

Optimization of customers' trust in the insurance industry by data envelopment analysis: An actual case study

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Abstract

The insurance industry is considered as one of the influential financial institutions that have an effective role in reducing the risk in various economic dimensions of society. Hence, insurance companies, by accepting the risks associated with the lives, property, and responsibilities of the community and economic activists, are the basis for the security of investment in society. Therefore, since the main field of activity of insurance companies is risk-taking, it is necessary for them to have access to powerful risk analysis tools to take effective risk management. Therefore, insurance companies have a significant interest in TRUST indicators for long-term communication with customers and the provision of the loyalty factor as a competitive advantage. This study seeks to find an optimal mix of demographic characteristics of the insurers who have the most confidence in insurance companies. For this purpose, a data envelopment analysis has been used with real data from three insurance companies in Tehran.

Keywords

The insurance industry, Trust, Demographic Features, Data Envelopment Analysis

1. Introduction

Trust is a person's level of confidence in his relationship with someone (Nyhan, 2000). It presents a fair, ethical and predictable behavior, according to it. The factor of trust can be divided into the following types. Personal trust, group trust, and organizational trust. These three types are closely interrelated. Organizational trust can be influenced by the trust placed in an individual or several individuals working at an organization. It is usually a vital factor in risk-taking organizations such as insurance brokers that need a high trust level to retain their customers. In any country, the insurance industry is considered to be an influential financial entity with an effective role in decreasing risk in various economic dimensions of society. Hence, insurance companies accept risks related to life, property and accept responsibility for the people and economic activists to provide mental peace and investment security in society. Therefore, because the main activity of insurance companies is to buy risks, they must have access to powerful risk analysis tools to be able to effectively manage risks. Customer trust in insurance companies consists of individuals' belief in the long-term advantages of these companies, the quality of insurance services provided and also the continuity of these services offered by the insurance companies. In the insurance industry, insurers consider these elements to be very important. This is because insurance is a service that shows its effects on the lives of customers in the long run. Moreover, insurers consider the continuity of insurance services to be essential. Accordingly, insurance companies pay special attention to trust indexes. They do this to maintain long-term relationships with customers and acquire the factor of loyalty as a competitive advantage. In the following, some important trust indices studied in the literature are explained.

- **Benevolence:** an insurer's belief in the fact that a broker will consider the interests of the insurers besides his interests (Mayer et al., 1995).
- **Ability:** having knowledge, skills, and competency that enable a broker to be effective in a certain field (Mayer et al., 1995), (Gubbins and MacCurtain, 2008).
- **Integrity:** an insurer's understanding of the fact that a broker adheres to a set of principles important for the insurers. Hence, both sides must have an equal understanding of these principles and implicitly accept them (Mayer et al., 1995), (Yeung et al., 2009).
- **Predictability:** the overall expectations of insurers about the behaviors of the other side in the future based on an individual's understanding of the past behaviors of a broker (Mayer et al., 1995).
- **Information transparency:** insurers must have sufficient and clear information about the terms of the contract.
- **Policy implications for insurers:** the unpredicted costs and anticipated risks for the loss of assets of insurers should not increase. Insurers must be able to meet their financial conditions.

In this study, we aim to find an optimal combination of the demographic characteristics of insurers who trust insurance companies the most. For this purpose, Data Envelopment Analysis (DEA) method with actual data from three insurance companies in Tehran was employed. In brief, the innovation and uniqueness of this study are described as follows:

- The use of a practical approach to continuously improve trust characteristics in insurance companies
- The comprehensive and simultaneous consideration of trust sub-factors
- Ranking the optimal combination of the demographic characteristics of insurers
- Presenting a real-world example to show the efficiency and suitability of the utilized approach

The paper proceeds as follows. Section 2, a review of the previous studies in this field is provided. Section 3 shows the implementation of the DEA method in real-world case studies. This section also represents the results. Finally, the conclusion and remarks are provided in Section 4.

2. Literature review

Trust as a component of social capital is essential for business relationships (Zboron, 2015). It is associated with firm performance, competitive advantage, satisfaction and economic outcomes, including transaction costs and reduced search costs. In the literature, trust has been used in different perspectives: managerial/organizational (Jeffries and Reed, 2000, Balasubramanian et al., 2003, Resnick et al., 2000), behavioral/psychological (Hollis, 1998), social/institutional (Mayer et al., 1995), technological and economic (Gambetta, 1988).

In adoption theories, Trust is an important factor with a significant effect on adoption of new products or services which have been developed by some companies such as banks and insurance companies (Abbasi et al., 2016, Bastan et al., 2017a). In addition, the role of the trust in the performance of insurance systems is so important that a large number of researchers have focused on it. Chirimubwe et al. (2013) investigated the relationship between statistic characteristics (gender, age, income, and education levels) and consumers' perception in Zimbabwe concerning valuable insurance. A sample consisted of 400 people was chosen from Harare, Zimbabwe, and the survey was carried out through questionnaires. Analysis of the data using descriptive statistics indicated that a significant difference in perceptions across age, income, gender and education levels exists. Ajami (2016) conducted an applied developmental study with cross-sectional data to examine the effect of trust and customer satisfaction on the brand equity of Iran Insurance Company in Khorasan province. Golisyvanani and Sedaghat (2015) studied the relationship between organizational trust and organizational change in Sanandaj¹ insurance companies in which the commitment to change was considered as the mediating variable. Both descriptive and inferential analyses were conducted, and the structural equation modeling was applied. The greatest impact of the trust aspects of organizational change was related to its horizontal aspect, and vertical and institutional aspects respectively affected it at lower levels. Damtew and Pagidimarri (2013) conducted a non-experimental study to investigate the impact of the trust on customer loyalty in

¹ A city in Iran

the insurance context. Structured questionnaires were provided to elicit the attitude of insurers, and the relationship between customer trust and customer loyalty was examined using Pearson correlation and Regression analysis.

The need for a more comprehensive tool for measuring trust, especially in the insurance systems is revealed by reviewing the relevant researches. In the qualitative methods, the structured questionnaires are designed with respect to the meanings and concepts of the trust, while quantitative approaches provide us with more strict measurements that help to compare various perspectives in an insurance system. In this paper, it is trying to identify the optimum combination of the demographic characteristics of the insurers regarding the trust in the insurance companies using DEA.

3. Methodology

As stated earlier, this research aims to investigate the level of public trust in the insurance system of Iran. For this purpose, several questionnaires were distributed among a random sample of insurers in three different insurance companies. These companies are located in the central part of Tehran, Iran. There are two main sections in the questionnaires. One section is about the characteristics of insurers, while the other one includes eighteen questions regarding system trust. Moreover, there are six factors in the questionnaire (See Table 1 in the appendix). These factors are “Ability”, “Benevolence”, “Integrity”, “Policy implications for insurers”, “Information supply and communication”, and “Predictability”. These factors are selected to be the output variables. A scale of 1 to 10 was determined for every question. To answer the questions, respondents were asked to draw a circle around their desired score.

Cranach's alpha was employed after data collection to test the questionnaire reliability whose acceptable threshold is 0.70 (Azadeh et al., 2016). Table 2 represents the results. The data in the questionnaire were confirmed using the test results. In this article, one set of insurer’s characteristics consists of gender, age, education, insurance type, and financial status. After the sets are identified, all possible combinations of insurer’s characteristics are determined. In table 3, the values for the demographic characteristics and possible combinations are present in each set.

Table 2. Reliability results of the considered indicator in the questionnaire

Indicator	Group type	Reliability (Cranach's Alpha)	Number of items
1	Ability	0.842	3
2	Benevolence	0.846	3
3	Integrity	0.845	3
4	Consequences of policies for Insurers	0.847	3
5	Information supply and communication	0.866	4
6	Predictability	0.954	2

Table 3. The results of all possible mixtures in a combination of insurer features

Feature	status						Possible state
	1	2	3	4	5	6	
Gender	1	2					
	man	woman					
Age	1	2	3	4	5	6	
	<18	18-26	26-36	36-46	46-56	>56	
Education	1	2	3	4	5		2*6*5*3*2=360
	<diploma	diploma	BS	MS	PhD and above		
Financial status	1	2	3				
	weak	moderate	good				
Type of insurance	1	2					
	social	Commerce					

DEA method is employed to evaluate eighty-eight insurers. Every insurer has been put in his/her relevant combination. Table 4 displays the results for each set. In every set, thirty-eight combinations have insurers taken from 88 possible combinations. According to the results, mixture 19 with adult individuals have more insurers compared to others. Ultimately, DEA was used to assess the performance of the insurance system in terms of the trust. The method implementation procedure is described below:

Table 4. Results of the combination

Mixture	Gender	Age	Education	Financial status	Type of insurance	Number
1	1	2	2	1	1	2
2	1	2	2	2	1	1
3	1	2	2	3	1	1
4	1	2	3	1	1	4
5	1	2	3	2	1	2
6	1	3	2	2	1	2
7	1	3	2	2	2	1
8	1	3	3	1	1	3
9	1	3	3	2	1	1
10	1	3	3	2	2	1
11	1	3	3	3	1	2
12	1	3	4	1	1	1
13	1	3	4	1	2	5
14	1	3	5	1	2	2
15	1	4	1	2	1	3
16	1	4	2	2	1	3
17	1	4	2	2	2	5
18	1	4	3	1	1	4
19	1	4	4	1	1	6
20	1	4	4	1	2	1
21	1	4	5	1	1	2
22	1	4	5	2	1	2
23	1	4	5	2	2	1
24	2	3	2	2	1	2
25	2	3	3	1	1	1
26	2	4	1	3	1	3
27	2	4	1	2	1	4
28	2	4	2	2	1	2
29	2	4	3	2	1	3
30	2	4	3	2	2	2
31	2	4	3	2	1	2
32	2	4	3	1	1	1
33	2	4	3	2	2	3
34	2	5	1	1	1	1
35	2	5	3	1	2	1
36	2	5	4	1	2	3
37	2	5	4	1	1	2
38	2	5	5	1	2	3

3.1. Data Envelopment Analysis (DEA)

Several approaches are employed in the literature to evaluate alternatives, such as TOPSIS (e.g., see Jamili et al., 2018), PROMETHEE-II (e.g., see Hamid et al., 2019), DEA (e.g., see Azadeh et al., 2016, Babajani et al., 2019, Gharoun et al., 2018, Habibifar et al., 2019, Hamid et al., 2018c, Yazdanparast et al., 2018, Hamid et al., 2018a, Hamid et al., 2017), and intelligent methods (Akbarpour et al., 2014, Mokhtari et al., 2012, Salmasnia et al., 2012, Tabandeh and Bastan, 2014). Also, Simulation-based approaches are used to evaluate policies, alternatives, and scenarios (Ahmadvand et al., 2014, Bastan et al., 2013a, Bastan et al., 2016a, Bastan et al., 2018a, Bastan et al., 2016b, Bastan et al., 2018b, Bastan et al., 2013b, Bastan et al., 2017b, Bastan and Shakouri, 2018, Kasiralvalad et al., 2016, Khoshneshin and Bastan, 2014, Hamid et al., 2018b). One of the most important and powerful decision-making methods is DEA that consists of many inputs and outputs. This method is utilized to select the ideal decision-making unit (DMU) for various fields including health care services, customer satisfaction, and gas consumption. To measure the weight of inputs and outputs, DEA enables every DMU to identify a set of weights. This is done to help a unit gain the ideal state among other units. Model (1) tests the efficiency of n-th DMU ($j = 1, \dots, s$). Every DMU comprises an input (m) as well as an output (s) that are displayed as $x_{1j}, x_{2j}, \dots, x_{mj}$ and $y_{1j}, y_{2j}, \dots, y_{sj}$, respectively. In this paper, Banker, Charnes, and Cooper (BCC) are employed in a way that will be discussed below (Banker et al., 1996).

$$\begin{aligned}
 & \text{Max } \theta \\
 & \text{s.t. } x_{i0} \geq \sum_{j=1}^n \lambda_j x_{ij}, \quad i = 1, \dots, m \\
 & \theta y_{rp} \leq \sum_{j=1}^n \lambda_j y_{rj}, \quad r = 1, \dots, s \\
 & \lambda_j \geq 0 \quad j = 1, \dots, n
 \end{aligned} \tag{1}$$

θ is the overall score of the unit P and λ_s is a dual variable.

In every combination, the insurance companies' efficiency values are calculated utilizing DEA. Table 5 shows the calculation results. The results indicate the efficiency of insurance companies in every mixture and the rank of the sets based on their efficiency. According to the tables above, the results presented below are acquired:

Mixture 31 consists of individuals in the age range of 36 to 46 with BS education, a woman's gender, moderate financial status and also social insurance who have the highest level of insurer trust in their associated insurance companies.

Table 5. Efficiency and ranking of possible mixtures

Possible Mixture	Efficiency	Ranking	Possible Mixture	Efficiency	Ranking	Possible Mixture	Efficiency	Ranking
1	1.000	25	16	1.000	25	31	2.778	1
2	1.461	7	17	1.250	11	32	1.000	25
3	1.071	21	18	1.258	10	33	1.242	12
4	2.601	4	19	2.650	2	34	1.050	22
5	1.000	25	20	1.000	25	35	1.818	6
6	1.003	24	21	1.190	13	36	1.073	20
7	2.353	5	22	1.000	25	37	1.000	25
8	1.357	8	23	1.000	25	38	1.000	25
9	1.010	23	24	1.000	25			
10	1.000	25	25	2.609	3			
11	1.130	16	26	1.117	17			
12	1.000	25	27	1.295	9			
13	1.111	18	28	1.181	15			
14	1.182	14	29	1.000	25			
15	1.105	19	30	1.000	25			

4. Conclusion

In this research, the DEA method is offered to assess the optimal combination of insurer's demographic characteristics and their trust in the insurance companies of Tehran. A standardized information gathering questionnaire was employed to collect the primary data. The validity and reliability of the data are tested utilizing Cranach's alpha, factor analysis, and statistical tests. The characteristics of the insurers include age, education, insurance type, and financial status. These characteristics are divided into two sets. Trust is assessed using six main indexes comprising "Ability", "Benevolence", "Integrity", "Policy implications for insurers", "Information supply and communication", and "Predictability". According to the research results, individuals in the age range of 36 to 46, BS education, a woman's gender, moderate financial status and also social insurance have the highest level of insurer trust in their desired insurance companies. It must be mentioned that the results are taken from Iranian insurers and since there are economic and social differences between Iran and other countries, they are not generalized to other countries. That said, the algorithm proposed in this paper can be utilized for any insurance company across the world.

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Appendix

Table 1. The trust questions used as output indicators in the algorithm.

Ability	Benevolence	Integrity	Consequences of policies for Insurers	Information supply and communication	Predictability
<ul style="list-style-type: none"> • Does an insurance company possess technical capabilities? • Does the insurance company enjoy an appropriate level of technical knowledge? • Is the insurance company capable of controlling intra-administrative violations? 	<ul style="list-style-type: none"> • Does the company give any importance to the interests of insurers? • Is the company honest with insurers? • Is the business contract fair? 	<ul style="list-style-type: none"> • Is there any assurance that damages will be justly compensated? • Is the company adhered to all the terms of the contract? • Has the company performed its obligations as well? 	<ul style="list-style-type: none"> • Are insurers capable of meeting their financial conditions? • Will insurers have no increase in insurance costs? • Do insurers, risk of property loss, increase? 	<ul style="list-style-type: none"> • Do insurers have adequate information about the terms of the contract? • Do insurers have enough information about the type of insurance and its various conditions? • Does company employees exchange information with insurers completely and with complete details? • Is the information provided to insurers clear? 	<ul style="list-style-type: none"> • Is it possible to predict whether the suitable history of loyalty and trust of the insurance company will guarantee its future loyalty? • Is the performance of the company predictable and will it lead to a desirable performance?