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Full Length Research Paper

How to manage knowledge well? Evidence from the life insurance industry

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As using knowledge management and performance effectively to gain competitive advantage is becoming critical in today's knowledge-based economy, an increasing number of industries are trying to explore optimal methods of managing knowledge- based assets, so-called intellectual capital (IC) in both visible and invisible forms and evaluate their performance in this regard. In Taiwan, the life insurance industry includes two crucial factors: first, it is one of main mechanisms that could significantly influence Taiwanese economic growth; and second, knowledge needed for high performance itself. However, not only is difficulty in professions growing, high flow rate of talent and an increase in, and extension of, diversity services, but the recent global economic depression is a drawback that is seriously damaging competitive advantage domestically and internationally. This phenomenon also obviously affects Taiwanese economic growth. Since the renaissance and auspicious future of Taiwanese life insurance industry might be expected by senior life insurance experts, the aim of this study is on the basis of its development nature, profit generation by effective knowledge management, to overcome the highlighted difficulties by developing the critical criteria of IC and utilizing the developed IC criteria to explore the benchmark company. This is accomplished through a hybrid multiple-criteria decision-making (MCDM) approach based on a decision-making trial and evaluation laboratory (DEMATEL), the analytic network process (ANP), and VlseKriterijumska Optimizacija I Kompromisno Resenje (VIKOR). Companies in the life insurance industry are encouraged to successfully evaluate and improve knowledge management performance based on the research findings, to bring about radical change in the existing state of affairs and to develop future strategies efficiently and solidly.

Key words: Intellectual capital, life insurance industry, DEMATEL, ANP, VIKOR.

INTRODUCTION

Since entering the knowledge- based economy, almost every industry has emphasized its efforts with reference to both tangible and intangible knowledge- based assets to gain competitive advantage worldwide (Tan et al., 2007; Sonnier et al., 2007; Wu et al., 2009a) through so-called intellectual capital (IC). In the past, IC was mainly used for measuring and improving the operational performance of private or small firms (Sanchez and Elena, 2006). Its importance rose largely due to today's knowledge-based economy, and several issues regarding performance evaluation and improvement based on IC are thus increased by both research and practice (Kaplan and Norton, 2004; Ng, 2006; Kamath, 2007). Based on the claim above, knowledge-based organizations are deemed core assets of nations across the globe and main mechanisms for acquiring sustained competitive advantage internationally (Tan et al., 2007; Sonnier et al., 2007). This phenomenon is also generally at work in Taiwan. In Taiwan, without a doubt, the hi-tech and biotech industries are the top two major mechanisms for

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enhancing Taiwan's economic growth, and indeed, recent studies have been conducted to enhance these two methods of performance improvement in different disciplines (Chen and Chen, 2009) . However, the life insurance industry, an industry that enjoys a share of almost 20% in the Taiwanese financial industry and is famous for its high employee incomes, seems to be overlooked. In addition, due to organizational and international shortcomings like difficulty fostering professions, high flow rate of talent, and an increase and extension of diversity services, as well as the recent global economic depression, the life insurance industry is currently facing a serious loss of competitive advantage worldwide. However, in accordance with senior life insurance experts' indications, it should be expected that the life insurance industry in Taiwan will have a considerable future due to Taiwan's contribution to the life insurance industry in Asia. Therefore, it can be expected that strategy development for future competition will become the top concern globally. To address such difficulties, a precise method of managing knowledge-based assets and evaluating and improving related performance for the Taiwanese life insurance industry is becoming an urgent need, especially in today's knowledge-based economic climate.

In accordance with the above, this study from the perspective of its development nature, the profit generation by effective knowledge management, aims to address the emphasized problems by identifying the important criteria of IC and adopting the developed IC criteria to explore a benchmark company that can exemplify firms in the life insurance industry, and thus measure and improve knowledge management performance. Owing to numerous critical criteria that are taken into account in forming the IC evaluation structure, this kind of problem can be handled via multiple-criteria decision-making (MCDM). This study has utilized a hybrid MCDM approach based on a Decision-Making Trial and Evaluation Laboratory (DEMATEL), the Analytic Network Process (ANP), and VlseKriterijumska Optimizacija I Kompromisno Resenje (VIKOR). The DEMATEL method is used to develop the interrelationships between evaluation criteria to form an impact relations map, the ANP is adopted to release the restriction on hierarchical structure (Yang et al., 2008), and VIKOR is utilized to deal with a discrete decision-making problem with noncommensurable and conflicting criteria (Opricovic and Tzeng, 2004; Opricovic and Tzeng, 2007). A body of studies has proven the advantages and reliability of DETATEL (Chiu et al., 2006; Wu and Lee, 2007; Lin and Wu, 2008), the ANP (Sarkis, 2003; Momoh and Zhu, 2003; Yang et al., 2008) and VIKOR (Opricovic and Tzeng, 2004; Opricovic and Tzeng, 2007; Chen and Chen, 2008) in their respective fields. In this study, DEMATEL is used to explore causal relationships and effects related to different IC dimensions. On the other hand, the impact relations map of IC dimensions constructed by DEMATEL then becomes the network evaluation structure for ANP analysis that is adopted to explore the relative weights of IC criteria. After that, VIKOR is utilized to confirm the benchmark company within the Taiwanese life insurance industry with respect to the explored relative weights of IC criteria.

AN EVALUATION OF INTELLECTUAL CAPITAL

Although the term IC already exists, it currently lacks a general definition (Guthrie, 2001; Kamath, 2007) . The earliest concept of IC was proposed by Galbraith in 1969: that ability requires the use of the brain and value creation rather than knowledge and intelligence only (Guthrie, 2001). IC has been mainly defined on the corporate level (Hudson, 1993; Bontis, 1996; Bell, 1997; Nahapiet and Ghoshal, 1998), on the member level (Stewart, 1997; Wiig, 1997; Roos, 1998; Ulrich, 1998; Nahapiet and Ghoshal, 1998), or in terms of relative value from competitors (Stewart, 1997; Osborne, 1998). Today, there are still numerous studies based on the original concept that attempt to recognize, understand, and handle IC specifically from the perspective of different disciplines (Neely, 2002; Diefenbach, 2004; Abeysekera and Guthrie, 2005; Bukh et al., 2005; Marr, 2005).

Because of the varied IC definitions, the dimensions and methods one can consider in evaluating it are also numerous. As for the dimensions to be evaluated, human capital, organizational capital, customer capital, structural capital, individual capital, collective capital, relational capital, innovation capital, and strategic alliances are addressed by Wu, Chen, and Chen in 2009 (Wu et al., 2009b). Among them, the most utilized dimensions for research are human capital, structural capital, and relational capital (Bontis, 1996; Edvinsson and Malone, 1997; Stewart, 1997; Sveiby, 1997; Johnson, 1999; Knight, 1999).

As for the IC evaluation methods, some that have been used in the past include ad hoc questionnaires with structural equation modeling based on partial least squares, extensive surveys based on customers' perspectives, experimental designs, multiple regression models, financial analysis reporting, and interviews (Beattie, 1999; Breton and Taffler, 2001; Arvidsson, 2003; Huang and Liu, 2005) . It has been argued, nevertheless, that such evaluation methods have lacked clear direction to guide top managers and organization members in evaluating and improving IC performance (Wu et al., 2009b). Because the aim of this study is to overcome the highlighted difficulties that the life insurance industry is facing today by developing critical evaluation criteria for IC and using those IC criteria to explore the performance of benchmark company, the problem to be solved can be addressed using Multiple-Criteria Decision- Making (MCDM). This method takes into account several critical factors in constructing the IC evaluation hierarchical structure and avoids the lack of clear direction for top managers and organization members-direction necessary to evaluate and improve knowledge management performance—as experienced using other evaluation methods.

THE DIFFICULTIES AND OPPORTUNITIES POSED BY THE LIFE INSURANCE INDUSTRY

In recent years, the global economic depression has not only decreased quality of life for individuals, but has also resulted in the failure of numerous companies to keep operating worldwide. Both the international and the domestic life insurance industry are also facing significant damage to their operations as a result of the depression. In particular, because of Taiwan's formal "loss to interest differential" (infoTimes, 2009) and the seven decreases of the interest rate by the Taiwanese central bank, which made the interest rate approach zero, the life insurance industry in Taiwan is thus facing one disaster after another. One chairman in the Taiwanese life insurance company indicated that there was a deficit of nearly 1,450 million in the Taiwanese life insurance industry; this was a record, and it meant that the deficit in 2008 was the sum of income during the previous four years (infoTimes, 2009).

Although the life insurance industry recovered from the economic depression gradually in 2009, it has retained only around 700 million of its net value; whereas, it enjoyed net value of nearly 4300 hundred million in 2008 (Huaxia, 2009). This phenomenon clearly indicates that the Taiwanese life insurance industry still has great challenges and difficulties to face in the future of its operations. However, because Taiwan is one of the top five insurance markets in Asia, with a historical growth rate of up to 18%, there are many more niches and advantages to be discovered in the long-run (infoTimes, 2009). Additionally, so far, the insurance premiums in Taiwan are among the top 10 globally. Although the insurance premium in mainland China is greater than that in Taiwan, China's population is much greater than in Taiwan. Furthermore, some of the Taiwanese life insurance companies have entered the mainland Chinese market and expect to emerge at the top of the global life insurance market in the future, according to most of the senior life insurance experts in Taiwan (infoTimes, 2009).

In accordance with the above information, two key points that can support the value and contribution of this study are summarized. First of all, the Taiwanese life insurance industry is currently mired in the negative consequences produced by the global economic depression. Exploring ways to resolve such difficulties has become an especially critical issue today. However, so far, related studies have mainly focused on discussion from finance or economics (Hsu and Wu, 2006; Hsu and Wu, 2008). Such studies have seemed to overlook the nature of the development of the life insurance industry, profit generation by effective knowledge management. Second, owing to the promising future expected for the Taiwanese life insurance industry, the question of how to develop strategies for obtaining competitive advantage worldwide will be a major concern. Continuing with the justification of the current research based on the summarized first point, strategies developed on the basis of effective knowledge management will be much more efficient and undefeatable. The two key points have a common requirement that makes it possible to evaluate and improve knowledge-based performance (the aim of this study).

A HYBRID MCDM MODEL

DEMATEL

The Decision-Making Trial and Evaluation Laboratory (DEMATEL) is adopted to develop the interrelations be-tween evaluation criteria to form an impact relations map (Yang et al., 2008). The calculation steps are described as follows (Yu and Tseng, 2006; Liou et al., 2007; Yang et al., 2008):

Step 1: Calculate the initial average matrix based on scores

This study assumes that a group of sample experts are asked to indicate the direct effect of elements (evaluation criteria) in accordance with the perception that each element *i* exerts on each other element *j*, as presented by a_{ij}, utilizing a scale ranging from 0 (no influence) to 4 (very high influence). On the basis of groups of direct matrices from samples of experts, an average matrix ***A*** can then be generated in which each element is the mean of the corresponding elements in the experts' direct matrices.

Step 2: Calculate the initial influence matrix

When one is completing the normalization of the average matrix ***A***, the initial influence matrix ***D***, $[d_{ij}]_{n\times n}$, is calculated so that all principal diagonal elements equal zero. In accordance with ***D***, the initial effect that an element exerts on and/or acquires from each other element is given. The map, as shown in Figure 1, illustrates a contextual relationship among the elements within a complex system; each matrix entry can be seen as its strength of influence. In Figure 1, an arrow from *d* to *g* means that *d* influences *g* with an influence score of 1. Therefore, it can then translate the relationship between the causes and effects of various measurement criteria into a comprehensible structural model of the system based on the degree of influence.

Step 3: Create the full direct/indirect influence matrix

The indirect effects of problems decrease when the powers of ***D*** increase, e.g., [illegible] which guarantees convergent solutions to the matrix inversion. As Figure 4 presented, the effect of *c* on *d* is greater than that of *c* on *g*. Based on this, an infinite series of both direct and indirect effects are derived. Let the (*i*, *j*) element of matrix ***A*** be presented by a_{ij}; the direct/indirect matrix can then be acquired through equations (1) - (4) as follows.

$$D = s^*A,\ s>0, \qquad (1)$$

or

$$[d_{ij}]_{n\times n} = s[a_{ij}]_{n\times n}, \quad s>0, \quad i,j \in \{1,2,\ldots,n\} \qquad (2)$$

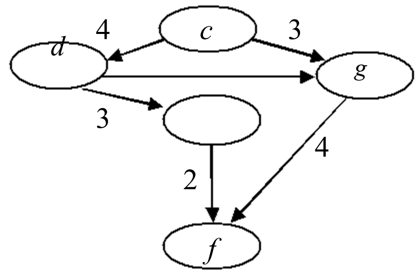

Figure 1. An influential map.

Where

$$s = \mathrm{Min}\left[\frac{1}{\max_{1\leq i\leq n}\sum_{j=1}^{n}|a_{ij}|},\frac{1}{\max_{1\leq i\leq n}\sum_{i=1}^{n}|a_{ij}|}\right] \quad (3)$$

and

$$\lim_{m\to\infty} D^{m} = [0]_{n\times n} \quad \text{where } D = [d_{ij}]_{n\times n},\ 0\leq d_{ij} < 1 \quad (4)$$

Then, the total-influence matrix ***T*** can be obtained by utilizing equation (5). Here, ***I*** is the identity matrix.

$$T = D + D^{2} + \cdots + D^{m} = D(I - D)^{-1} \quad \text{when } m \to \infty \quad (5)$$

If the sum of rows and the sum of columns are represented by vector *r* and *c,* respectively*,* in the total influence matrix ***T***, then

$$T = [t_{ij}], \quad i,j = 1,2,\ldots,n \quad (6)$$

$$r = [r_i]_{n\times 1} = \left(\sum_{j=1}^{n} t_{ij}\right)_{n\times 1} \quad (7)$$

$$c = [c_j]'_{1\times n} = \left(\sum_{i=1}^{n} t_{ij}\right)'_{1\times n} \quad (8)$$

Where, the superscript apostrophe denotes transposition.

If r_i represents the sum of the i^{th} row of matrix ***T***, then r_i presents the sum of both direct and indirect effects of factor *i* on all other criteria. In addition, if c_j represents the sum of the j^{th} column of matrix ***T***, then c_j presents the sum of both direct and indirect effects that all other factors have on *j*. Furthermore, when $j = i$, the amount of the row and column aggregates, ($r_i + c_i$) provides an indicator of influential strength that is given and received. Namely, when ($r_i + c_i$) is positive, then factor *i* affects other factors, and if it is negative, then factor *i* is affected by others (Tzeng et al., 2007; Liou et al., 2007; Yang et al., 2008).

Step 4: Confirm the threshold value (□) and generate the impact relations map

Lastly, a threshold value,□, should be set by taking into account the sample experts' opinions in order to ignore minor effects presented in matrix ***T*** elements (Yang et al., 2008). That is, to decrease the complexity of the impact relations map, a threshold value determined by the decision maker for the degree of influence of each factor is required. If the influence level of an element in matrix ***T*** is higher than the threshold value, then this element is included in the final impact relations map (Liou et al., 2007; Yang et al., 2008). In the following section, the analytic network process (ANP) and its calculation steps are introduced to overcome the problem of interdependence and feedback among each measurement criterion generated by the DEMATEL.

ANP

The Analytic Network Process (ANP) is utilized in MCDM to release the restriction of a hierarchical structure (Yang et al., 2008); its steps for calculation can be illustrated as follows (Huang et al., 2005; Yang et al., 2008).

Step 5: Form a supermatrix by using criteria comparison in the system

This can be accomplished using pairwise comparisons. The relative importance values of pairwise comparisons can be categorized from 1 (equal importance) to 9 (extreme inequality in importance) (Saaty, 1980). The following is the general form of the supermatrix (Figure 2) (Yu and Tseng, 2006; Liou et al., 2007), where C_m represents the m^{th} cluster, e_{mn} represents the m^{th} element in the m^{th} cluster, and W_{ij} is the principal eigenvector of the effect of the elements compared in the j^{th} cluster to the i^{th} cluster. If the j^{th} cluster has no impact on the i^{th} cluster, then W_{ij} = [0] (Huang et al., 2005; Yu and Tseng, 2006).

Step 6: Acquire the weighted supermatrix by multiplying the normalized matrix based on the result of the DEMATEL (Yang et al., 2008)

Traditionally, the way used to derive the weighted supermatrix is by transforming each column to sum to unity. Because the elements in their appropriate columns are divided by the number of clusters, the columns will thus sum to unity. Traditionally, such a normalization method assumes that influence among clusters have equal weights, which may not suit the real world, as there may exist different effect levels among each cluster. Therefore, to overcome such an irrational problem, Yang et al. (2008) propose a novel hybrid model to combine the DEMATEL with ANP, which we demonstrate as follows. Initially, the impact-relation map is first developed by DEMATEL, as stated previously. The total influence matrix ***T*** and a threshold value, □, are then used to develop a new matrix. In matrix ***T***, the value of each cluster is set as zero if it is less than □; this new matrix is named an □-cut total influence matrix ***T***□ (as Equation 9).

$$
\begin{array}{cc|cccccccccc}
 & & & C_1 & & & C_2 & & \cdots & & C_m & \\
 & & e_{11} & \cdots & e_{1n_1} & e_{21} & \cdots & e_{2n_2} & \cdots & e_{m1} & \cdots & e_{mn_m} \\
\hline
 & e_{11} & & & & & & & & & & \\
 & e_{12} & & & & & & & & & & \\
C_1 & \vdots & & W_{11} & & & W_{12} & & \cdots & & W_{1m} & \\
 & e_{1n_1} & & & & & & & & & & \\
 & e_{21} & & & & & & & & & & \\
 & e_{22} & & & & & & & & & & \\
W = C_2 & \vdots & & W_{21} & & & W_{22} & & \cdots & & W_{2m} & \\
 & e_{2n_2} & & & & & & & & & & \\
\vdots & \vdots & & \vdots & & & \vdots & & \vdots & & \vdots & \\
 & e_{m1} & & & & & & & & & & \\
 & e_{m2} & & W_{m1} & & & W_{m2} & & \cdots & & W_{mm} & \\
C_m & \vdots & & & & & & & & & & \\
 & e_{mn_m} & & & & & & & & & &
\end{array}
$$

Figure 2. The general form of the supermatrix.

$$
T_\alpha = \begin{bmatrix} t_{11}^{\alpha} & \cdots & t_{1j}^{\alpha} & \cdots & t_{1n}^{\alpha} \\ \vdots & & \vdots & & \vdots \\ t_{i1}^{\alpha} & \cdots & t_{ij}^{\alpha} & \cdots & t_{in}^{\alpha} \\ \vdots & & \vdots & & \vdots \\ t_{n1}^{\alpha} & \cdots & t_{nj}^{\alpha} & \cdots & t_{nn}^{\alpha} \end{bmatrix} \quad d_1 = \sum_{j=1}^{n} t_{1j}^{\alpha} \tag{9}
$$

if t_{ij} < , then $t^{\alpha}_{ij}=0$; Otherwise, $t^{\alpha}_{ij}=t_{ij}$. After that, α-cut total influence matrix T_α is normalized by using Equation 10 and renamed as T_s (as presented in Equation 11.

$$
d_i = \sum_{j=1}^{n} t_{ij}^{\alpha} \tag{10}
$$

$$
T_s = \begin{bmatrix} t_{11}^{\alpha}/d_1 & \cdots & t_{1j}^{\alpha}/d_1 & \cdots & t_{1n}^{\alpha}/d_1 \\ \vdots & & \vdots & & \vdots \\ t_{i1}^{\alpha}/d_i & \cdots & t_{ij}^{\alpha}/d_i & \cdots & t_{in}^{\alpha}/d_i \\ \vdots & & \vdots & & \vdots \\ t_{n1}^{\alpha}/d_3 & \cdots & t_{nj}^{\alpha}/d_3 & \cdots & t_{nn}^{\alpha}/d_3 \end{bmatrix} \tag{11}
$$

Then, the weighted supermatrix (W_w) can be derived by Equation (12) using the normalized α-cut total influence matrix T_s .

$$
W_w = \begin{bmatrix} t_{11}^{s}\times W_{11} & t_{21}^{s}\times W_{12} & \cdots & \cdots & t_{n1}^{s}\times W_{1n} \\ t_{12}^{s}\times W_{21} & t_{22}^{s}\times W_{22} & \vdots & & \vdots \\ \vdots & \cdots & t_{ji}^{s}\times W_{ij} & \cdots & t_{ni}^{s}\times W_{in} \\ \vdots & & \vdots & & \\ t_{1n}^{s}\times W_{n1} & t_{2n}^{s} W_{n2} & \cdots & \cdots & t_{nn}^{s}\times W_{nn} \end{bmatrix} \tag{12}
$$

Where, $t^{s}_{ij} = t^{\alpha}_{ij}/d_i$

Step 7: Limiting the weighted supermatrix by raising it to a sufficiently large power k

It can be done by using Equation (13) until the weighted supermatrix (W_w) becomes convergent and stable and thus able to acquire global priority vectors (weight).

$$
\lim_{k\to\infty} W_w^{k} \tag{12}
$$

VIKOR

The VIKOR method was developed by Opricovic and Tzeng (2004). This method is based on the compromise programming of multi-criteria decision making (MCDM). We assume that the alternatives are each evaluated according to separate criterion functions; the compromise ranking could be utilized by comparing the measure of closeness to the ideal alternative (Tzeng et al., 2005). The multi-criteria measure for compromise ranking is developed from the L_p-metric used as an aggregating function in a compromise programming method (Zeleny, 1982). The numerous J alternatives are represented as $a_1, a_2, \ldots, a_J$. For an alternative a_j, the rating of the i^{th} aspect is denoted by f_{ij}, that is, f_{ij} is the value of i^{th} criterion function for the alternative a_j; n is the number of criteria (Tzeng et al., 2005). The development of the VIKOR method began with the form of L_p-metric shown as follows (Opricovic and Tzeng, 2004):

$$
L_{pj} = \left\{\sum_{i=1}^{n}\left[w_i(f_i^* - f_{ij})/(f_i^* - f_i^-)\right]^p\right\}^{\frac{1}{p}},\ 1 \le p \le \infty; j = 1,2,\ldots J \tag{14}
$$

In the VIKOR method, L_{ij} (represent S_j as followed) and $L_{\infty j}$ (represent R_j as followed) are used to formulate ranking measures. The solution gained by $\min_j S_j$ is with a maximum group utility, and the solution gained by $\min_j R_j$ is with a mix individual regret of the ''opponent.'' The compromise solution F^C is a solution that is the closest to the ideal F^*. Here, compromise means an agreement established by mutual concessions, which are shown in Figure 3 as $\Delta f_1 = f_1^* - f_1^c$ and $\Delta f_2 = f_2^* - f_2^c$ (Opricovic and Tzeng, 2004).

There are five VIKOR calculation steps, which are as follows (Opricovic and Tzeng, 2004; Tzeng et al., 2005; Opricovic and Tzeng, 2007):

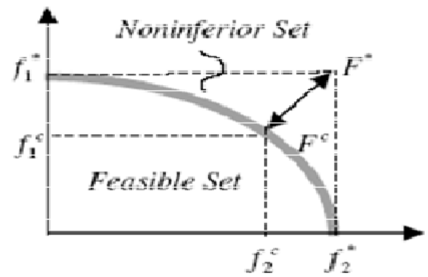

Figure 3. Ideal and compromise solutions.

Step 1. Decide the best f_i^* and the worst f_i^- values of all criterion functions *i*= 1, 2,…, *n*

If the i^{th} function represents a benefit, then

$$f_i^* = \max_j f_{ij} \quad f_i^- = \min_j f_{ij} \tag{15}$$

Step 2. Calculate the values S_j and R_j; j= 1, 2,…, J, by Equation 16

$$S_j = \sum_{i=1}^{n} w_i (f_i^* - f_{ij})/(f_i^* - f_i^-)$$

$$R_j = \max_i \left[w_i (f_i^* - f_{ij})/(f_i^* - f_i^-) \right] \tag{16}$$

Where, w_i are the weights of criteria expressing their relative importance.

Step 3. Calculate the values Q_j, *j*= 1, 2,…, *J*, by the relation

$$Q_j = v(S_j - S^*)/(S^- - S^*) + (1-v)(R_j - R^*)/(R^- - R^*)$$

$$S^* = \min_j S_j, \quad S^- = \max_j S_j$$

$$R^* = \min_j R_j, \quad R^- = \max_j R_j \tag{17}$$

and *v* is introduced as weight of the strategy of the maximum group utility, which here is *v* = 0.5.

Step 4. Alternatives ranking, sorted by the values S, R and Q, in decreasing order

The results are three ranking lists.

Step 5. We propose a compromise solution

The alternative (d), which is ranked the best by the measure Q (min) if it satisfies the following two conditions:

1. $Q(a'') - Q(a') \geqslant DQ$, which is called acceptable advantage, Where, *a''* is the alternative with the second position in the ranking list by $DQ = 1/(J-1)$; *J* is the number of alternatives.
2. Acceptable stability in decision making: alternative *d* also has to be the best ranked by *S* and/or *R*. This solution is stable in a decision-making process, which could be ''voting by majority rule'' (when *v* > 0.5 is needed), ''by consensus'' *v* 0.5, or ''with veto'' (*v* < 0.5). Here, *v* is the weight of the decision-making strategy with the maximum group utility.

If the conditions cannot be fully satisfied, then a set of compromise solutions is proposed:

1. Alternatives *a''* and *a,''* if only condition 2 is not satisfied, or
2. Alternatives *a'*; *a''*…$a^{(m)}$ if condition 1 is not satisfied, where $a^{(m)}$ is determined by the relation $Q(a^{(M)}) - Q(a') < DQ$ for Max$M$.

The best alternative ranked by *Q* is the one with the minimum value of *Q*. The main ranking result is the compromise ranking list of alternatives, and the compromise solution with the advantageous rate (Tzeng et al., 2002). Ranking by utilizing the VIKOR method requires different values of criteria weights and the analysis of the impact of criteria weights on a proposed compromise solution. It determines the weight stability intervals by using the methodology cited in Opricovic (1998). The compromise solution gained with initial weights (w^i, $i = 1,\ldots,n$) will be replaced if the value of a weight is not in the stability interval. The analysis of weight stability intervals for a single criterion is utilized for all criterion functions, with the given initial values of weights; by doing so, the preference stability of a gained compromise solution may be analyzed using the VIKOR program (Opricovic and Tzeng, 2004).

VIKOR is a tool that benefits MCDM in situations where the decision maker is unstable at the beginning of system design; in addition, decision makers accept the obtained compromise solution, as it provides maximum group utility, represented by Min *Q,* and mi - nimum individual regret, represented by Min *R* (Tzeng et al., 2002).

AN EMPIRICAL STUDY

The purpose of this study is to overcome highlighted difficulties by constructing the effective criteria of IC and using constructed IC criteria to explore the benchmark company through hybrid multiple-criteria, decision-making (MCDM) approach in accordance with Decision Making Trial And Evaluation Laboratory (DEMATEL), Analytic Network Process (ANP), and VlseKriterijumska Optimizacija I Kompromisno Resenje (VIKOR). The

Table 1. The definitions of IC evaluation criteria.

Evaluation dimensions	Evaluation criteria	Definitions
Human Capital (D1)	Member's professional experiences and serving year (C1)	Member's past experiences in working in life insurance-related companies and such working years.
	Member's active learning attitude (C2)	Member's willingness and desire to learn something new and always keep his knowledge up to date.
	Member's work efficiency (C3)	Member's ability to finish his jobs on time or perform above the standard.
	Effective interaction with people (C4)	Member's social ability for getting along with co-workers or customers.
	Member's information ability (C5)	Member's skill at online working and gathering information.
Structure Capital (D2)	Corporate innovative culture (C6)	Corporate operation mainly toward differentiation among other competitors.
	Intellectual property and patent (C7)	The number of intellectual property and patents a corporation has.
	Corporate overall strategy planning (C8)	Corporate overall future development direction and strategy for competing with its competitors
	Top manager's support and assistance (C9)	The degree a top manager helps his members to solve problems.
	Managing computerization (C10)	The degree to which a top manager conducts internal management online.
Relation Capital (D3)	The growth rate of customers (C11)	The growth of a corporation's customer base from the previous year.
	Relationship with financial institutes(C12)	A corporation's creditworthiness with cooperating financial institution.
	Corporate prestige (C13)	A corporation's external fame and perceived reliability relative to competitors.
	Corporate self-value upgrading (C14)	Diversity services offered to customers before and after sales
	Corporate market share (C15)	The overall competitive advantage in obtaining customers of a corporate among others in the life insurance industry.

DEMATEL method is first employed to develop the network structure. The ANP is further used to compute the limiting supermatrix to obtain the global weights of IC criteria in the network structure. The VIKOR is finally utilized to rank alternatives (top five life insurance industries) in accordance with the global weights of IC criteria. After summarizing recent IC studies, 49 IC criteria are initially synthesized. Utilizing the Delphi method with 24 senior experts with relevant background (12 from universities and another 12 from the life insurance industry) who have more than 15 years of experience either in academia or in the life insurance industry, three IC evaluation dimensions containing Human Capital (D1), Structure Capital (D3), and Relation Capital (D4) are developed, with each including 5 IC evaluation criteria. In Table 1, the definitions of IC evaluation criteria are summarized. Similarly, due to 22 life insurance companies in Taiwan, the Delphi method is utilized again to determine the top five prestigious companies, which could possibly be benchmarks within the Taiwanese life insurance industry.

After constructing the evaluation's hierarchical structure, the interrelationships between each IC evaluation dimension are first confirmed. Senior experts (24) from related backgrounds are asked to score the influence level of relationships among the three evaluation dimensions. Based on the experts' ratings, the average initial direct-relation 3*3 matrix ***A*** is formed as provided in Table 2. Using steps (Equations 1 - 6) of DEMATEL, the total influence 3*3 matrix **T** is obtained, which is given as Table 3. To maintain important relationships, a threshold value of 0.693 is set by

Table 2. The average initial direct-relation 3*3 matrix *A*.

	D1	D2	D3
D1	0	1.75	3.64
D2	2.98	0	1.51
D3	1.03	1.48	0

Table 3. Total influence 3*3 matrix *T*.

	D1	D2	D3
D1	0.866	1.031	1.549
D2	1.230	0.761	1.321
D3	0.693	0.681	0.659

Table 4. ⊏-cut total influence 4*4 matrix $T_{⊏}$.

	D1	D2	D3
D1	0.866	1.031	1.549
D2	1.230	0.761	1.321
D3	0.693	0	0

Table 5. The normalized ⊏-cut total influence 3*3 matrix T_{s}.

	D1	D2	D3
D1	0.251	0.299	0.450
D2	0.371	0.230	0.399
D3	1.000	0.000	0.000

reaching a consensus with experts after discussion. The ⊏- cut total influence 3*3 matrix $T_{⊏}$ is presented as Table 4.

Since the result of DEMATEL analysis manifests different impact levels among dimensions, the utilized traditional normalized method is therefore irrational (Yang et al., 2008). In this study, combined approach based on DEMATEL and ANP is thus. The use of DEMATEL is to calculate the ⊏-cut total influence 3*3 matrix $T_{⊏}$ as listed in Table 5. By going through Equations 9 - 12, the impact relations map (i.e., the network evaluation structure of ANP) is then developed to reflect the complicated causal relationships among each IC evaluation dimension. In accordance with Table 5, the network evaluation structure of ANP is provided as Figure 4.

In accordance with the interrelationship and influence levels between IC evaluation dimensions (Figure 4), the unweighted 15*15 supermatrix for IC criteria ***W*** is obtained (Table 6) after consulting with the original 24 senior experts and *Step 5*. By Equation 12, the weighted 15*15 supermatrix of IC criteria $\boldsymbol{W_w}$ is calculated as given in Table 7. To explore the global weights of IC criteria, equation (13) is adopted to determine the limiting supermatrix ($\boldsymbol{W_{final}}$). The final results are provided in Table 8 along with the overall ranking. Based on the global weights of limiting supermatrix ($\boldsymbol{W_{final}}$), the VIKOR methods for the ranking of the top five life insurance companies is conducted. Due to several evaluation criteria's being non-quantifiable, to ensure the consistency and precision of the final ranking, while scoring, a range from 5 (the best) to 1 (the worst) is given according to assessments by senior experts. Initially, the average original performance value given as Table 9 is acquired by averaging all the experts' scores. To achieve the highest aspired level (Opricovic and Tzeng, 2002), f^{*}_{j} is advised to set to 5 (the best) and f^{-}_{j} is set to 1 (the worst) instead of using Equation 15. The S_j and R_j are then computed after utilizing Equation 16. Adopting Equation 17, the value of *Q* is acquired accompanied by 0.5 for *v*, as so-called voting by consensus. Finally, in accordance with *Q* values, the ranking of the top five life insurance companies is explored. The results of VIKOR evaluation value and the ranking of the top five life insurance companies are provided in Table 10.

DISCUSSIONS

In today's knowledge-based economy, using knowledge-based assets to generate competitive advantages has become mainstream practice for industries worldwide; thus, industries highly involved in utilizing knowledge assets for operation are considered to be among a nation's core assets. Due to such a phenomenon, the importance of intellectual capital (IC) is thus emphasized and has become a popular issue in the literature. Taiwan's life insurance industry not only plays a critical role in the country's economic growth but also highly requires knowledge-based assets for its general operation. Due to the recent global economic depression, advantages of life insurance industry in both the national and the international arenas have dropped drastically, and several challenges need to be overcome soon. Nevertheless, experts on life insurance estimate that its advantages will in the future revive and even surpass historical levels. Thus, developing strategies for international competition will be a major concern. Summarizing the above claims, this study from the standpoint of the development nature of the life insurance industry, profit generation by effective knowledge management, argued that, a precise way for evaluating and improving knowledge-based performance, is an efficient and undefeatable foundation for achieving the current and future goals of the Taiwanese life insurance industry.

The aim of this study was to conquer the problems that Taiwanese life insurance industry faces today by developing the critical IC criteria and utilizing developed criteria to confirm the benchmark company by adopting a

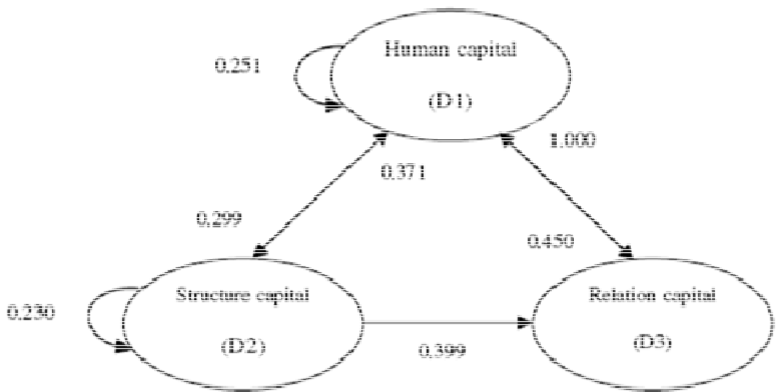

Figure 4. The impact relations map and network evaluation structure of IC.

Table 6. The unweighted 15*15 matrix of IC criteria *W*.

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15
C1	1.000	0.000	0.000	0.000	0.000	0.179	0.115	0.109	0.187	0.205	0.105	0.125	0.125	0.149	0.157
C2	0.000	1.000	0.000	0.000	0.000	0.126	0.024	0.105	0.183	0.019	0.057	0.104	0.025	0.171	0.136
C3	0.000	0.000	1.000	0.000	0.000	0.247	0.306	0.275	0.216	0.244	0.287	0.256	0.305	0.210	0.254
C4	0.000	0.000	0.000	1.000	0.000	0.265	0.315	0.296	0.249	0.295	0.316	0.275	0.320	0.284	0.263
C5	0.000	0.000	0.000	0.000	1.000	0.183	0.240	0.215	0.165	0.237	0.235	0.240	0.225	0.186	0.190
C6	0.114	0.178	0.165	0.185	0.152	1.000	0.000	0.000	0.000	0.000	0.155	0.146	0.167	0.117	0.165
C7	0.315	0.326	0.295	0.302	0.295	0.000	1.000	0.000	0.000	0.000	0.255	0.332	0.279	0.316	0.295
C8	0.307	0.285	0.205	0.264	0.271	0.000	0.000	1.000	0.000	0.000	0.238	0.300	0.245	0.301	0.230
C9	0.101	0.016	0.149	0.020	0.015	0.000	0.000	0.000	1.000	0.000	0.146	0.027	0.126	0.031	0.106
C10	0.163	0.195	0.186	0.229	0.267	0.000	0.000	0.000	0.000	1.000	0.206	0.195	0.183	0.235	0.204
C11	0.215	0.217	0.295	0.157	0.240	0.030	0.128	0.013	0.003	0.151	1.000	0.000	0.000	0.000	0.000
C12	0.108	0.158	0.006	0.085	0.106	0.179	0.155	0.108	0.145	0.175	0.000	1.000	0.000	0.000	0.000
C13	0.125	0.165	0.103	0.105	0.169	0.271	0.245	0.304	0.280	0.215	0.000	0.000	1.000	0.000	0.000
C14	0.203	0.165	0.261	0.269	0.200	0.205	0.186	0.270	0.255	0.196	0.000	0.000	0.000	1.000	0.000
C15	0.349	0.295	0.335	0.384	0.285	0.315	0.286	0.305	0.317	0.263	0.000	0.000	0.000	0.000	1.000

Table 7. The weighted 15*15 matrix of IC criteria $\boldsymbol{W_w}$.

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15
C1	0.251	0.000	0.000	0.000	0.000	0.066	0.043	0.040	0.069	0.076	0.105	0.125	0.125	0.149	0.157
C2	0.000	0.251	0.000	0.000	0.000	0.047	0.009	0.039	0.068	0.007	0.057	0.104	0.025	0.171	0.136
C3	0.000	0.000	0.251	0.000	0.000	0.092	0.114	0.102	0.080	0.091	0.287	0.256	0.305	0.210	0.254
C4	0.000	0.000	0.000	0.251	0.000	0.098	0.117	0.110	0.092	0.109	0.316	0.275	0.320	0.284	0.263
C5	0.000	0.000	0.000	0.000	0.251	0.068	0.089	0.080	0.061	0.088	0.235	0.240	0.225	0.186	0.190
C6	0.034	0.053	0.049	0.055	0.045	0.230	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
C7	0.094	0.097	0.088	0.090	0.088	0.000	0.230	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
C8	0.092	0.085	0.061	0.079	0.081	0.000	0.000	0.230	0.000	0.000	0.000	0.000	0.000	0.000	0.000
C9	0.030	0.005	0.045	0.006	0.004	0.000	0.000	0.000	0.230	0.000	0.000	0.000	0.000	0.000	0.000
C10	0.049	0.058	0.056	0.068	0.080	0.000	0.000	0.000	0.000	0.230	0.000	0.000	0.000	0.000	0.000
C11	0.097	0.098	0.133	0.071	0.108	0.012	0.051	0.005	0.001	0.060	0.000	0.000	0.000	0.000	0.000
C12	0.049	0.071	0.003	0.038	0.048	0.071	0.062	0.043	0.058	0.070	0.000	0.000	0.000	0.000	0.000
C13	0.056	0.074	0.046	0.047	0.076	0.108	0.098	0.121	0.112	0.086	0.000	0.000	0.000	0.000	0.000
C14	0.091	0.074	0.117	0.121	0.090	0.082	0.074	0.108	0.102	0.078	0.000	0.000	0.000	0.000	0.000
C15	0.157	0.133	0.151	0.173	0.128	0.126	0.114	0.122	0.126	0.105	0.000	0.000	0.000	0.000	0.000

Table 8. The limiting 15*15 supermatrix for IC criteria W_{final} and ranking

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	Ranking
C1	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	5
C2	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	9
C3	0.131	0.131	0.131	0.131	0.131	0.131	0.131	0.131	0.131	0.131	0.131	0.131	0.131	0.131	0.131	2
C4	0.145	0.145	0.145	0.145	0.145	0.145	0.145	0.145	0.145	0.145	0.145	0.145	0.145	0.145	0.145	1
C5	0.106	0.106	0.106	0.106	0.106	0.106	0.106	0.106	0.106	0.106	0.106	0.106	0.106	0.106	0.106	3
C6	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	13
C7	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	7
C8	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	10
C9	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	15
C10	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	12
C11	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	8
C12	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	14
C13	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049	11
C14	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	6
C15	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	4

Table 9. The average of original performance value given by experts

Alternatives	Human capital (D1)					Structure capital (D2)					Relation capital (D3)				
(companies)	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15
L 01	2.48	2.20	3.53	2.15	2.22	2.06	2.72	2.55	2.63	2.48	2.36	2.71	2.48	2.30	2.37
L 02	1.68	1.49	2.31	2.04	1.97	2.30	1.77	1.96	2.62	1.34	2.15	2.61	1.45	1.88	1.36
L 03	3.45	3.33	3.16	3.50	2.69	2.57	2.82	3.26	3.17	2.51	3.43	3.05	3.67	3.55	3.71
L 04	2.35	2.06	2.11	2.68	2.10	2.29	2.19	2.33	1.98	2.21	1.33	1.93	2.22	1.74	1.46
L 05	3.06	3.54	2.36	3.13	2.09	2.44	3.43	2.67	2.89	2.39	3.11	2.20	2.56	2.74	2.21

hybrid multiple-criteria decision-making (MCDM) approach according to decision making trial and evaluation laboratory (DEMATEL), analytic network process (ANP), and VlseKriterijumska Optimizacija I Kompromisno Resenje (VIKOR). In accordance with the result of this study, the top concern for the life insurance industry to manage knowledge effectively is "effective interaction with people (C4)" (0.145); followed by "Member's work efficiency (C3)" (0.131), "Member's information ability (C5)" (0.106), "Corporate market share (C15)" (0.099), "Member's professional experiences and serving year (C1)" (0.070), "Corporate self- value upgrading (C14)" (0.069), "Intellectual property and patent (C7)" (0.059), "The growth rate of customers (C11)" (0.057), "Member's active learning attitude (C2)" (0.051), "Corporate overall strategy planning (C8)" (0.050), "Corporate prestige (C13)" (0.049), "Managing computerization (C10)" (0.041), "Corporate innovative culture (C6)" (0.031), "Relationship with financial institutes (C12)" (0.030), and "Top manager's support and assistance (C9)" (0.012). In addition, the life insurance company "L03" (0.000) can be the benchmark within the Taiwanese life insurance industry. The rest are ranked as "L05" (0.553), "L01" (0.727), "L04" (0.859), and "L02" (0.000). Based on the result, both existing and newly built life insurance companies are encouraged to make company "L03" their benchmark for future knowledge management performance improvement and enhancement.

As predicted by this study and reflected in the real phenomenon that fostering professions is difficult, human capital is the most important asset for the Taiwanese life insurance industry in seeking to manage knowledge effectively (within the top five criteria ranking, four are human capital evaluation criteria) in achieving its current and future goals (Table 8). Specifically, since interacting with not only current customers but also potential customers is highly demanded in pursuing top performance within life insurance company, members who have strong social abilities can thus help enhance the performance significantly for their company. However, based on the result of benchmark ranking, two of the top life insurance companies have failed to do so (Table 10). This result shows that currently keeping and/or obtaining well social ability members is generally not effectively conducted. To keep or obtain members with advanced social ability, for the former, a strong and particularly comprehensive investigation method regarding customer satisfaction

Table 10. VIKOR evaluation value and ranking of the life insurance companies.

Evaluation criteria	Performance evaluation[b]					PIS/ NIS		Relative weight
	L01	**L02**	**L03**	**L04**	**L05**	f_i^*	f_i^-	w_i [a]
C1	0.038	0.070	0.000	0.044	0.015	5	1	0.070
C2	0.033	0.051	0.005	0.037	0.000	5	1	0.051
C3	0.000	0.113	0.034*	0.131*	0.108*	5	1	0.131
C4	0.134*	0.145*	0.000	0.081	0.037	5	1	0.145
C5	0.069	0.106	0.000	0.087	0.088	5	1	0.106
C6	0.031	0.016	0.000	0.017	0.008	5	1	0.031
C7	0.025	0.059	0.022	0.044	0.000	5	1	0.059
C8	0.027	0.050	0.000	0.036	0.023	5	1	0.050
C9	0.005	0.006	0.000	0.012	0.003	5	1	0.012
C10	0.001	0.041	0.000	0.011	0.004	5	1	0.041
C11	0.029	0.035	0.000	0.057	0.009	5	1	0.057
C12	0.009	0.012	0.000	0.030	0.023	5	1	0.030
C13	0.026	0.049	0.000	0.032	0.025	5	1	0.049
C14	0.048	0.064	0.000	0.069	0.031	5	1	0.069
C15	0.056	0.099	0.000	0.095	0.063	5	1	0.099
S_j	0.534	0.915	0.061	0.782	0.436			
R_j	0.134	0.145	0.034	0.131	0.108			
Q_i	0.727	1.000	0.000	0.859	0.553			
Rank [c]	3	5	1	4	2			

1. [a] is the weight of each performance evaluation criteria (as shown in Tables 8). 2. [b] is obtained from $w_i \frac{|f^* - f_{ij}|}{|f_i^* - f_i^-|}$ (the weighted value of arithmetic average of original performance evaluation value given by experts). 3. [c] are rankings based on the rules (the smaller the value of Q_i is, the better it is.). 4. *Symbol represents the worst performance of the 15 evaluation criteria in every life insurance company's performance evaluation values.

satisfaction for rewarding members might be helpful. Such a method can not only help those who have good social ability maintain their performance but also encourage those who do not have such ability to learn from benchmark members. For the latter, both interview and observation in the probation period for future member selection is important. Developing a suitable personality examination and taking it into account while electing cannot simply increase the rate of selection of right members; it must also decrease the cost of before-the-job training in the future.

Efficiency in a member's work is a critical factor in determining the overall performance of a company. Although pay by cases is a general way in life insurance companies to reward members for good performance.

Nevertheless, as the result of VIKOR (as Table 10), three of the top life insurance companies have performed the worst on this standard. Several reasons can be drawn, such as the improvement of living standards, increases in product prices, great gap of rewards between expectation and practice, or rewarding below motivation level. On the other hand, a comprehensive observation concerning the reward both in the member's mind and in reality is necessary. Besides, since pay by cases is a general, a weak reward mechanism may even result in a higher rate of losing efficient members to other companies, one of its characteristics of high flow rate of talents, which may seriously destroy a company's the overall efficiency and performance. Since the benchmark company is also included, it is highly suggested to put in more effort toward sustaining long-lasting competitive advantages and current status. It is true that companies in the life insurance industry are aggressive and competitive. Indeed, to increase market share, companies today have largely increased and diversified their services. Therefore the information ability that a member contains will become a key factor for sustaining a company's competitive advantages by knowing what competitors will do, what customers need, and how to differentiate from competitors. So far, four of the top life insurance companies cannot fully acquire the best performance (Table 10) in this area. In this regard, putting more effort into related on-the-job training for improving or updating members' information abilities, or taking such performance into account when considering rewards, is encouraged. For company performance itself, the top manager ought to restore information gathered by members so as to develop possible reflective strategies for both defending and building sustained competitive advantages over competitors.

Further, once a company has corporate market share, it could be expected to have two advantages: performance synergy by word of mouth marketing, and an increase of its attraction in the eyes of potential applicants. Currently, except for the benchmark company, the rest of four still have room to make this improvement. Although ways for enhancing corporate market share are numerous, it is easier to say this than to say that it is due to several factors like industry dynamic, organizational culture, the number and types of resources, company re-gions, and different customer demands, which could lead the result of the corporate market share to change over time. Therefore, life insurance companies are suggested to have their external and internal organizational effective factors and self-owned resources a precise evaluation concerning certain global market place development situation before creating strategies for gaining their market share. Owing to several factors involved, it stands that the sunk cost will be great, and hence a misleading evaluation result may acutely damage a company's future development and survival possibility.

Responding to one of the real characteristics of the life insurance industry, in which it is arduous to foster individual professions, members' professional experiences and amount of time in the industry have thus become a treasure for companies. Except for the benchmark company, the other four are revealed to require enhancement. Additionally, since the nature of work in life insurance companies mainly is member-to-customer, understanding how to deal with customers' different needs and further satisfy them to build a long-term relationship is important for a company to increase performance and sustain healthy operations. Such an understanding needs considerable time to accumulate and learn by a member to become his professional experiences and, importantly, cannot be transferred easily. Additionally, a majority of life insurance companies have been deemed unprofessional by the Taiwanese, making a large decrease in the prestige of the life insurance industry. In this regard, members' professional experiences and the number of years served could help a company quickly acquire increased market share, due to an increase in reliability. For companies aiming to keep such members, better managerial positions, regular forums for experience sharing, and different levels of rewarding are encouraged for promoting members' organizational commitment. Among them, regular forums for experience sharing can enhance the experiences of these new members. For companies aiming to acquire new members, taking this criterion into account is highly advised to prevent a possible decrease in prestige.

Although the rest of the 10 IC evaluation criteria are also critical in measuring and improving knowledge management performance, this study argues to regard them as secondary focuses. This argument is based on the fact that the sum of weights for the top five IC criteria is over half (55%), which could be rationally assumed to have a significant impact on the result of the evaluation and improvement. In accordance with the principle of 80/20, it would be much more efficient to put great effort into those who show a high return on investment. Namely, life insurance companies are suggested to improve knowledge management performance in accordance with the rest of the 10 IC criteria but only if the top 10 are already confirmed to reach the highest performances.

Conclusions

Without a doubt, in today's knowledge-based economy, the more effective knowledge management and performance, the more solid are the competitive advantages that an organization can acquire. The life insurance industry in Taiwan, which plays a crucial role in determining domestic economic growth, today seriously is losing its competitive advantages not only nationally, but also internationally. On the basis of its promising future, as expected by senior life insurance experts, this study grounding on its development nature, profits generated by effective knowledge management, aims to solve the highlighted difficulties by developing the critical criteria of IC and adopting such IC criteria to explore the benchmark company; it will also provide a precise way in which the life insurance industry can evaluate and improve knowledge- based performance. Based on the results of this study, life insurance firms are encouraged to evaluate and improve their knowledge management performance in compliance with the research findings to successfully turn the industry's difficulties into opportunities and to efficiently develop future strategies.

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