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# An investigation on critical success factors for knowledge management using structural equation modeling

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**Abstract**

This paper explores the critical success factors (CSFs) for knowledge management (KM) in the life insurance industry utilizing the techniques of Structural Equation Modeling (SEM). The research was carried out in three phases: field study, pilot survey and main survey. The results indicate that (i) environments significantly affect organizational characteristics, (ii) environments and IT infrastructure significantly affect KM characteristics, and (iii) individual characteristics, KM characteristics and organizational characteristics significantly influence KM implementation. This study offers a comprehensive research model for further examination in other industries and provides the life insurance business with practical suggestions.



*Keywords:* Knowledge management (KM); Critical success factor (CSF); Structural equation modeling (SEM); Life insurance

## 1. Introduction

There has been a growing recognition in the business world viewing knowledge as critical resources and knowledge resources matter more than conventional ones, such as land and capital [1]. The knowledge-based view provides a theoretical basis on why knowledge-based resources are vital in creating the sustainable competitiveness [2,3]. KM practices enhance the flow of insight and advice between employees and therefore they can benefit from other's expertise [4]. The idea that enterprises can improve employees' use of knowledge via knowledge management (KM) has been widely accepted among practitioners, whereas few organizations have undertaken KM as successfully as they should.

The nature of knowledge has been described as "justified true belief" [5]. Davenport and Prusak [6] advise 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. Knowledge is defined in this research as "the understanding, awareness, or familiarity acquired through study, investigation, observation, or experience over the course of time" [7]. In the case of life insurance business, "knowledge" refers to the familiarity and professional capability in underwriting, claim, customer service, policy design and so on. Managing knowledge effectively can provide businesses with several competitive advantages, including average level of KM, service quality improvement, cost and time reductions, strengthened relationships among colleagues and quicker knowledge creation [8]. KM is referred to manage the corporation's knowledge through a specified


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process for acquiring, organizing, sustaining, applying, sharing and renewing the knowledge of employees to enhance organizational performance and create value [6,9]. In this study, KM is defined as "the creation, extraction, transformation and storage of the correct knowledge and information in order to design better policy, modify action and deliver results for both the employees and organizations in the life insurance business" [10].

## 2. Critical Success Factors

Critical Success Factors (CSFs) refer to the limited number of areas in which satisfactory results will ensure successful competitive performance for the individual, department, or organization [11, 30]. Ranjan and Bhatnagar [12] advocate that CSFs are the crucial factors or parameters required for ensuring the continued success of an organization and these factors represent those managerial areas that must be given special and continual attention to cause high performance. As KM encompasses a wide range of perspectives, the successful implementation of KM is dependent on several critical factors. Stankosky, et al. [13] propose a 4-pillar KM model, in which leadership, organization, technology and organizational learning are identified as the four CSFs for successful KM operation. Further, Hsieh and Chen [14] signify several internal CSFs for KM, including motivation of employees, company culture, support from top management, reward of knowledge sharing, efficiency for mining the knowledge, as well as appropriate information technology (IT).

Holsapple and Joshi [15] point out that environmental influence (e.g., fashion, markets, competition, technology, time, as well as governmental, economic, political, social and educational climate) plays important roles in the success of KM in organizations. Hung [16] recommends that organizations should consider external environmental changes and the customers' demands to ensure their abilities to gain the sustainable competitiveness in the market.

Technologies capture, store and distribute structured knowledge for use by people. Technology is a great enabler of knowledge sharing, whereas knowledge is the value added by people in organizations in terms of experience and interpretation that transforms information into knowledge [17]. Technology drives change and raises awareness concerning KM. To guarantee conditions for KM to be in place and sustain overtime needs a strong support from top management [18]. Managers should highly motivate sharing and use of knowledge since the natural tendency of people is to hoard their knowledge and look suspiciously upon that from others [19].

Ajzen and Fishbein [20] suggest that the demographic variables, such as socioeconomic status, education and personality trait are the external variables of behaviors. Individual factors, such as educational level, tenure and participation, are the cluster in predicting innovation adoption in organizations [21]. In order to integrate knowledge to create organizational capability, Grant [22] advocates three primary mechanisms, including directives, organizational routines, and self-contained task teams.

The adoption and practice of KM in life insurance enterprises involve not only the individual innovativeness, but also the organizational innovativeness. Rogers [23] suggests that organizational characteristics (e.g., size and structure) will influence the innovativeness of an organization. Gold, Malhotra, & Segars [24] identify technology as one of the main infrastructure capabilities in KM for an organization. Technology can effectively integrate the previously fragmented flows of information and knowledge. However, the managers would request to avoid overloading users with unnecessary data, eliminate the knowledge that was no longer valid and keep up with new technologies. Alavi and Leidner [25] suggest that the culture of teamwork and knowledge sharing is one of the important KM capabilities needed in organizations. Brand [18] observes that innovation happens and KM works best when employees trust that their company will be loyal to them over time. Based on the literature review as depicted above, the research model is hence proposed (see Fig. 1) and nine hypotheses are suggested as follows.

- **H1.** Environments significantly affect organizational characteristics.
- **H2.** Environments significantly affect KM characteristics.
- **H3.** IT infrastructure significantly affects KM characteristics.
- **H4.** KM characteristics significantly affect individual characteristics.
- **H5**. Individual characteristics significantly affect KM implementation.
- **H6**. KM characteristics significantly affect KM implementation.
- **H7.** Organizational characteristics significantly affect KM implementation.
- **H8.** IT infrastructures significantly affect KM implementation.
- **H9**. Cultural factor significantly affects KM implementation.

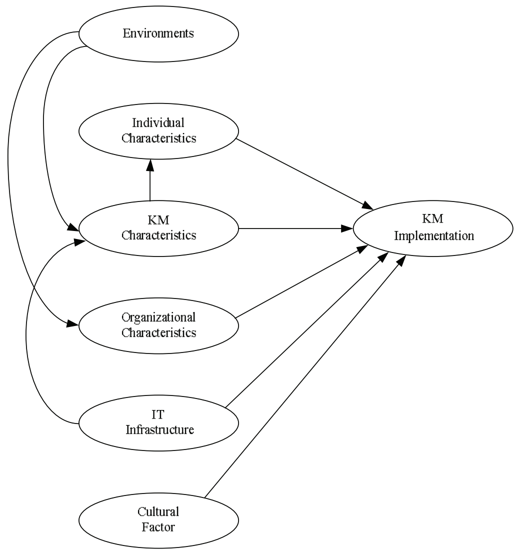


**Figure 1.** Research model

Figure 1. Research Model

## 3. The Role Of Km In The Life Insurance Industry

Life insurance can be seen as an arrangement through which the risk of specific individuals can be share by the general majority of people [26]. Different from other industries, the products sold by the life insurance business are comparatively "invisible" and "untouchable" [26]. "People" play an important role in conveying the knowledge and services to the customers in the life insurance industry. Besides, most of the life insurance policies were long term and therefore the life insurance companies should provide lasting, sometimes lifelong, services for the customers. Therefore, KM would be imperative for life insurance companies to enhance performance and gain a competitive edge. However, the adoption and applications of KM have just launched in Taiwan's life insurance business recently. Innovation is described by Rogers [23] as an idea, practice, or object that is perceived as new by an individual or another unit of adoption [23]. In this study, KM is viewed as an innovation for the life insurers and their employees.

## 4. Research Methods

This study initially identifies the factors and associated variables affecting successful KM based on comprehensive literature review. The research modifies the factors and variables via a qualitative filed study conducting ten interviews with knowledge workers, including managers and staff in life insurance companies in Taiwan. The qualitative data are analyzed using content analysis [27]. A questionnaire is designed based on the literature review and modification from the field study. The instrument items are measured on a seven- point (1-7) Liker scales, in which 1 indicates that the respondent strongly agree with the statement and 7 indicates that the respondent strongly disagree with the statement respectively. The questionnaire is pre-tested by three knowledge workers in the life insurance sector in Taiwan, pilot tested among 40 employees in a life insurance enterprise, and revised to ensure content validity. Finally, this study, via cross-sectional research approach, selects eight life insurance companies varied in history, size and location to be the participant organizations, and undertakes the main survey to 605 subjects among the life insurance enterprises in Taiwan. The research subjects in the main survey include the office managers and staff, who work full time and are involved in knowledge work to some extent in the company. The main survey collects 362 valid responses (i.e., a 59.8% effective response rate).

A confirmatory factor analysis (CFA) is performed to specify the structure between observed indicators and latent constructs, and test the validity of measurement model. Subsequently, structural equations among latent constructs are examined to test the conceptual structural equation model (SEM). The CFA and SEM procedures are conducted utilizing AMOS software.

## 5. Data Analysis and Results

The subjects in the main survey comprised of 36.2% male and 63.6% female. The majority (53.0%) of them were in the age group of 31 to 40; only 0.6% were 20 or below, 29.8% in 21 to 30 and 16.3% were over 41. Most of the respondents' educational background was bachelor (57.7%), followed by technical school (23.5%). There were 23.5% office managers and 76.5% office staff involved participation in the main survey. 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.

This study first undertakes the CFA to confirm the factor loadings of the seven constructs (i.e., environments, individual characteristics, KM characteristics, organizational characteristics, IT infrastructure, cultural factor and KM implementation) and to assess the model fit. The model adequacy was assessed by the fit indices suggested by Hair, et al. [28], and Jo¨reskog and So¨rbom [29]. Convergent validity of CFA results should be supported by item reliability, construct reliability, and average variance extracted [28]. As presented in Table 1, t-values for all the standardized factor loadings of items are significant ($p < 0.01$). Construct reliability estimates range from 0.45 to 0.77, which indicates a satisfactory estimation. The average extracted variances of all constructs range between 0.76 and 0.91 which exceed the suggested value of 0.5. The measurements of these items are summarized in Appendix A. The results indicate that the measurement model has good convergent validity. Therefore, the proposed measurement model is reliable and meaningful to test the structural relationships among the constructs.

**Table 1. Convergent validity**

| Constructs | Items | Items reliability | Construct reliability | Average variance extracted |
|---|---|---|---|---|
| Environments | EI1 | 0.715 | 0.4896 | 0.7926 |
| | EI2 | 0.763 | | |
| | EI3 | 0.672 | | |
| | EI4 | 0.643 | | |
| Individual characteristics | IN1 | 0.616 | 0.5624 | 0.7916 |
| | IN2 | 0.821 | | |
| | IN3 | 0.796 | | |
| KM Characteristics | KM1 | 0.807 | 0.6192 | 0.89 |
| | KM2 | 0.754 | | |
| | KM3 | 0.852 | | |
| | KM4 | 0.822 | | |
| | KM5 | 0.689 | | |
| Organizational Characteristics | OR1 | 0.568 | 0.4477 | 0.7617 |
| | OR2 | 0.691 | | |
| | OR3 | 0.78 | | |
| | OR4 | 0.618 | | |
| IT infrastructure | IT1 | 0.833 | 0.6952 | 0.9012 |
| | IT2 | 0.847 | | |
| | IT3 | 0.823 | | |
| | IT4 | 0.832 | | |
| Cultural Factors | CU1 | 0.835 | 0.7653 | 0.9071 |
| | CU2 | 0.861 | | |
| | CU3 | 0.926 | | |
| KM Implementation | KP1 | 0.818 | 0.7482 | 0.8988 |
| | KP2 | 0.834 | | |
| | KP3 | 0.938 | | |

The structural model is estimated with a maximum likelihood estimation method. The fit indices of the structural model are summarized in Table 2. The overall model indicates that $\chi^2 = 688.42$, d.f.=287, and is significant at p <0.001. Technically, the p-value should be greater than 0.05, i.e. statistically insignificant, to indicate that the model well fits the empirical data. As the $\chi^2$ value is very sensitive to sample size, however, it frequently results in rejecting a well-fitted model when sample size increases. In practice, the normed $\chi^2$ (i.e. $\chi^2$ /d.f.) has been recommended as a better goodness of fit than the value. In order to examine the model fit, therefore, this study uses sample size dependent (rather than sample size independent) measures of goodness of fit. The $\chi^2$ /d.f. ratio of less than 5 is used as the common decision rule of an acceptable overall model fit. The normed $\chi^2$ of model is 2.399 (i.e. 688.42/287), indicating an acceptable fit. Other indicators of goodness of fit are as follows: CFI=0.929, RMSEA=0.062, GFI=0.873, AGFI=0.844, NFI=0.885, NNFI=0.919 and SRMR=0.086.

**Table 2. Fit indices for measurement and structural model**

| Fit indices | Recommended | Measurement model | Structural model |
|---|---|---|---|
| $x^2$/df | <3.0 | 1.465 | 2.399 |
| CFI | >0.9 | 0.978 | 0.929 |
| RMSEA | <0.08 | 0.036 | 0.062 |
| GFI | >0.90 | 0.924 | 0.873 |
| AGFI | >0.80 | 0.903 | 0.844 |
| NFI | >0.90 | 0.933 | 0.885 |
| NNFI | >0.90 | 0.973 | 0.919 |
| SRMR | <0.09 | 0.035 | 0.086 |

Fig. 2 presents details regarding the parameter estimates for the model. Totally, seven out of nine hypotheses are supported. Environments have significant effects on organizational characteristics (γ1=0.62, t-value=7.53). Environments and IT infrastructure significantly affect KM characteristics (γ2=0.69, t-value=7.83; γ3=0.16, t-value=2.29). KM characteristics have significant effects on individual characteristics (γ4=0.64, t-value=10.18). Individual characteristics, KM characteristics and organizational characteristics significantly influence KM implementation (γ5=0.19, t-value=2.72; γ6=0.30, t-value=3.38; γ7=0.15, t-value=2.52).

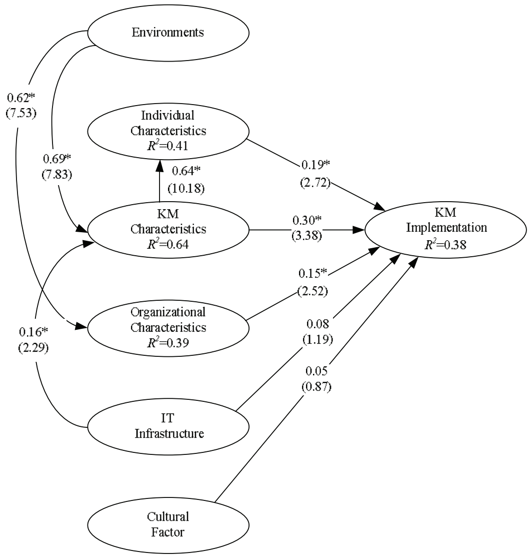


**Figure 2.** Hypotheses testing results.
*$p$<0.05; t-values In parentheses.

Figure 2. Hypotheses Testing Results

## 6. Conclusions And Future Research

This research provides an insight into the CSFs for KM by conducting empirical studies among Taiwan's life insurance enterprises. These CSFs are identified via extensive literature review and further enriched through a qualitative field study to fit the features of life insurance business. This study contributes to the existing literature in that there has been little evidence found in exploring KM applications with its CSFs within the life insurance sector. For life insurance enterprises, particularly those embarking on KM in Taiwan or elsewhere, this study presents the essential factors that should be taken into account to put KM into practice successfully.

As with any research, the specific service context and cross-sectional method of this study limit the interpretation of the findings. Some adjustments must be made to apply these results to other industries. However, this study provides directions for future research in exploring the CSFs for KM implementation. Generalization of the current study would also need further examination in a broader region such as Asia or in the international setting.

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## Appendix A. The measurements of items in seven constructs

| Factor | Items | |
|---|---|---|
| Environments | EI1: | Industrial competition |
| | EI2: | Trend |
| | EI3: | Rules and regulations |
| | EI4: | High development of IT |
| Individual characteristics | IN1: | Individual innovativeness |
| | IN2: | Work attitude |
| | IN3: | Personality |
| KM characteristics | KM1: | Time schedule and guidelines |
| | KM2: | Participation of the department representatives |
| | KM3: | Knowledge transfer channel |
| | KM4: | Knowledge type |
| | KM5: | Reward for KM |
| Organizational characteristics | OR1: | Size |
| | OR2: | Structure |
| | OR3: | Strategy and policy |
| | OR4: | Employee turnover rate |
| IT Infrastructure | IT1: | Software infrastructure |
| | IT2: | Compatibility |
| | IT3: | Function |
| | IT4: | Data updating and maintenance |
| Cultural factor | CU1: | Team-work culture |
| | CU2: | Encouragement of asking for help |
| | CU3: | Encouragement of interaction with others |
| KM implementation | KP1: | Identifying Knowledge |
| | KP2: | Sharing knowledge |
| | KP3: | Using knowledge |