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Empirical Study on Evaluation of Sustainable Development Capability Based on DEA-AHP

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Abstract

After the 2008 financial crisis, the sustainable development capability of Chinese property and casualty insurance enterprises has been an important issue and a focus of people's concern. This paper selects PICC Property and Casualty Company (PICC P&C), China Continent Property & Casualty Insurance Company (CCIC P&C), China United Property Insurance Company (CIC), China Pacific Insurance Company (CPIC) and Ping An Property & Casualty Insurance Company (Ping An) as research objects. Using DEA-AHP method to evaluate the five companies from the efficiency perspective, the paper reaches the conclusion that PICC P&C is the most efficient. Then, it studies the strategies to promote the sustainable development capability of domestic property and casualty insurance companies: pay attention to employee training; form effective learning mechanism; build up knowledge sharing incentive mechanism; improve knowledge sharing system and organization structure platform; and build up trust mechanism for knowledge contribution.

Key words: Sustainable development capability; Evaluation; DEA-AHP method

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INTRODUCTION

The report of the 17th CPC National Congress proposed

> Accelerate the establishment of a social security system covering both urban and rural residents, guarantee their basic living with social insurance, social relief and social welfare. Accelerate the improvement of the social security system by focusing on the basic pension insurance, basic medical care, and the minimum living standard security system and supplementing it with charity and commercial insurance.

From this, it can be concluded that commercial insurance plays an important role in the improvement of the social security system. However, due to historical reasons and social attitudes, people do not understand commercial insurance well. They even have some prejudices and misunderstandings. Meanwhile, a global financial crisis took place in 2008. Its breadth and depth is much more violent than those of the 1997 Asian financial crisis. In some countries, the normal order of economic operation suffered a great deal of damage. The sudden interruption of the economic growth process even led to violent social unrest. The global financial crisis had some impact on the Chinese economy and financial market. In 2008, China's insurance penetration rate was only 3.25% and the insurance density was about 736.74 yuan, far below the world average in 2006 (average insurance penetration rate is 8% and average insurance density is $512).

The outbreak of the financial crisis prompted people to reflect on the problems in the financial development process, study the cause and begin to look for a new and more stable and healthy financial development model. Sustainable development has become a consensus of all mankind. Its meaning is no longer just ecologically sustainable development. It has been extended to the sustainable socio-economic development. Insurance, especially property and casualty insurance, is an essential part of financial stability. It plays a significant role in financial stability and the prevention of financial crisis. Therefore, choosing sustainable development as corporate strategy for property

and casualty insurance companies helps to ensure not only the sustained and long-term development of the property and casualty insurance industry, but only the promotion of stable and healthy national economic development and national economic security.

1. LITERATURE REVIEW AND RESEARCH IDEAS

The evaluation of the sustainable development capability is a difficult and crucial aspect of theoretical research in enterprise sustainable development. From a financial point of view, Professor Robert C. Higgins (1998), American financial expert, put forward the concept of sustainable growth rate for the first time. In his view, sustainable growth rate is the maximum rate of growth in enterprise sales under the condition that the enterprise does not run out of financial resources; At the same time, contrasting it with actual growth rate (usually represented by the actual sales growth rate), he proposed three types of enterprise growth: too much growth, too little growth and balanced growth. From a financial standpoint, he built a sustainable growth model to explore the corporate strategy to achieve balanced growth.

It is common for national economy to use green GDP or sustainable income NNP as the core indictors of macroeconomic statistics instead of GDP. Chen et al. (2002) deducted from this fact that in those enterprise statistical indicator systems whose center is sustainable development, indicator of current period profit rate should be deducted appropriately. A new indicator, "sustainable earning power", should be used as the core of evaluation. Based on that, he built a comprehensive evaluation index system of sustainable development of enterprises.

Wu (2003) analyzed the influencing factors of the sustainable development of enterprises. They believe that enterprise sustainable competitiveness evaluation index system should mainly include financial, market, technology, management, information, and environment indicators. Using the Analytic Hierarchy Process (AHP), they established the enterprise sustainable competitiveness comprehensive evaluation model.

Based on the dynamic variation of the competitiveness factor score relative to time, Yin, Yu, and Chu (2003) created the enterprise sustainable development indicators to evaluate the capability of sustainable development of enterprises. Composite score of enterprise competitiveness factors is derived from comprehensive evaluation of integrated evaluation index system composed of company operation capability, profitability and growth capability. This evaluation process makes descriptions and judgments of enterprise sustainable capability from static and dynamic perspectives.

Wang and Cuan (2000) constructed an evaluation index system for sustainable development levels, including a set of indicators such as environmental benefits, economic efficiency and social benefits. They also analyzed and explained each indicator.

In addition, Zhao (2002) built an evaluation index system for sustainable development capabilities for machinery industrial enterprises. The system includes target indicators and supporting indicators. An evaluation methodology was also proposed, including the evaluation model of economic development, a single indictor model and the comprehensive evaluation model. From the aspects of entrepreneur factors, product chain factors, enterprise capability factors and macro environmental factors, Hou and Wang (2003) built an evaluation index system for sustainable development capabilities for high-tech start-ups. Yu (2001) constructed an evaluation index system from the aspects of the state of the economy, human resource conditions, technical conditions, and harmonious conditions. They also explained each indicator.

There exists some literature on evaluation index system for sustainable development of enterprises. Existing research is mostly done through the points of view such as scale of business and growth of financial results. But there is little research on evaluation methods. Besides factor analysis, analytic hierarchy process, fuzzy comprehensive evaluation method, there is little research on other methods, such as data envelopment analysis, gray evaluation method and rough set. Different evaluation methods have different characteristics. Factor analysis can use rather few factors to reflect most of the information of the original data. However, this method is only suitable for the static comparison among the evaluation subjects. It is not suitable for dynamic comparisons. Analytic Hierarchy Process sorts the various options based on the subjective judgment of their relative importance. The advantage is that the judgment is based on the preferences of the decision makers, but subjective factors play a major part and the evaluation results may not be objective enough. Fuzzy comprehensive evaluation method introduces fuzzy math into the evaluation. It is rather objective, but practical application is difficult. Gray comprehensive evaluation method can be applied to evaluation subjects with "missing data" and "poor information," but it determines the effectiveness of the model only by prediction accuracy. Rough set can be used when there is no need for prior information, but the theory is still flawed in rough logic and inexact reasoning. Data Envelopment Analysis is one of the rather objective quantitative evaluation methods. It uses various input indicators and various output indicators to effectively compare units of the same type.

In order to enrich the evaluation of corporate sustainable development capability and provide companies with more scientific and objective evaluation methods, this paper combines Data Envelopment Analysis (DEA) and Analytic Hierarchy Process (AHP) to form a comprehensive evaluation method from an efficiency

point of view. To this end, the idea of this paper is: first, describe the DEA-AHP method; then, based on previous research results of the evaluation of the sustainable development capability of Chinese property and casualty insurance companies - the index system, determine evaluation plans and the input and output indicators; then, process survey data and use DEA software to evaluate efficiency; finally, make some policy recommendations for the sustainable development capability of Chinese property and casualty insurance companies.

2. DEA-AHP METHOD

Data envelopment analysis (DEA) was proposed by Charnel A and Cooper W, famous operations research experts. Based on the concept of relative efficiency, it evaluates the effectiveness of same type multi-input multi-output decision-making units (DMU). Observing input and output data, this non-parametric estimation method evaluates DMUs by changing weights (Wei, 2004). A notable feature of DEA is that it does not need to consider the relationship between inputs and outputs and does not require pre-estimated parameters or any weight assumptions, avoiding subjective factors. It calculates the input and output efficiency of DMUs with the ratio of the weighted sum between output and input.

2.1 C^2R Model

C^2R model is a basic DEA model based on principles of intuitive ideas and mathematical modeling.

Given n DMU_j ($1 \le j \le n$), the input and output vectors of DMU_j respectively are

$$x_j = (x_{1j}, x_{2j}, \cdots x_{mj})^T$$

$$y_j = (y_{1j}, y_{2j}, \cdots y_{sj})^T$$

$$j = 1,2,\cdots,n$$

Because various inputs and outputs have different status and role in the production process, it is necessary to "integrate" inputs and outputs when evaluating DMUs. That means treating them as a production process of overall input and overall output. Each input and output need to be assigned an appropriate weight. Let the weights x_j of be v_i, the weights of y_j be u_k, ($1 \le i \le m$, $1 \le k \le s$), then the weight vector of inputs and outputs is

$$v = (v_1, v_2, \cdots, v_m)^T \qquad u = (u_1, u_2, \cdots, u_k)^T$$

Let the following be the efficiency evaluation index of the jth DMU.

$$h_j = \frac{uy_j^T}{vx_j^T} = \frac{\sum_{k=1}^{s} u_k y_{kj}}{\sum_{i=1}^{m} v_i x_{ij}}, \quad j = 1,2,\cdots,n$$

In this definition, we can always appropriately select u and v to make $h_i \le 1$. To be precise, the larger h_i is, the more outputs we can obtain with relatively fewer inputs. Therefore, we can examine whether DMU_j is optimal with the maximum value of h_i that is obtained by changing u and v as much as possible. The C^2R model can be constructed as follows:

$$\max \frac{\sum_{k=1}^{s} u_k y_{kj_0}}{\sum_{i=1}^{m} v_i x_{ij_0}} = V_P$$

$$\begin{cases} s.t. \dfrac{\sum_{k=1}^{s} u_k y_{kj}}{\sum_{i=1}^{m} v_i x_{ij}} \le 1, j = 1,2,\cdots,n \\ u_k \ge 0, k = 1,2,\cdots s; v_i \ge 0, i = 1,2,\cdots,m \end{cases}$$

2.2 Integrated DEA-AHP Model

The evaluation results of DEA depend completely on the objective indicator data of the evaluation pan. It does not take into account the preferences of decision makers. It can only categorize the DMUs as valid and invalid. It gives too little information about valid DMUs and cannot reasonably sort them. In practical application, the importance of evaluation indicators may vary. In order to reflect the different levels of preference toward various evaluation index and to make the evaluation results more comprehensive and reasonable, this paper integrates DEA and AHP and proposes the comprehensive model for Chinese property and casualty insurance companies. The ideas are as follows: first, use AHP to derive the weights of the evaluation plans; then use DEA to find out the relative efficiency of each company for the elements or child indicators under each plan; finally, sort the overall efficiency of the companies by combining the weights of each indicator and the value of relative efficiency. When calculating weights using AHP, the relative values of each pair of indicators in the matrix can be obtained by surveying experts. The specific ideas are as follows:

Given n property and casualty insurance companies and m evaluation plans, then the specific evaluation procedures based on DEA-AHP are as follows:

Step one: establish evaluation index system of sustainable development capability of property and casualty insurance companies;

- Step two: select indicators of a certain level as evaluation plan;
- Step three: determine the input and output indicators of the evaluation plan;
- Step four: using analytical hierarchy process, calculate the weight w_i (i=1,$\cdots m$) of the evaluation plan;
- Step five: using data envelopment analysis method,

get the optimal value h_{ij} (i=1,$\cdots m$; j=1,$\cdots n$) for each evaluation plan;

- Step six: using the weight w_i from step three and the efficiency assessing value h_{ij} from step four, calculate the overall efficiency value: $\sigma_j = \sum_{i=1}^{m} w_i h_{ij}$, $j = 1,\cdots n$. Then the sustainable development capability of each company can be sorted based on σ_j.

Traditional DEA does not consider the preference of decision-makers. This integrated model approach addresses this problem and overcome the weakness of strong subjectivity that AHP and many other decision-making methods have. The evaluation resulted from this approach is more comprehensive and realistic. At the same time, this approach simplifies the calculation process and is easy to implement.

Of course, this method also has its own inadequacies. DEA cannot sort the DMUs whose efficiency value is 1. The decision makers cannot compare the performance of companies whose efficiency values are 1. In addition, when information is not comprehensive, decision makers cannot accurately, data envelopment analysis method does not sort the efficiency of decision making units with value 1, which makes policy makers unable to compare the efficiency values for a performance of the pros and cons; when you when the information is not comprehensive, policy makers cannot be accurately given the parameters to the overall target level of importance, these are issues to be resolved.

3. EMPIRICAL ANALYSIS

3.1 Data Sources

This paper designed two questionnaires based on the data required. Questionnaire one is on sustainable capability. Questionnaire two is on satisfaction. Based on premium income data from China Insurance Yearbook, PICC Property and Casualty Company (PICC P&C), China Continent Property & Casualty Insurance Company (CCIC P&C), China United Property Insurance Company (CIC), China Pacific Insurance Company (CPIC) and Ping An Property & Casualty Insurance Company (Ping An) are selected. In order to guarantee the quality of survey, questionnaire respondents were asked to complete questionnaires independently. In order to ensure the validity of the findings, the responses were checked one by one. Incomplete questionnaires or questionnaires with clear errors were not counted. On-site interviews were conducted as part of the investigation. Investigators filled out the questionnaires which were included in the analysis. 250 copies of questionnaire one were issued. 234 responses were received. Among them, 227 were valid, or 90.8% of all issued questionnaires were valid. 300 copies of questionnaire two were issued. 289 responses were received. Among them, 278 were valid, or 92.7% of all issued questionnaires were valid.

3.2 Comprehensive Evaluation Based on DEA-AHP Model

Based on the previous DEA-AHP model procedures, comprehensive evaluation was done for PICC P&C, CCIC P&C, CIC, CPIC and Ping An.

3.2.1 Evaluation Index System of Property of Sustainable Development Capability of Property and Casualty Insurance Companies

Summarize the evaluation index system based on previous research on evaluation index of sustainable development capability of property and casualty insurance companies, as shown in Table 1.

3.2.2 Determination of Evaluation Plans

According to the index system (Table 1), select the learning and innovation capability, environment capability, management capability and corporate governance capability as the four plans.

Table 1
Evaluation Index System of Sustainable Development Capability of Property and Casualty Insurance Enterprises

	Primary indicators	Secondary indicators
Evaluation Indicators for Sustainable Development Capability of the Property and Casualty Insurance Enterprises	Financial Capability	Premium income, premium income growth rate, owners' equity growth rate.
	Learning and Innovation Capability	Per capita staff trainings, proportion of R&D personnel, proportion of R&D funding, per capita premium income.
	Environment Capability	Number of new customers, public reputation, product market share.
	Management Capability	Strategic management capability, frequency of communication, departmental communication effectiveness, customer satisfaction.
	Corporate Governance Capability	Proportion of shares held by the largest shareholder.

3.2.3 Determination of Input and Output Indicators of Evaluation Plans

Based on the actual circumstances and data availability of property and casualty insurance companies, using the index system in Table 1, input indicators can be converted into output indicators using DEA, as shown in Table 2 below. From Table 2, it can be seen that sustainable development capability is made up of learning

and innovation capability, environment capability, management capability and corporate governance capability. These four indicators are input indicators. Then financial capability in the index system can be transformed as output indicators.

Table 2
Input and Output Indicators of Chinese Property and Casualty Insurance Companies

Sustainable development capability	Input indicators	Output indicators
Learning and innovation capability U_{11}	Per capita staff trainings (I1), Proportion of R&D personnel (I2), Proportion of R&D funding (I3)	Per capita premium income (O1), Premium income (O2), Premium income growth rate (O3)
Environment capability U_{12}	New customer ratio (I4), Public reputation (I5)	Product market share (O4)
Management capability U_{13}	Strategic management Capability (I6), Frequency of communication (I7), Departmental communication effectiveness (I8), Customer satisfaction (I9)	Premium income (O2), Premium income growth rate (O3)
Corporate governance capability U_{14}	Proportion of shares held by the largest shareholder (I10)	Owners' equity growth rate (O5)

Among the input and output indicators in Table 2, per capita staff trainings (I1), public reputation (I6), strategy capability (I7), frequency of communication (I8), departmental communication effectiveness (I9), and customer satisfaction (I10) cannot be directly obtained in Statistical Yearbook. Survey results can be used to transform qualitative findings to quantitative findings. For the transformation, the indicators must be scientifically quantified, using numerical values to reflect customers' attitude toward the subject. This paper uses quantitative methods to break down views, preferences and attitudes. Scale has two advantages: one is that figures can be easily statistically analyzed; second is that attitude measurement becomes easy and can be easily realized. Using Excel, per capita staff trainings (I1), public reputation (I6), strategy capability (I7), frequency of communication (I8), departmental communication effectiveness (I9), and customer satisfaction (I10) are averaged. The results are in Table 3. The original data for other indicators are obtained from Insurance Statistical Yearbook 2009.

Table 3
Input and Output Indicator Values of DMUs

	Companies	PICC P&C	CCIC P&C	CIC	CPIC	Ping An
Input indicators	Per capita staff trainings (I1)	3.7021	3.3556	3.1304	3.5000	3.6512
	Proportion of R&D personnel (I2)%	0.0184	0.0217	0.0107	0.0150	0.0311
	Proportion of R&D funding (I3)	0.1543	0.0867	0.1021	0.1432	0.1386
	New customer ratio (I4)%	0.0878	0.0321	0.0324	0.0654	0.0895
	Public reputation (I5)	3.2878	2.6115	2.9065	2.8058	2.8669
	Strategic management capability (I6)	3.2766	2.9111	3.1739	2.9348	3.3488
	Frequency of communication (I7)	3.2128	3.2667	2.9565	3.2391	3.4884
	Departmental communication effectiveness (I8)	2.5532	2.4222	2.4348	2.4130	2.5349
	Customer satisfaction (I9)	5.0000	1.0000	2.0000	3.0000	4.0000
	Proportion of shares held by the largest shareholder (I10)%	0.1231	0.1578	0.1143	0.1656	0.1432
Output indicators	Per capita premium income (O1)millions of RMB	1.2838	0.4584	0.6519	0.8367	0.4410
	Premium income (O2)millions of RMB	101762.9500	9447.5900	19153.3800	27817.0000	26870.2200
	Premium income growth rate (O3)%	0.1508	-0.0579	0.0442	0.1871	0.2527
	Product market share (O4)%	0.3615	0.0410	0.0750	0.0958	0.0877
	Owners' equity growth rate (O5)%	0.1519	0.2640	-0.1534	0.0931	0.3055

3.2.4 Determination of Weights

To comprehensively evaluate the five companies, the author used AHP to conduct weight calculation of the four major indicators. The ratio of each pair of indicators was obtained by surveying experts. The most frequent choices of 20 experts were used as the final ratio. Table 5 shows the corresponding matrix and the consistency check.

Table 5
Matrix of Four Indicators U_1 and Consistency Check

U_1	U_{11}	U_{12}	U_{13}	U_{14}	Weight	*CI*
U_{11}	1.0000	2.0000	3.0000	5.0000	0.482407	
U_{12}	0.5000	1.0000	2.0000	3.0000	0.271798	$\frac{4.014536-4}{4-1}=0.004845$
U_{13}	0.3333	0.5000	1.0000	2.0000	0.157508	
U_{14}	0.2000	0.3333	0.5000	1.0000	0.088287	

Note: λ_{max}=4.014536, *CI*=0.004845, *RI*=0.9, CR=0.005384<0.10

In table 6.7, the weight of the learning and innovation capability indicator is 0.482407; that of the environmental capability indicator is 0.271798; that of the management capability indicator is 0.157508; that of the corporate governance capability indicator is 0.088287.

3.2.5 DEA Evaluation Value of the Four Evaluation Plans for the Five Companies

Based on the data in Table 4, calculated using DEA software, evaluation index of the four major indicators are shown in Table 6.

From Table 6, it can be seen that the learning and innovation capability indicators of PICC P&C, CCIC P&C and CIC are 1. They have the highest score. Ping An and CPIC rank next in that order. This shows that PICC P&C, CCIC P&C and CIC have more effective staff training and more effective conversion of R&D investment into practical results, realizing the value of these resources. On the other hand, Ping An and CPIC have a lower value efficiency of investment in staff training, R&D staff and R&D funding. However, compared with other indicators, these values of this indicator for all five companies are rather high. This shows that overall, the five companies have an effective investment in R&D staff and R&D funding, which has a positive effect on the premium growth.

For environment capability indicator, PICC P&C has the highest effectiveness. CIC, CPIC, CCIC P&C and Ping An rank next. The scores of the five companies vary greatly for this indicator. This shows that CIC, CPIC, CCIC P&C and Ping An fail to maximize the effective conversion from input elements (number of new customers and public reputation) to output (market share). There are problems with the number of new customers and public reputation.

For environment capability indicator, PICC P&C, CPIC and Ping An have the highest effectiveness. The value is 1. CIC and CCIC P&C rank next. This shows that PICC P&C, CPIC and Ping An have better strategic management, communication frequency, departmental communication and customer satisfaction. CIC and CCIC P&C need to improve management capabilities, particularly departmental communication.

For corporate governance capability, PICC P&C has the highest effectiveness, followed by Ping An, CCIC P&C, CPIC and CIC. This shows that the largest shareholder plays an effective role in PICC P&C. The other companies fall short in this aspect, especially CIC.

Overall, PICC P&C has the highest score for all four indicators. CCIC P&C has good learning and innovation capability and corporate governance capability. CIC has good learning and innovation capability. CPIC has good learning and innovation capability and management capability. Ping An has good management capability, learning and innovation capability and corporate governance capability.

Table 6
DEA Evaluation Results of Five Companies

Evaluation Subjects	Evaluation indicators			
	Learning and innovation capability U_{11}	Environment capability U_{12}	Management capability U_{13}	Corporate governance capability U_{14}
PICC P&C	1.000	1.000	1.000	1.000
CCIC P&C	1.000	0.310	0.464	0.635
CIC	1.000	0.562	0.559	0.000
CPIC	0.798	0.356	1.000	0.213
Ping An	0.823	0.278	1.000	0.810

Note: CIC's owners' equity growth rate is negative, cannot be calculated, this paper treats the result as 0.

3.2.6 Comprehensive Evaluation of the Five Companies

Using weights from Table 5, the paper further evaluates the comprehensive capability of the five companies. Its results are shown in Table 7. As can be seen from Table 7, PICC P&C ranks first in sustainable development capability, followed by CIC, CCIC P&C, Ping An and CPIC.

Table 7
DEA Comprehensive Evaluation Results of the File Companies

Evaluation subjects	Evaluation Indicators				Average comprehensive evaluation	Comprehensive ranking
	Learning and innovation capability	Environment capability	Management capability	Corporate governance capability		
PICC P&C	1.000	1.000	1.000	1.000	1.000	1
CCIC P&C	1.000	0.310	0.464	0.635	0.696	3
CIC	1.000	0.562	0.559	0.000	0.723	2
CPIC	0.798	0.356	1.000	0.213	0.658	5
Ping An	0.823	0.278	1.000	0.810	0.702	4

Using the size of effectiveness, the sustainable development capability of the five companies can be categorized, such as "1" is excellent, "0.9-1.0" is very good, "0.8-0.9" is good, "0.7-0.8" is fair, "0.6-0.7" is passing and "0.6 and below" is poor. The results are that the sustainable development capability of PICC P&C is excellent; that of CCIC P&C is passing; that of CIC is fair; that of CPIC is passing; that of Ping An is fair.

3.2.7 Cause Analysis

In 2008, influenced by Chinese domestic environment (snow and frozen disaster in the South and "5·12" Wenchuan earthquake) and international environment (global financial crisis), the performance of major property and casualty insurance companies (except PICC P&C) showed different degrees of decline. Major property and casualty insurance companies took active measures, strengthened staff training and increased R&D investment. All staff started to "act" and realized their values. However, because of the deficiencies in environmental capabilities, management capabilities and corporate governance capabilities, these efforts were not organically integrated with learning and innovation capabilities, which led to the decline in overall performance.

From the evaluation results, it can be seen that PICC P&C dominated in competition in 2008. In that year, domestic natural disasters occurred one after another. The global financial crisis was getting more and more severe. PICC P&C was not affected, but instead showed growth. The cause is worth careful consideration.

a. Learning and innovation capability

From the cultural structure of the staff, in 2008, PICC P&C had 40 people with doctoral degrees, a 2.56% increase over 2007; 1416 people with Master's degrees, a 17.6% increase over 2007; 26124 people with bachelor's degrees, an 18.86% increase over 2007. The size of the high-quality personnel pool kept expanding. At the same time, in order to improve staff's learning capability, PICC P&C set out to create a learning organization and carried out a variety of activities. Specifically the President's Office started a sharing class with a theme of modern management theory and practice, creating a common knowledge platform. The sharing class used video conferencing format to share advanced management theoretical research results. Well-known domestic and overseas experts, scholars were invited to disseminate management concepts, management practices of successful enterprises, and scientific management methods.

b. Environment capability

PICC P&C increased efforts to develop markets and expand expansion insurance coverage and penetration. In particular, one is to deepen interaction with all levels of government, accelerate the development of agriculture insurance business, and further enhance the ability to serve the construction of new rural areas. Second is to actively adapt to the adjustment of traffic compulsory insurance policy and maintain sustainable and stable development of traffic compulsory insurance business. Third is to vigorously develop liability insurance and health insurance, actively promote liability insurance in schools, governments, factories and mines, and rural areas, and further expand the coverage of production safety, school management liability, and carrier's liability insurance. Four is to strengthen the underwriting of large projects.

c. Management capability

To steadily upgrade management, PICC P&C advocated "Learning as work and work as learning" and achieved significant results in management innovation. The company promoted the "triple play" work and learning model of subject research, curriculum development and teacher training. Also, the company explored golden work process, developed business decision support system and application process standardization system. Management level was effectively enhanced. In order to facilitate smooth communication among departments, PICC P&C straightened out information communication mechanisms, improved features of intranet and extranet, and extensively carried out activities such as "I offer my advice and suggestions for the company." These achieved good

results. To improve customer satisfaction, PICC P&C chooses serving the people as the purpose and provides coverage and guarantee for the society. When dealing with risk management, PICC P&C continues to strengthen risk management and control and promote stable operation.

d. Premium income

In 2008, premium income exceeded RMB 100 billion. According to data from Bloomberg, PICC P&C ranks 10th among all listed insurance companies in non-life insurance (including group companies and specialized companies). This indicates that PICC P&C is now a large international company. In 2008, the overall premium income of PICC P&C increased 14.9%. Vehicle insurance grew 11.7%. Non-vehicle insurance grew 22.3%. Agriculture insurance, accident and health insurance, liability insurance and freight insurance business developed rapidly. Business property insurance and home property insurance maintained a certain level of growth. The Sichuan Provincial Branch overcame the impact of the earthquake and achieved an increase of 16.1% in premium income.

4. STRATEGY RECOMMENDATIONS

Whether a company attempts to improve learning and innovation capabilities, environmental capabilities, management capabilities and corporate governance capabilities, it needs to improve staff quality, information exchange and knowledge accumulation. The following can be considered:

4.1 Focus on On-the-Job Training

On-the-job training should be different for different employees. From a management perspective, employees are usually categorized in three levels: basic level, middle level and senior level. There are many basic level employees. Their training should focus on structured knowledge such as business knowledge, operation skills and service awareness and other very detailed aspects. For middle level employees, the training should be mainly on the basic functions of internal management – planning, organizing, leading and controlling. The training should focus on semi-structured knowledge, such as how to identify problems, what are the ways to solve the problems and what is the optimal way. For senior management, the training should focus on developing strategic vision and keen sense of market. These abilities cannot be taught overnight, but frequently involve senior management in trainings will help accumulation of knowledge. This accumulation contributes to the formation of strategic vision and a sense of market.

4.2 Formation of Effective Learning Mechanism

To develop effective learning mechanism, property and casualty insurance companies must decide internally the relationship between business development strategies and learning in daily work, because having learning capability is the only way of enterprise sustainable development. Senior leadership must repeatedly stress the strategic goals of the organization are achieved through learning contained in everyday work and the decision making. The company joins together strategic objectives and day-to-day actions and achieves "consistency." Once the relationship between them are defined, strategic objectives and day-to-day actions become "rules" of learning practices and will be able to serve the business.

Secondly, the companies need to make learning activities a routine and standardize them. People constantly reflect on their experience. This forms the basis of learning. The learning that an organization needs and the learning people pursues are different. The difference is that people's pursuit of learning happens naturally without guiding. Thus, in order for organizations to form effective learning activities, they must fully mobilize the enthusiasm of the members. An employee will not only complete her work, but also voluntarily find time to think about how to improve the way.

4.3 Construction of Incentive Mechanism of Knowledge Sharing

In general, people will only contribute their knowledge only when they feel that knowledge sharing will be beneficial to them. Therefore, incentive is the core of knowledge sharing encouragement. The following aspects can be considered to motivate staff to share knowledge: first, dismantle obstacles of exchanges. The establishment of incentive mechanisms to encourage people to participate in some type of communication is a good way to improve exchanges. The key is to ensure these mechanisms should not become short term activities that cannot be sustained. In addition, it is necessary to prevent incentive mechanisms from becoming "system loopholes" for certain members. Second, link knowledge contribution to opportunities and development. If an organization has a culture to truly encourage individuals to share knowledge, knowledge contribution becomes a natural thing. If managers gain power through personal heroism and accumulation of knowledge, then the pace of their knowledge contribution in the knowledge management process will be considerably slow. Third, find common benefits. The knowledge sharing culture cannot be formed overnight. Within a large organization, it is difficult for individual employees to see their knowledge sharing is beneficial to the company as a whole or to themselves. Small informal teams can carry out knowledge and information exchange within specific areas. This can be used to achieve knowledge sharing.

4.4 System and Organizational Structure Platform to Improve Knowledge Sharing

Limited time and lack of motivation are the two important reasons of knowledge contribution failures. Employees in most rapidly developing organizations do not have time to consider how to make their work products accessible,

clear and wildly accepted. Because time is limited, the organizations which respect knowledge contribution should find some ways to motivate employees. For example, assign time and space for employees to contribute their best work; appoint dedicated staff to support knowledge contribution; support the transfer of tacit knowledge; weave an organization network.

4.5 Build Trust Mechanisms for Knowledge Contribution

Without trust, knowledge-sharing organization becomes a paradox. Trust has many manifestations, but any form of trust can lubricate the knowledge contribution chain. The companies can consider the following when building trust mechanisms of knowledge contribution: one is to have a reciprocity agreement between employees and the company; second is to make detailed policies regarding the use of intellectual property; third is to enhance ownership by self-publication; forth is to expand the scope of trust.

CONCLUSION

Using DEA-AHP methods, selecting a representative sample of five property and casualty insurance companies, from the angle of efficiency, this paper evaluated sustainable development capability. It concluded that in the wake of 2008 financial crisis, PICC P&C has the highest operation effectiveness. It further recommended that domestic property and casualty insurance companies should pay attention to on-the-job training, develop effective learning mechanisms, build incentive mechanisms of knowledge sharing, enhance systems and organizational structure platforms of knowledge sharing and build trust mechanism for knowledge contribution.

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