\checkmark		
KP3	Sharing knowledge	Shin, 2001; Thompson, Higgins and Howell, 1991	\checkmark		
KP4	Converting knowledge	,	\checkmark		

Table 1: Measurements	of the	Constructs
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Table 1 shows the measurement items and their sources from literature and the field study. The source column presents the literature supporting the measurement item. The check in the field study indicates that the item that is verified or collected from the field study.

Instrument Development

The survey instrument was designed to contain three main parts: opening, middle and ending components (Neuman, 2000). The opening part provided the respondents with the survey instructions (e.g., the aims of the research project, the nature participants' involvement and protection for all responses). The middle part was composed of the instrument items that were measured on a seven- point (1-7) Liker scales, in which 1 indicated "strongly agree" and 7 indicated "strongly disagree" respectively. The respondents were requested to provide demographic information in the last part of the questionnaire. As suggested by Neuman (2000), the questions in the instrument were arranged in such a sequence so as to minimize the discomfort and confusion of respondents. The items for measuring the factors in KM adoption and diffusion were adapted from the literature and enriched vie the field study to better present the factors in the operational version.

The measure items for each construct and their sources are presented in Table 1. A confirmatory factor analysis (CFA) is performed to specify the structure between observed indicators and latent constructs. Structural equations among latent constructs are then examined to test the conceptual structural equation model (SEM). The CFA and SEM procedures are conducted utilizing AMOS software Amos 7.0.

DATA ANALYSIS AND RESULTS

Demographic Characteristics

The respondents' demographic characteristics are presented in Table 2. The majority of them were in the age group of 31 to 40 (53.0%) and only 0.6% were 20 or below. 59.9% of the respondents had over five year's seniority, in which 21.5% had 5-10 year's seniority and 6.9% had seniority of more than 15 years.

Characteristics	Frequency	Percentage (%)
Gender		
Male	131	36.2
Female	229	63.6
Age		
20 or below	2	0.6
21-30	108	29.8
31-40	192	53
41-50	58	16
51 or above	1	0.3
Seniority		
Less than 2 years	77	21.3
2+ to 5 years	68	18.8
5+ to 10 years	114	31.5
10+ to 15 years	78	21.5
More than 15 years	25	6.9
Title		
Office manager	94	23.5
Staff	277	76.5

Table 2 Demographic Profile

Table 2 presents the characteristics of the respondents who participate in the main survey. The 94 office managers include 1 vice president or above, 3 assistant vice presidents, 3 office directors, 8 department managers, 31 associate manager, 18 assistant manager, 4 division chief and 17 supervisor.

Assessments of the Measurement Model

A confirmatory factor Analysis (CFA) was first used to confirm the factor loadings of the five constructs (i.e. perceived usefulness, complexity, subjective norm, attitude towards KM adoption and KM practice) and to assess the model fit. The fit indices of the measurement model were summarized in Table 3. This

study used the following seven values recommended by literature to assess model fit: ratio $\chi 2/d$ f \leq 3.0 (Hayduck, 1987); CFI \geq 0.9 (Bagozzi, 1988); RMSEA \leq 0.06 (Bagozzi, 1988; Bentler, 1999); GFI \geq 0.9 (Scott, 1991); AGFI \geq 0.8 (Scott, 1991); NFI \geq 0.9 (Bentler, 1980) and NNFI \geq 0.9 (Bentler, 1980). As presented in Table 3, the overall model indicated that $\chi 2/d$.f.=1.72 (i.e. 269.98/157) and was significant at p <0.001. Furthermore, other indicators of goodness of fit were CFI=0.98, RMSEA=0.05, GFI=0.93, AGFI=0.91, NFI=0.95 and NNFI=0.97. All the model-fit indices exceeded the respective common acceptance levels suggested by previous research, demonstrating that the measurement model exhibited a good fit with the data collected. Therefore, we proceeded to evaluate the psychometric properties of the measurement model.

Table 5. Fit mulces for measurement and Structural mode	Table	3: Fit	Indices	for	Measurement	and	Structural	Model
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Fit indices	Recommended Value	Measurement Model	Structural Model
x²/df	≤ 3.0	1.72	2.27
CFI	≥ 0.9	0.98	0.96
RMSEA	≤ 0.08	0.05	0.06
GFI	≥ 0.90	0.93	0.91
AGFI	≥ 0.80	0.91	0.88
NFI	≥ 0.90	0.95	0.93
NNFI	≥ 0.90	0.97	0.95

Table 3 presents the fit indices for measurement model and structural model respectively. Hair, et al. (1998) argued that the model-fit indices should reach accepted standards before judging model fitness. It is shown in Table 3 that every model-fit index exceeded the recommended value suggested by previous studies.

Constructs	Items	Items	Construct	Average Variance
		Reliability	Reliability	Extracted
Perceived	PU1	0.82	0.67	0.93
Usefulness	PU2	0.81		
	PU3	0.87		
	PU4	0.82		
	PU5	0.82		
	PU6	0.79		
Complexity	CM1	0.84	0.77	0.93
complexity	CM2	0.91	0.77	0.52
	CM3	0.89		
	CM4	0.87		
Subjective	SN1	0.79	0.63	0.83
Norm	SN2	0.79		
	SN3	0.79		
Attitude toward	AT1	0.89	0.72	0.88
KM Adoption	AT2	0.84	0.72	0.00
Kin Auoption	AT3	0.82		
	1115	0.02		
KM Practice	KP1	0.82	0.70	0.90
	KP2	0.87		
	KP3	0.82		
	KP4	0.84		

Table 4: Convergent Validity

Table 4 shows the item reliability, construct reliability and average variance extracted (AVE) of the measurement model. It indicates that the convergent validity is satisfactory and thus the hypothesized measurement model is reliable for further examination of structural relationships among the constructs.

Hair, et al. (1998) suggested that convergent validity of CFA results should be supported by item reliability, construct reliability, and average variance extracted (AVE). As shown in Table 4, all of the construct reliability values, ranging from 0.63 to 0.77, exceeded the recommended cut-off value of 0.6 (Fornell and Larcker, 1981). The AVE of all constructs range between 0.83 and 0.93 which are above the

suggested value of 0.5 meaning that the variance accounted for by each of the constructs was greater than the variance accounted for by the measurement error (Fornell and Larcker, 1981; Hair, et al., 1998). These indicated that the measurement model had good convergent validity. Therefore, the hypothesized measurement model was reliable and meaningful to test the structural relationships among the constructs.

Assessments of the Structural Model

The seven recommended fit indices were also applied to assess the structural model (see Table 3). Comparison of all fit indices with their corresponding suggested values, provided evidence of a good model fit (χ2/d.f.=2.27, CFI=0.96, RMSEA=0.06, GFI=0.91, AGFI=0.88, NFI=0.93 and NNFI=0.95). We could thus proceed to examine the path coefficients of the structural model. This study examines the structural model with one exogenous construct (i.e. KM practice) and four other constructs (i.e. perceived usefulness, complexity, subjective norm and attitude toward KM adoption). Figure 2 displays the properties of the casual paths, including the standardized path coefficients, path significances, and variance explained (R2) by each path. As expected, perceived usefulness ($\beta = 0.72$, P < 0.001) had direct and positive effects on the attitude toward KM adoption significantly. Thus, H1 was supported. However, the suggested impact of complexity on the attitude toward KM adoption was shown to be insignificant. H2a was rejected. The influence of complexity on perceived usefulness was found to be significant, whilst the coefficient value was positive (β =0.41, P < 0.001). The results did not support the hypothesis H2b, which was proposed that complexity negatively influences the perceived usefulness. Subjective norm was revealed to be the other significant factor in determining the attitude toward KM adoption (β =0.17, p < 0.001), supporting H3. Finally, the attitude toward KM adoption appeared to significantly affect KM practice (β =0.63, p < 0.001) and thus H4 was supported.





Figure 2 presents the properties of the casual paths, including the standardized path coefficients, path significances, and variance explained by each path, in the structural model. It is shown that complexity significantly influences perceived usefulness. Subjective norm and perceived usefulness significantly affects the attitude toward KM adoption, which in turn influences KM practice.

Research regarding new technology acceptance often addresses gender difference, among all personality features (Lin and Lu, 2011; Sanchez-Franco, 2006; Venkatesh, Morris and Ackerman, 2000). It is suggested that men and women have different views in measuring value and benefit (Morre and Benbasat, 1991; Venkatesh, Morris and Ackerman, 2000). Therefore, this study further applies the Amos 7.0. Multiple-Group Analysis to discover whether male and female subjects (i.e., 131 male and 229 female) have difference in the cause and effect of the model constructs in this research. The indices of fit for the

two groups are consistent with the required values, thus entitling us to verify a high degree of goodness of fit between the model and the sample data. Figure 3 and Figure 4 show the estimates of path coefficients and the results of variance explained (R2) between the constructs. The results indicate that gender groups have significant difference in the paths "complexity to the attitude toward KM adoption" and "subjective norm to the attitude toward KM adoption". Complexity had a negative and significant effect on men's attitudes toward KM adoption, while such an effect was shown to be insignificant for women. On the other hand, the significant effect of subjective norm on women was not revealed to be significant on men's attitude in adopting KM.

Figure 3: Hypotheses Testing Results for Men Samples (n=131)



Figure 3 presents the hypotheses testing results from the men respondents. The findings reveal that complexity significantly influences perceived usefulness positively, while affects attitude toward KM adoption negatively in the men group. The effects of perceived usefulness on KM practice via attitude toward KM adoption are significant and positive for men samples.



Figure 4: Hypotheses Testing Results for Women Samples (n=229)

Figure 3 presents the hypotheses testing results from the women respondents. The findings reveal that complexity has significant effects on perceived usefulness in the women group. Different from the men group, the results indicate that subjective norm significantly influences attitude toward KM adoption, which has impacts on KM adoption.

DISCUSSION

This study empirically validated existing theories within the context of life insurance business by investigating the effects of perceived usefulness, complexity and subjective norm, on KM practice through the attitudinal factor. Combining the theories of Innovation Diffusion, TRA and TAM, the present research advanced our understanding of the perceptive constructs and their linkage to employees' attitudes and behaviors in the process of adopting and implementing KM. The results indicated that perceived usefulness and subjective norm were significant in determining the employee's attitudes toward KM adoption, which in turn affected their behaviors in KM practice.

According to the path coefficients, perceived usefulness exhibited the significant and direct effect on the attitude toward KM adoption. This research verified the influence of perceived usefulness on people's adopting KM in the life insurance sector. For the managers of the life insurance enterprises, this study suggests that they should enlighten the employees on the worth and significance of KM for them, such as increasing productivity, enhancing efficiency, and making it easier, more convenient and flexible at work, etc., and thus the employees would be more willing to accept KM and realize that applying KM is not only important for the organizations, but also beneficial for themselves.

Subjective norm was posited to be essential in affecting an individual's behavior in the past research. This study extended the notion by indicating that subjective norm had positive impacts on the practice of KM via employees' attitudes toward KM adoption. In the literature, Dishaw and Strong (1999) presented that social norm played a more significant role in an organizational background. The participants in the field study agreed that the employees were very likely to be affected by others in adopting and applying KM. The empirical evidence shows that senior management, opinion leader and requirement of company play important roles in influencing the employees' attitudes toward KM acceptance. As suggested by Wong and Aspinwall (2005), successful KM requires proactive entrepreneurial support and leadership from top management. Top management and leaders should contribute to promote a corporate mindset that emphasizes cooperation and knowledge sharing across the organization, create an environment in which knowledge creation and cross-boundary learning can flourish, as well as provide continual support and commitment to sustain the effort for KM.

This study identified attitude toward KM adoption as the employees' overall affective reaction to the acceptance of KM, and found that such an attitudinal factor had significant impacts on the employees in conducting KM activities. This study supported previous research that suggested attitude as a crucial factor in predicting an individual's behavior. Little empirical research was found in the literature to consider the attitudinal factor in investigating KM adoption and applications. This study presented the research framework and associated items for examining the employees' feelings regarding accepting KM. From the interviews in the field study, attitude was recognized as the primary factor in deciding a person's performance in KM practice. Consequently, how to increase the employee's interests to accept KM (e.g., introducing the benefits of KM and encouragements from top management), would be the focal point for the life insurance companies to put KM into place.

However, the proposed negative influence of complexity on perceived usefulness was not supported in this study. This study suggested that complexity negatively influence perceived usefulness based on the previous studies, and the opinions from several interviewees, who described that, if they needed to spend too much time on learning and applying KM, they would recognize KM as a burden, rather than benefits. Complexity in this study was found to have a significant effect on perceived usefulness, but such an effect was positive (β =0.41). The possible explanation for the results might be unearthed from some unique opinions collected from the qualitative field study. One interviewee mentioned that, "if a KM system is not "complicated" enough, it means that it is not satisfactory to deal with the various tasks in the practical operations." It is interesting to realize that the employees would somewhat assume that, if a KM project

or system is too easy to execute or use, it is probably a project or system which could not really solve the employees problems and thus is not useful for them.

The relationship from complexity to the attitude toward KM adoption was insignificant statistically. While Rogers (1995) suggested that complexity was one of the determinant factors in influence the diffusion of an innovation, its impacts on the attitude toward KM acceptance were not found to be significant in this empirical study. Most of the interviewees in the field study stressed that the complexity of KM would decrease the employees' interests to adopt it. Nonetheless, one interviewee did not agree such an argument. On the contrary, she said that, "as long as KM is useful for me at work, I will try my best to learn it". It can be inferred that when KM was perceived to be useful in improving job performance, the employees would be willing to overcome any difficulties and accept KM. Actually, some earlier research has questioned the overall significance of perceived ease of use in IT adoption (Straub, Limayem and Karahanna, 1995; Keil and Beranek, 1995), and indicated that in many cases a new IT was adopted primarily for its perceived usefulness. That is, the users was paying more attention to whether the new IT was instrumental in accomplishing tasks that were not inherent in the use of the IT itself. Hence, this study provided managerial implications that, though the life insurance enterprise should try to make KM as easy as possible for the employees in adopting and applying KM, the employees cared more about what were the exact benefits that KM could bring to them in their daily tasks.

This study discovered that gender makes a difference in the effects of complexity and subjective norm on the attitude toward KM adoption. Figure 3 and Figure 4 present the results of structural model analysis with men and women respectively. First, in the paths of influence on the attitude toward KM adoption, complexity had a significant effect with the male subjects, but not with the female subjects. The reason could be that women cares more about the benefits that KM would bring to them (i.e., perceived usefulness) and thus disregard the complexity and associated difficulties involved in adopting KM. Second, coinciding with the previous research (Venkatesh and Morris, 2000; Venkatesh and Morris, 2003;), we found that women are more susceptible to other's opinions and susceptible to the influence of colleagues and management in accepting KM, while men are not so sensitive to the subjective norm in deciding whether or not to adopt KM. The results validated that both men and women subjects are affected by perceived usefulness in forming their attitudes which influence behaviors in KM implementation, whilst women tend to be affected by others' thoughts and opinions in their workplace and not so concerned regarding how complex the KM project might be.

CONCLUSION

Researchers have applied the theory of ID in various areas during the last decades. However, little is known about the adoption and practice of KM in the life insurance sector. This paper fills this gap in the literature by examining the perceptive and attitudinal factors of KM adoption and practice. We collect qualitative data from a field study to fine-tune the proposed model developed from extensive literature review, and then conduct a survey collecting 362 responses for further analyses via confirmatory factor analysis and structural equation model techniques.

The results show that perceived usefulness significantly affects the employees' attitudes toward KM adoption and the attitudinal factor plays a significant role in influencing the employees in undertaking KM activities. Subjective norm is found to be the other significant factor in shaping the employees' attitudes toward KM adoption. To generate an environment in which opinion leaders, senior management and companies' requirements can be fully utilized to promote KM concepts and processes would be essential in having KM into place successfully. The findings from the field study provide not only amendments of the key constructs in the research model, but also fruitful information for probing into how the employees think about KM adoption and diffusion. We unearth the phenomenon that employees would consider a KM project or system not useful if it is not complicated. The past research suggested

that people's recognitions on usefulness might be delimitated when a new system or technology was too difficult to learn or operate. However, this empirical study presents the other viewpoints that KM would not be useful if it involves little complexity. The differences between male and female subjects are also presented in this paper. The results show that women are more sensitive to subjective norm, while men lay fewer emphases on others' opinions. The findings also imply that women would be more willing to conquer the hindrances involved in KM if they feel that adopting and applying KM will enhance their job efficiency and is worthwhile the efforts.

In this paper, the selection of the participant companies and respondents were not purely random and thus there could be some risk of sample bias. While the questionnaire was developed in such a way that the respondents were provided with the definitions of knowledge and KM, some respondents might not be able to give their real opinions for having little understanding or experience of KM in their companies. Therefore, the use of an oral instruction before distributing the questionnaire would be preferable, wherever possible. With the research conducted in the context of Taiwan's life insurance industry, the conclusions reached in the current study were not of universal applications. Future research can extend the applications of this study to different geographical contexts and other industry sectors, such as banking, security and financial holding companies. Further studies might investigate the external factors that influence the perceptive factors and the impact of KM practice on the organization's performance.

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