



Designing an Analytical Model to Determine the Factors Affecting Insurer Churn by Neural Network Technique

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ABSTRACT

In today's growing, saturated and competitive markets, the insurance industry, like other industries, is suffering from customer churn. Recent advances in communications and technology have led to increased awareness and ease of comparison of insurance policies and services. Thus, insurers are constantly confronted with new offers from competing companies and easily turn to competitors; in other words, they churn. The aims of this research are actually pursued through the following research question. What are the main factors of churn in the Iranian insurance industry? This study is conducted in two phases: qualitative and quantitative. First, in the qualitative phase, 15 experts in the insurance industry are interviewed to identify the factors affecting churn. Then, based on the identified factors in the research literature and comparing them with the results of the interview, 8 main influential factors are identified and finalized. In the quantitative phase, these indices are first weighted by hierarchical analysis technique. Then, the statistical population is determined in the quantitative phase; they included the insurers of the Iranian insurance company, and by selecting a sample of 120, neural network technique is applied to fit the model. The calculated $R = 0.74$ proves that the eight identified factors (type of insurance, premium, final result of claims, duration of cooperation, payment method, number of installments, number of policies, and number of claims) can best explain the reasons of churn of policyholders.

Keywords:

Factors Affecting Churn, Insurance Industry, Prediction, Neural Networks.

1. Introduction

Customers are one of the most important assets of businesses in many dynamic and competitive market companies (Amin, et al., 2018). In an era of increasingly saturated markets and intensifying competition among companies, customer churn has become a major problem. Searching for and identifying customers who are highly inclined to leave the company or, in other words, predicting customer churn, is essential as part of a customer retention strategy aimed at reducing Customer Churn Prediction (De Caigny, Coussement, & W. De Bock, 2018). Customer churn is a marketing term that means turning customers to other suppliers or buying less. As existing customers are an important source of profit in the business, the ability to identify customers who show signs of leaving the business can generate more profit for companies (Chen, 2016). In the recent years, the insurance industry in Iran has been competitive with various companies in the market in terms of profitability, portfolio composition, loss rate, penetration rate, retention and satisfaction of insurers and market share. Maintaining insurers has become a major problem for most insurance companies. As in the Iranian insurance industry, like many other industries, the cost of finding new insurers is much more than the cost of maintaining existing insurers, so it is essential to analyze the causes of insurers' downfall and churn in this industry. Pay and design models to predict how many insurers will exit the portfolio in the coming years.

Customer relationship management is a process that studies everything about current and future customers to understand or anticipate their ever-changing needs and is beneficial to both clients and managers. Customer Relationship Management helps managers to understand the dynamics of their laws, regulations, policies and mindset in line with customer aspirations (Ravi, Ravi, & Krishna Prasad, 2017).

Customers are one of the most important business assets in many dynamic and competitive market companies (Amin, et al., 2018). To survive in the marketplace and maintain competitive advantage, many organizations have taken steps to maximize the value of the customer life cycle. In fact, many organizations believe that customers are their most important asset, and customer retention is a long-term, beneficial strategy to ensure the success of organizations. As competition intensifies, many

organizations are focusing on customer relationship management. Customer churn as part of Customer Relationship Management has become a major concern (Shokrollahi, Aghdasi, & Asadi, 2016).

In the era of increasingly saturated markets that have intensified competition between companies, customer churn has become a major problem. Searching for and identifying customers who are highly inclined to leave the company or, in other words, customer churn prediction, is essential as part of a customer retention strategy aimed at reducing customer loss (De Caigny, Coussement, & W. De Bock, 2018).

Customer churn is a marketing term that means turning customers to other suppliers or buying less. As existing customers are an important source of profit in business, the ability to identify customers who show signs of leaving can make a profit for companies. If companies fail to take the necessary steps to retain customers before their situation is shaken, customers may never come back to the company, leading to a loss of capital and loss of future revenue for the company. Adopting a timely customer retention strategy can keep customers going, and this is the best way to keep customers going. Creating a forecasting mechanism to monitor customer falls is an important step in business development and has become a popular topic in the last ten years. In general, researchers use information about past customer behavior from a database, such as demographics, transaction records, and interactions. All of this information has been transformed into quantitative variables and is used to create forecasting models to predict the likelihood of future customer falls. Retaining existing customers is one of the most important strategies to increase the profitability of companies. Long-term customers have high and stable spend power and can create word-of-mouth advertising. They can even attract new customers on their own. Therefore, loyal customers are considered the most valuable asset of companies. In a mature market, business is largely derived from existing customers, and retaining existing customers can create more value than attracting customers. Previous studies have shown the importance of retaining existing customers. New customers do not have immediate revenue benefits. The success rate for retaining existing customers is 60%, which is twice the success rate of attracting new customers. The cost of attracting

new customers can be up to twelve times higher than the cost of keeping existing customers. Reducing the customer drop rate to 5% can increase profits by 25%. Also, studies by Quilles and Guckie in 2005 show that if businesses respond to small changes in customer behavior, they can generate 10 times more value by stopping customer loss (Chen, 2016).

Nowadays, as technology evolves, changes in sales patterns, and competitive markets emerge, markets face surplus supply, which makes the customer the real market leader. Therefore, businesses should move from focusing on products to focusing on their customers and managing their behavior to prevent them from leaving and maximizing profit and revenue for their organizations. Customer Relationship Management is the process of rigorously managing customer information and managing it appropriately to maximize their loyalty. The main purpose of customer relationship management is to create customer satisfaction and happiness in order to prevent them from turning around because customer loss is a serious risk that threatens all organizations and a small change in customer retention level leads to significant changes in stock and Profits are organized. Customer service is the main and most important issue for businesses, especially shopping malls. On the other hand, attracting new customers is costly, and sometimes five times the cost of retaining existing customers. However, many business organizations are losing their valuable customers due to the competitive market. This is known as customer churn. Customer churn is a marketing term in which the customer is interested in another organization or product which leads to reduced sales revenue and increased cost of attracting customers. Various studies have been conducted to predict consumer decline and their performance, all of which indicate the importance of this issue. According to marketing experts, many companies lose an average of 25 percent of their customers annually. Occasionally, customer drop statistics have been reported as high as 36%. On the other hand, a 5% drop in customer loss will result in a 25 to 85% increase in revenue. These statistics illustrate the role of "customer churn management" in ensuring the survival of the organization. Accordingly, customer loss and its management is an important issue for different industries (Khodabandelou & Zivari Rahman, 2017).

If companies do not specifically identify falling customers and loyal customers, they will incur huge losses because they create incentives for loyal customers rather than falling customers and waste organizational resources; And not only does the downstream customer not be persuaded to stay, but the likelihood of their turnaround is also increased. Therefore, companies need to design models that identify future customers at risk of falling. Therefore, today business executives are trying to understand the importance of predicting the role of customer failure in achieving success (Khodabandelou & Zivari Rahman, 2017).

Insurance plays an important and critical role in the specific economic growth and development of developing countries. Considering the location and the factors affecting it as well as the impact of the various policies adopted in this sector will have significant effects on the economy of the country (Hassanzadeh et al., 2010).

Achieving economic development requires tools that are critical to the dynamism, evolution, and development of financial markets, including the money market, capital, and the insurance industry. Insurance companies, by the nature of their operations, are important channels of savings and therefore important and central financial institutions that assist in the preparation and allocation of capital and in helping to finance the economic units. Providing social communities with a secure environment in the process of life and economic and social activities underpins socio-economic development. The insurance industry provides the conditions necessary for population mobility in the economic and social fields by reducing the costs associated with the risks associated with aging and economic and non-economic activities, thereby stimulating employment, investment and growth, and investment and growth. It becomes economical. In addition, the insurance industry also gains the ability to finance firms and economic activities through the production of premium premiums. However, the uncertainty of the business environment will be inefficiently remedied in the absence of obstacles to the development and prosperity of the insurance industry. Accordingly, it is necessary to eliminate insurance industry failures (Karimian et al., 2015).

On the other hand, maintaining existing insurers and encouraging them to buy more insurance is one of

the most important concerns of insurance companies. Turning insurers from one insurer to another has a major impact on the financial viability of insurance companies. In this regard, the Hobby Insurance Company needs to identify the factors affecting the return of insurers, in addition to trying to address those deficiencies, so that they can address their current market development and attract new insurers.

In the recent years, the insurance industry in Iran has been competitive with various companies in the market in terms of profitability, portfolio composition, loss rate, penetration rate, retention and satisfaction of insurers and market share. Maintaining insurers has become a major problem for most insurance companies. If we only look at the statistics of each of the top representatives of the insurance sales network, we will find that in most cases, the insurers have left the insurance company after a year and have been attracted to competing insurance companies. As in the Iranian insurance industry, as in many other industries, the cost of searching for new insurers is much more than the cost of maintaining existing insurers, it is essential to analyze the causes of insurers' downfall and churn in this industry. Pay and design models to predict how many insurers will exit the portfolio in the coming years. In many cases, falling or turning over even an insurer can cause a sharp drop in the portfolio of an insurance company or insurance agent. Because some insurers do not just buy insurance policies from insurance companies, they also buy several policies called so-called portfolio aggregation. Understanding why insurers in the insurance industry switch from one insurer to another insurer is a crucial issue for companies active in the insurance industry. Because the identification of these factors can help predict and collapse forecasts through a variety of statistical and mathematical models, this will allow insurers to prepare themselves for this dilemma. Initial surveys in the Iranian insurance industry show that insurers turn away from their insurers for a number of reasons and are attracted by competing insurance companies, the main reasons being: failure to receive damages on time, high rates Premiums, inappropriate behavior of insurance companies, unhealthy activities of competing insurance companies, one of which is the rate breakdown, avoidance of insurance companies by insurance companies, failure of insurance companies to provide after sales insurance services, etc. Therefore, according to the aforementioned, the main

issue in the Iranian insurance industry is the high rate of loss and churn of the insurers from the portfolio of the insurer companies, which causes these companies in addition to losing their financial strength. It also reduces the risk of accepting these companies. So the main question in this thesis is what are the most important factors influencing the downfall or churn of insurers in the Iranian insurance industry? And can the model and techniques of statistical and mathematical models be designed to predict insurers' behavior or turn over while classifying insurers in the Iranian insurance industry?

Main Research Issue:

The main issue in the Iranian insurance industry is the high rate of insurer churn from the portfolio of insurers.

So the main question in this thesis is what are the most important factors influencing the churn of insurers in the Iranian insurance industry?

And can the model and techniques of statistical and mathematical models be designed to illustrate the analytical model of divergence?

2. Background of research

In our country, the insurance industry, as one of the most important components of the service market, plays an important role in economic development and growth. According to a recent report by the Insurance Institute, insurance penetration rates in Iran have increased and people are turning to buying insurance more than ever before. This, in turn, has caused insurance companies to face new problems, including retaining current customers. To that end, insurers are looking for solutions to manage customer relationship management, maximize customer life value, and maintain their customers they have turned away. Because customer churn from insurance is part of the cost of losing customers, it is likely to benefit competing companies and recounting the unsatisfied customer interaction experience can diminish the effectiveness of marketing strategies and attract customers. On the other hand, the importance of preventing the issue of turnaround in the insurance industry is increasing, as it is a very difficult and costly process to attract new customers to most insurance fields. Because in many cases, the premium paid by insurers will not necessarily result in a loss, and the insurer may never receive monies for their

premiums. In fact, the insurance premium paid by the insurers in many insurance fields is contingent upon the occurrence of the accident and the need to buy many insurance products from the consumers and thus to find a new customer for the company. Insurance is created much harder and later than other goods and services. Therefore, retaining current customers is very important for insurance companies and requires a comprehensive research (Hossein Khani, Hosseini Motlagh, & Khakzar Bafroui, 2014).

Nowadays, customers in the insurance industry can easily compare the insurance and coverage of insurance companies using the Internet. As a result, today the insurance industry has become more transparent than ever before and has become a highly competitive marketplace in which insurance companies have to compete to maintain and expand their client base and market position. Therefore, customer retention becomes more important every day. Rich Held and Sasser (1990) are co-founders of the "zero defect" theory, which aims to protect customers in order to avoid loss of

profits. They believe that companies can increase their profits by almost 100% only by retaining 5% of their customers. Other research has shown that the cost of attracting new customers is more expensive than retaining existing customers. Torkzadeh, Chang, and Hansen (2006) showed that this cost can be up to 12 times more expensive, while Ng and Liu (2000) proved that this cost is 3 to 5 times higher. As research has shown that attracting new customers is far more costly than retaining existing customers, customer churn has become an interesting topic in all businesses. Customer Relationship Management can be recognized as an important part of customer relationship management as they strive to build long-term relationships and maximize the value of their customer base. Customer retention is a major concern for customer relationship management. Customer churn forecasting is an important element of customer behavior. A significant increase in profits can be achieved by making small changes in customer retention management (Siemes, 2016).

Customer relationship management involves the relationship between the customer and the organization. In the twentieth century, academics and managers have become more interested in communicating with customers. This topic is very broad and covers from basic contact information to

marketing strategies. Four important elements of customer relationship are: customer identification, customer attraction, customer development and customer retention. An example of customer identification is customer segmentation, for example, by gender. Customer recruitment is related to marketing issues, such as direct marketing. An important element of customer development is up-selling Sales Technique. Finally, customer retention is a key concern of customer relationship management, and is associated with loyalty and complaint management programs. Customer satisfaction, which points to differences in customer expectations and satisfaction perceptions, is a key element in keeping customers engaged. Customer retention means going beyond customer expectations so that they remain loyal to the brand. When customer expectations are not met, the opposite effect occurs, the same as customer churn. Customer churn means losing existing customers and turning them into competitors. To manage customer churn, one must first identify the customer churn and then persuade them to stay (Huigevoort, 2015).

Customer Relationship Prediction is an important area of research known as part of customer relationship management because for various reasons retaining and satisfying existing customers is much more beneficial than attracting new customers: (1) Successful companies have long-term customer relationships. Instead of looking for new and less profitable customers, with a high attrition rate of their features, focus on the needs of their existing customers; (2) customers leaving the company can influence other customers in their social networks to do the same; (3) long-term customers have beneficial effects on both profit and cost aspects. . In terms of profits, long-term customers tend to buy more and can influence others with positive word-of-mouth advertising about the company. From a cost perspective, the costs of providing them services are lower, as the company now has more information about them and recognizes the needs of its customers, leading to lower service costs; (4) Competitive marketing measures have less impact on long-term customers; (5) Loss of customers increases the need and cost of attracting new customers and reduces non-sales profits and lost opportunities to increase sales. These effects make existing customer maintenance costs much lower than new customer new costs.

Consequently, predicting customer falls and churns in customer retention strategy is essential. In 2018, De Caigny and co-workers stated that in a time when markets are increasingly saturated and competition between companies has intensified, customer escape has become a major problem. Therefore, it is very clear to companies and managers that past customer information, which is used to build models, has become one of the most important factors in confronting customer churn in current customer databases. Searching for and identifying customers who are highly inclined to leave the company or, in other words, predicting customer churn, is essential as part of a customer retention strategy aimed at reducing customer churn. More precisely, in customer churn forecasting, a scoring model enables estimating the probability of future churn for each customer base, based on past customer records. In practice, these points can be used to select target customers in a customer retention campaign (De Caigny, Coussement, & W. De Bock, 2018).

Zhu et al., in their 2017 study, also highlighted the importance of the classification problem in predicting customer churn. They see customer churn forecasting as an important issue in customer relationship management; in today's highly competitive business environment, customers are easily competitors. Studies show that the cost of attracting a new customer is 5 to 6 times the cost of maintaining an existing customer. At the same time, long-term customers are less sensitive to competitors' marketing activities and thus have higher benefits for the company. Therefore, companies are shifting their focus from attracting new customers to retaining their current core customers. Proper customer loss forecasting helps companies target the right customers in order to retain them, which has become a key marketing priority. As a result, today we see numerous applications of data mining techniques in this field (Zhu, Baesens, & K.L.M. Vanden Broucke, 2017).

Fu et al., in their 2017 study of customer retention rate in the online gaming industry, identified player (customer)¹ retention rates as one of the key performance indicators (KPI) in the industry, suggesting that recruiting new players could be much more expensive. To keep the players available. On the other hand, distracted players can have negative effects through unpleasant verbal reports and this can lead to the loss of more potential customers.

Analyzing and managing effective customer retention can help identify players' behaviors and identify various factors that influence players' decline, from personal commitment, competing products and services, or changing interests to social impacts. By recognizing these factors, game developers can run customized customer retention campaigns tailored to different player segments (Fu, Chen, Shi, Bose, & Cai, 2017).

Maria Skarzdottir and her colleagues in 2017 conducted a study of social network analysis to predict customer churn in the telecommunications industry and stated that these companies have a competitive outlook, where customers face multiple suppliers and are easily accessible. They can change service providers in times of discontent, creating a difficult environment that requires high growth for growth. In addition, studies have shown that customer churn can be much more expensive for companies than customer retention. Therefore, a very common strategy for identifying customers is most likely to turn to them and encourage them to persuade them to use the services of those companies. Loyal customers since they are likely to buy more goods and expressing their satisfaction more verbally, and thus indirectly attracting more customers, are more profitable for companies. In the telecommunications industry there is also a great deal of data being collected from customers, such as demographics, financial information, consumption behavior and call records, which provide an opportunity to apply this information with the help of analytical techniques (Oskarsdottir, et al., 2017).

Streepling and his colleagues in 2017 stated that attracting new customers to saturated markets would be very challenging and would be five to six times the cost of preventing existing customers from falling (Stripling, Vanden Broucke, Antonio, Baesens, & Snoeck, 2017) (Zhu, Baesens, & KLM Vanden Broucke, 2017) (Huigevoort, 2015). Detecting potential churns among millions of customers is a difficult task. For this reason, companies are relying on forecasting models to stay competitive in the industry. Consequently, customer churn forecasting and classification techniques are of great interest. The researchers note that most of the research does not address the core business need, which is to maximize profits. So, in their view, correctly identifying potential diversions is a challenge; and another

challenge is identifying customers who are more profitable for the industry than others. Therefore, an ideal turnaround forecasting model, in their view, is capable of effectively identifying potential turnarounds while at the same time looking at profitability as a priority (Stripling, Vanden Broucke, Antonio, Baesens, & Snoeck, 2017).

Ludicrous surveys by Luo and Ziyori Rahman have shown that most companies lose an average of 25 percent of their customers each year, according to expert research. Sometimes, customer churn statistics of up to 36% are also reported. On the other hand, a decrease in customer churn of up to 5% can lead to a 25 to 85% increase in revenue. These statistics illustrate the importance of customer centric management in ensuring the survival of the organization. Likewise, customer management and management is a very important issue in different industries. If companies fail to differentiate between non-returning customers and non-returning customers, they will suffer enormous losses because encouraging non-returning customers instead of turning away customers will waste organizational resources, and not only encourage true returning customers. They will not continue to use the company's products or services, but will also be more likely to turn over. Therefore, companies should use models that accurately identify potential customers that may fall in the future. Therefore, today most managers try to understand the important role of predicting customer turnaround in success. From a customer relationship management perspective, managers need to correctly identify the reasons and timing of customer churn and apply customer retention strategies in the right time to know how much they are able to control. For this reason, in today's competitive market environment and with shortening the business life cycle, the use of business intelligence (BI) for better and better decision making and customer return management is increasing (Khodabandelou & Zivari Rahman, 2017).

Su Chen also emphasizes the importance of existing customers in his research. New customers do not have fast profitability. The success rate in retaining new customers is 60%, twice the success rate of new customers. The cost of attracting new customers can be up to 12 times higher than the cost of maintaining customers. Reducing the customer churn rate to 5% can bring more than 25% profitability for the company. Cole and Gookie also showed in their

research that businesses can generate more than ten times the value if they respond to small changes in customer behavior (Chen, 2016).

3. Research Methodology

3.1. Qualitative research methods

Due to the nature of this research, it can be divided into two parts. In the qualitative section, the researcher identifies and extracts key indicators of customer churn by conducting interviews with insurance industry managers, branch chiefs, technical and loss assistants, senior representatives and insurers.

3.1.1. Population and Statistical Sample in Qualitative Research

The statistical population includes all managers of the insurance industry, chief executives, deputies, senior representatives and top insurers and all clients of the insurance industry. Since, according to the report of the Central Planning and Development Bureau of the Central Insurance of the Islamic Republic of Iran, the Iranian insurance company has about 40% of the share of insurance companies from the market insurance premium (Central Insurance Planning and Development of the Islamic Republic of Iran, 2018).), Can alone represent the industry, interviewed by insurance industry executives, branch heads, technical and loss assistants, senior representatives and insurers of Iran Insurance Company. The community of respondents and interviewees can be a mix of policyholders, senior executives and experts in the Iranian insurance industry. According to the population, the sample of the respondents will be classified and targeted.

3.2. A little research method

Then, the researcher will use a combination of statistical techniques and statistical techniques to design a hybrid model to predict insurers' churn by categorizing them.

In this section, a hybrid model will be designed using statistical techniques and techniques to help forecasters categorize, collapse or reverse them. Numerous machine learning algorithms are commonly used to predict loss in different environments. The most commonly used are logistic regression, decision trees, support vector machines (SVM) and neural networks (Milosevic, Zivic, & Andjelkovic, 2017).

3.2.1. The population and statistical sample in quantitative research

The data of this research will be obtained from Iran Insurance Company. In this study, data on 120 insurance companies in different industries were examined.

4. Research Results

4.1. Summarize, summarize, and extract indicators from the interview process

After reviewing and documenting the data obtained from the interview and considering the decision making rules for these indicators, which are the same as being repeated by the interviewees, Table 1 shows the summary and extraction of the interview indicators.

Index	Fifth interviewee	Second interviewee	Third interviewee	Fourth interviewee	Fifth interviewee	Sixth interviewee	Seventh interviewee	Eighth interviewee	Ninth interviewee	Tenth interviewee	Eleventh interviewee	Twelfth interviewee	Thirteenth interviewee	Fourteenth interviewee	Fifteenth interviewee	Total
Premium Amount	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	13
Level of dissatisfaction				✓	✓				✓						✓	4
Insurance Number	✓	✓	✓	✓	✓		✓		✓		✓		✓		✓	10
Discount rate		✓			✓		✓	✓	✓	✓		✓				7
Number of complaints		✓		✓											✓	3
Dating an insurer						✓	✓	✓								3
Availability			✓						✓		✓	✓				4
The number of installments		✓	✓	✓	✓	✓	✓			✓				✓	✓	9
Speed of handling complaints			✓	✓		✓	✓		✓				✓	✓		7
Speed of issuing insurance policy							✓	✓	✓						✓	4
How to treat staff	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓				10
Amount of damage	✓		✓	✓	✓	✓		✓	✓		✓		✓	✓	✓	11
Cover / Closing Number		✓			✓			✓								3
Insurers Advertising								✓							✓	2
Competitors strategy		✓	✓		✓	✓	✓		✓	✓		✓				8
geographical location					✓			✓		✓						3
The nature of the insurer	✓	✓		✓		✓	✓									5
Extra service	✓															1
The insurer's integrity	✓		✓				✓									3
Fulfillment of promises	✓						✓						✓			3
Frequency of damages	✓	✓			✓			✓			✓		✓	✓	✓	8
Bad economic conditions		✓	✓				✓		✓							4
Speed of delivery of insurance policy			✓					✓								2
How to get Premium		✓	✓			✓	✓			✓	✓	✓		✓		8
Lack of liquidity		✓				✓			✓	✓						4
Type of insurance policy	✓	✓		✓	✓		✓	✓		✓					✓	8
Value of insurance		✓													✓	2
Bidding		✓		✓		✓										3
Dating style			✓													1
Number of visits				✓											✓	2

Index	Fifth interviewee	Second interviewee	Third interviewee	Fourth interviewee	Fifth interviewee	Sixth interviewee	Seventh interviewee	Eighth interviewee	Ninth interviewee	Tenth interviewee	Eleventh interviewee	Twelfth interviewee	Thirteenth interviewee	Fourteenth interviewee	Fifteenth interviewee	Total
the quality of service				✓						✓	✓		✓	✓		5
Advertising method					✓							✓				2
Year of Cooperation / Extension		✓	✓	✓	✓	✓		✓		✓				✓	✓	9
Number of insurer personnel					✓	✓										2
Number of branches / agencies						✓			✓	✓						3
The physical aspect of the workplace							✓			✓						2
Speed of dealing with damages	✓						✓					✓		✓	✓	5
Percentage franchise		✓													✓	2
Insurer dating				✓											✓	2
How to deal with marketers							✓				✓	✓				3
The power of risk taking									✓							1
Insurer or representative credit										✓	✓	✓				3
after sales service											✓					1
Public Satisfaction											✓					1
Phantasm											✓					1
Notification method												✓				1
Notification time												✓				1
Non-transparent contracts														✓		1

4.2. Comparison of paired indices with AHP technique

In order to examine the indices more accurately and determine the weights of each, we sought to validate the selected indices again with the help of expert opinions. For pairwise comparisons and to determine the importance or weight of each of the indicators, after designing the following HPP questionnaire, the questionnaire was distributed among 20 other insurance industry experts, apart from the 15 individuals interviewed. And the result is shown in Chart 1.

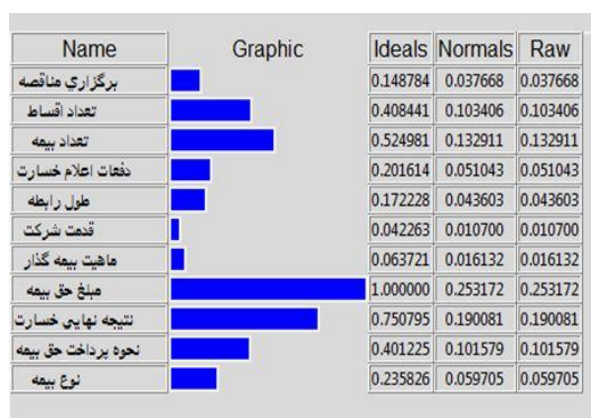


Figure 1: Weights of factors affecting turnaround

4.3. Finalize the indicators

To select the final indicators, we set out the following decision rules, and given these conditions, we were able to select the main indicators that can be used to predict the churn of corporate insurers:

- Investigate the factors identified and extracted from the research background

- Examine and extract indicators from interviews with experts
- Specify the number of duplicates of indicators in the research background
- Specify the number of duplicate indicators in the interviews
- Set number 8 as the basis of index selection (at least 8 repetitions in background and interview)
- Consider quantitative data on selected indicators
- Results of pairwise comparison of indices using HP technique

In the light of the above decision-making rules, the final seven indicators were:

- Premium amount
- Insurance Number
- The number of premium installments
- Frequency of damages
- The length of the relationship or the number of times you renew the policy
- Final result of damage (amount of damage)
- How to get / pay a premium
- Type of insurance policy

4.4. Result of Neural Network Model

4.4.1. Neural Network Structure

Following the implementation of the relevant codes, the results are shown in Figure 1.

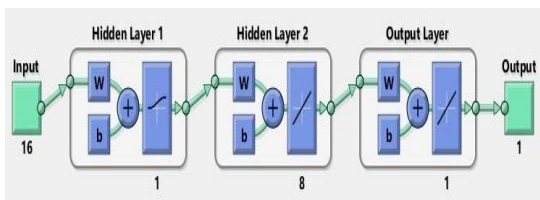


Figure 1: Neural network image related to model design in Matlab software

4.4.2. The Neural Network Training Process

The neural network training process is shown in Figure 2.

The number of repeats (APACs) is set at 12.

4.4.3. Performance of perceptron artificial neural network in optimal condition

The optimal state occurred in Apac 9 and the error in this case is 0.15085. In fact, point 0.15058 is the best case with the least error (Fig. 3).

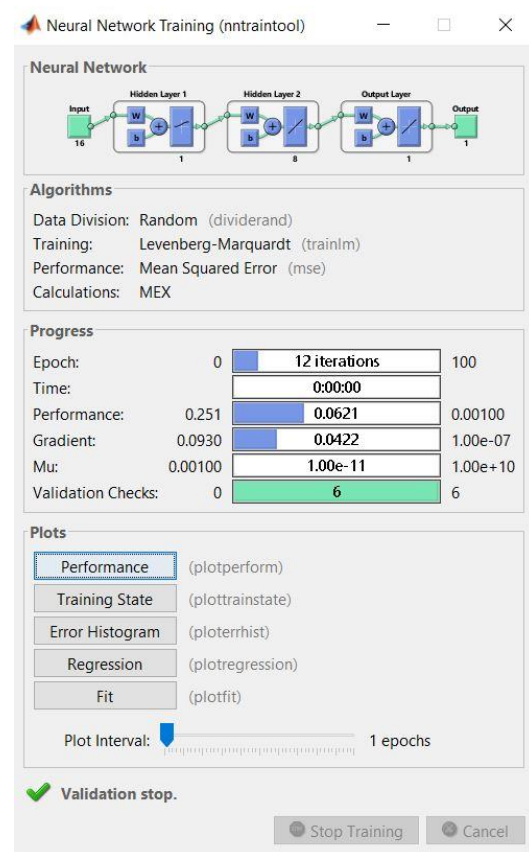


Figure 2: The neural network training process

4.4.4. Model and amount of regression derived from neural network in prediction

The model and the regression value of the predicted neural network are finally $R = 0.74561$ in Figure 4.

The value of regression obtained from the execution of the perceptron neural network codes with said characteristics is $R = 0.74561$. This covers over 50%, and is a very good number, meaning that the model's prediction was significantly acceptable. The resulting analytical model is illustrated in Figure 2

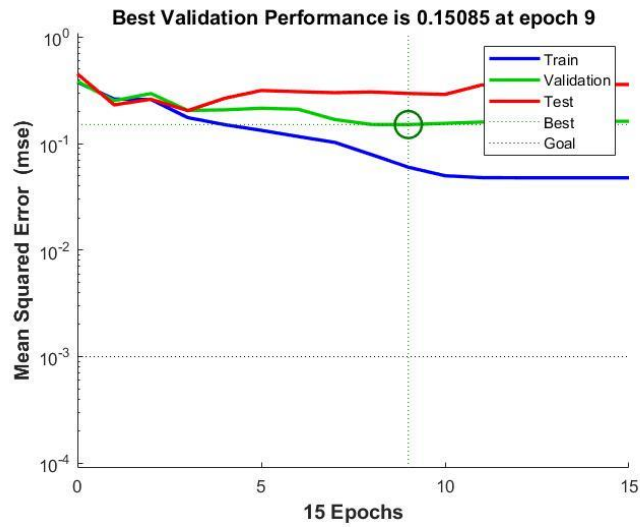
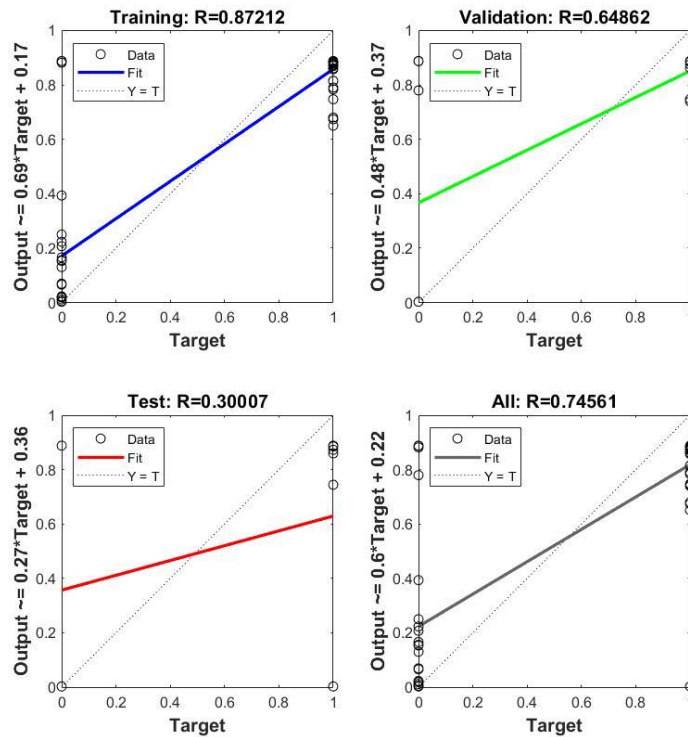
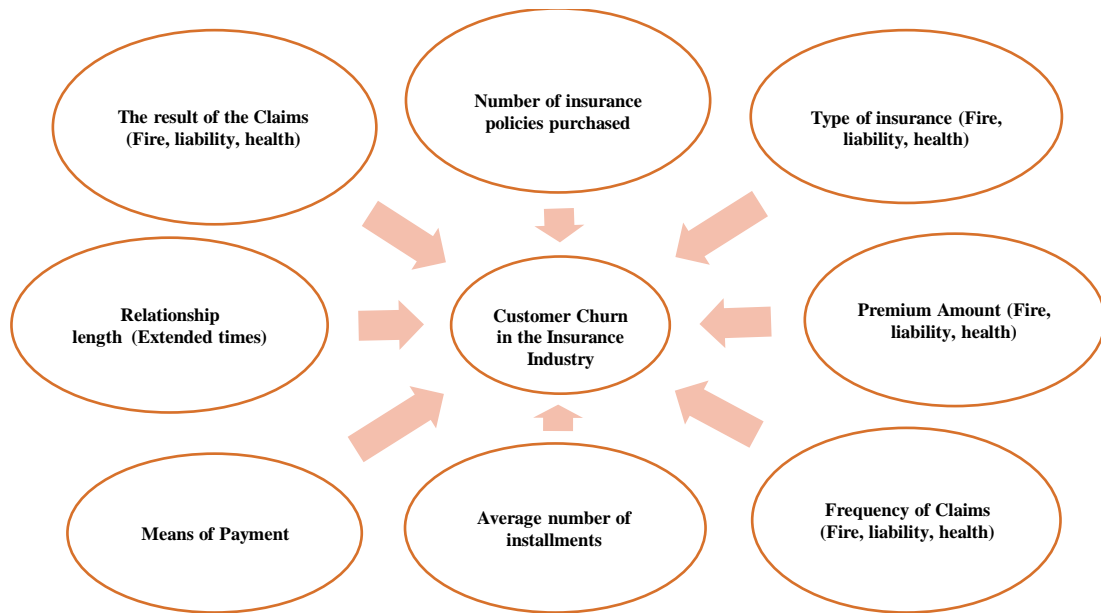


Figure 3: Performance of perceptron artificial neural network in optimal condition



$R = 0.74561$

Figure 4: Regression model



Graph 2: Analytical Research Model

The research question of this study is related to identifying the factors affecting the churn in organizational insurers. After studying the research literature, reviewing and screening the background results and conducting interviews with experts in insurance industry and finally conducting a survey, 8 main indicators are identified. These indicators are:

- 1) Number of insurance policies that an insurer buys from the insurance company;
- 2) The type of insurance policies purchased (in this study fire insurance, liability and health insurance are examined);
- 3) The amount of insurance premiums (in this study fire insurance, liability and health insurance are examined);
- 4) The number of claims declared (in this study fire insurance, liability and health insurance are examined);
- 5) The average number of installments of the insurance policy, (in this study this number is herewith obtained: the total number of installments divided by the number of types of insurance policies purchased);
- 6) How to pay the premium (in this study, i.e. cash payment or payment by check);

- 7) The length of the relationship with the insurer, which refers to the number of times the insurer has renewed the insurance policy with the insurer;
- 8) 8. The final result of the claim cases, which means the general satisfaction of the insurer with the claim of loss and the amount that he receives for loss.

These eight factors influencing the churn of corporate insurers are analyzed as final indicators, and after collecting real data from a sample of 120 corporate insurers and the application of neural network techniques (calculating $R = 0.73$), it has been verified that the identified factors can best explain the reason for the churn of corporate insurers.

Based on the above and the outputs of the model, the variables can be illustrated in the order of effect in Table 1.

Table 1: Order of effectiveness of model variables

Row	Description of variables
1	Health Insurance Premium
2	Type of insurance (Health Insurance)
3	The result of Health Insurance Claims
4	Frequency of claims in Health Insurance
5	Average number of installments
6	Number of insurance policies purchased
7	Type of insurance (fire)
8	Fire Insurance Premium
9	The result of Liability Claim
10	Type of insurance (Liability)
11	Means of Payment
12	Relationship Length (Extended Frequency)
13	Frequently of Claims in Liability Insurance
14	Frequency of Claims in Fire Insurance
15	The result of Fire Insurance Claims
16	Liability Insurance Premium

5. Practical suggestions

- 1) Since the health policy is the most influential and the cause organizational insurer to churn, it is recommended that its claim files be collected at short intervals and then paid within 15 days.
- 2) Since the average index of the number of insurance installments has had the most impact on corporate insurers, it is recommended that insurers consider the number of insurance installments at least 10 months.
- 3) The number or variety of insurance policies purchased by the insurance insurer during one year has also a great impact on the insurers churn. Thus, the variety of insurance policies purchased can reduce the insurers churn. Because dissatisfaction in the field of health insurance can be compensated by satisfaction in other insurance policies.
- 4) Means of Payment also has a moderate impact on corporate insurer churn. Since most insurers refuse to pay by check, it is advisable, to receive premiums in cash at specified installment dates and to avoid pressing for a check as far as possible. On the other hand, practical experience has shown that insurers who pay voluntarily by checks are good-natured insurers who intend to stay in the portfolio of the insurer's portfolio and continue to cooperate.

6. Suggestions for future research

- In order to more accurately model the factors affecting and predicting organizational insurer churn, it is recommended to consider other factors not included in this study, such as: how employees behave, the speed of handling complaints, and strategies, competitors, quality of service and speed of dealing with claims.
- It is suggested to investigate the causal relationships between the indicators identified in a separate study.

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Note

¹. The players in the online gaming industry are the same customers.