

## An AHP method for identifying influential factors on insurance cost

Firouzeh Azizi<sup>a\*</sup>, Mehdi jafarzadeh kenari<sup>b</sup> and Mehri Nasiri<sup>b</sup>

<sup>a</sup>Department of Management, University of Tarbiat Modarres, Tehran, Iran

<sup>b</sup>Department of Management and Accounting, Allameh Tabatabaie'i University, Tehran, Iran

### CHRONICLE

#### Article history:

Received May 25, 2013  
Received in revised format  
28 June 2013  
Accepted 2 August 2013  
Available online  
August 10 2013

#### Keywords:

AHP  
Insurance cost  
Cost management

### ABSTRACT

During the past few years, there have been increasing competitions in insurance firms around the world and most insurance firms try to find appropriate methods to reduce the cost of their products. In this paper, we perform an empirical investigation to find important factors influencing cost management in insurance industry. The proposed study of this paper detects five items including human productivity, economic inflation, competitions within industry, information technology and rate of damage paid to customers, which are effective on four important cost components. The implementation of analytical hierarchy process on ranking four cost components indicate that the amount of damage paid to customers is the most important factor followed by administration expenses, commission and advertisement.

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## 1. Introduction

Measuring the performance of insurance firms plays an important role on making strategic decisions in this industry (Klumpes, 2004). There are many studies used for measuring the performance of insurance firms and most of them are involved with various criteria. There are different multi criteria decision making techniques used to find an integrated decisions. Analytical hierarchy process is one of the most popular techniques, which has been widely used by both academics and practitioners (Saaty, 1977, 1988). However, many issues on insurance industry are involved with uncertainty and people may wish to use different methods such as fuzzy logic to handle uncertainty (Shapiro, 2004). The insurance industry has various areas with potential applications for fuzzy logic (FL). These incorporate classification, underwriting, projected liabilities, fuzzy future and present values, pricing, asset allocations and cash flows, and investment. Yücenur and Demirel (2012) presented group decision making process for insurance company selection problem with extended VIKOR method under fuzzy environment. Sayadi et al. (2009) used extension of VIKOR method for decision making problem with interval numbers.

\*Corresponding author.

E-mail address: [fazizi@modares.ac.ir](mailto:fazizi@modares.ac.ir) (F. Azizi)

Korhonen and Voutilainen (2006) presented some finding on the most preferred alliance structure between banks and insurance companies. Phillips et al. (1998) presented a method for financial pricing of insurance in the multiple-line insurance company. Taksar (2000) presented optimal risk and dividend distribution control models for an insurance company.

## 2. The proposed study

The proposed study of this paper tries to find important factors influencing cost management in insurance industry. The proposed study uses a group of 520 experts and managers who are actively working in Iranian insurance industry. The sample size of this study is determined as follows,

$$n = \frac{N \times z_{\alpha/2}^2 \times p \times q}{\varepsilon^2 \times (N - 1) + z_{\alpha/2}^2 \times p \times q}, \quad (1)$$

where  $N$  is the population size,  $p = 1 - q$  represents the yes/no categories,  $z_{\alpha/2}$  is CDF of normal distribution and finally  $\varepsilon$  is the error term. Since we have  $p = 0.5$ ,  $z_{\alpha/2} = 1.96$  and  $N = 520$ , the number of sample size is calculated as  $n = 384$ . The study designs a questionnaire consists of 40 questions and it was first verified by asking some experts to give their insights and then we distribute it among all participants. The questionnaire also asks decision makers about the effects of two productivity and information technology on reduction of different insurance expenditures.

## 3. The results

We first offer the results of our survey on important productivity and information technology factors on reducing insurance costs. Table 1 summarizes the results of our survey.

**Table 1**

The summary of influential factors on cost reduction

Item	Description	Rate of confirmation	Accept/Reject
1	Information technology reduces administration expenditures.	73%	√
2	Information technology reduces advertisement expenditures.	78%	√
3	Information technology reduces risks and damages fees.	59%	√
4	Information technology reduces commission expenses.	77%	√
5	Productivity of human resources reduces research and development expenses.	26%	×
6	Productivity of human resources reduces administration expenses.	81%	√
7	Productivity of human resources reduces advertisement expenses.	91%	√

As we can observe from the results of Table 1, except one case, the effect of human productivity on the costs of research and development, decision makers believe information technology and increase in productivity of human resources could reduce administration, advertisement, risks and damages fees, significantly. These two items, i.e. information technology and human resource productivity, are essential factors detected in the first round of our survey. We have also detected three other factors including competition among insurance firms, inflation rate and insurance coverage percentage are also considered as other important factors in our survey. In addition, four cost items are considered as the most important expenses in insurance industry including administration cost, advertisement cost, damage payable and commission fees paid to retailers. We first compare four cost components in terms of human productivity using analytical hierarchy process (AHP) and the results are summarized in Table 2 as follows,

**Table 2**

The results of pairwise comparison and AHP method in terms of human productivity

Cost	Administration	Commissions	Advertisement	Damage paid
Weight	0.369	0.321	0.179	0.137
Consistency ratio	0.04			

The results of Table 2 show that administration cost is the most important factor followed by commissions paid to retailers, advertisement and damage paid. Table 3 presents the results of the same pairwise comparison in terms of competition.

**Table 3**

The results of pairwise comparison and AHP method in terms of competition factors

Cost	Administration	Commissions	Advertisement	Damage paid
Weight	0.118	0.370	0.362	0.149
Consistency ratio	0.02			

In terms of competition, commission fees are the most important factor followed by advertisement. Next, we compare four cost items in terms of inflation rate and Table 4 shows the results of our survey.

**Table 4**

The results of pairwise comparison and AHP method in terms of inflation rate

Cost	Administration	Commissions	Advertisement	Damage paid
Weight	0.171	0.237	0.150	0.442
Consistency ratio	0.05			

In terms of inflation rate, damage fee paid to customers is the most important factor followed by commissions paid to retailers. Information technology is another factor influencing cost components, which are summarized in Table 5 as follows,

**Table 5**

The results of pairwise comparison and AHP method in terms of information technology

Cost	Administration	Commissions	Advertisement	Damage paid
Weight	0.369	0.244	0.166	0.222
Consistency ratio	0.08			

In terms of information technology, administration cost is the most important item followed by commissions, damage paid and advertisement. Finally, rate of damage paid is the last item used for our survey and Table 6 shows details of our results.

**Table 6**

The results of pairwise comparison and AHP method in terms of rate of damage paid

Cost	Administration	Commissions	Advertisement	Damage paid
Weight	0.167	0.214	0.092	0.528
Consistency ratio	0.08			

The results of Table 6 clearly show that damage paid to customers is the most important item followed by commissions. Before we make the final ranking, we need to determine the weights of four components.

**Table 7**

The results of pairwise comparison and AHP method in terms of five criteria

Cost	Human productivity	Competition	Inflation rate	Information technology	Damage coverage
Weight	0.192	0.104	0.124	0.236	0.344
Consistency ratio	0.04				

After applying the weights of Table 7, we may find ranking of four cost components in Table 8 as follows,

**Table 8**

The results of ranking of different cost items

Cost	Administration	Commissions	Advertisement	Damage paid
Weight	0.247	0.261	0.161	0.33
Consistency ratio	0.04			

The results of Table 8 specify that the cost of damage paid to customers is the most important item followed by administration expenses as well as commissions.

#### 4. Conclusion

In this paper, we have presented an empirical investigation to find important factors influencing cost management in insurance industry. The proposed study of this paper has detected five items including human productivity, economic inflation, competitions within industry, information technology and rate of damage paid to customers, which are effective on four important cost components. The implementation of AHP on ranking four cost components has revealed that the amount of damage paid to customers is the most important factor followed by administration expenses, commission and advertisement.

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