Int. J. Nonlinear Anal. Appl. 14 (2023) 11, 169–180
ISSN: 2008-6822 (electronic)
http://dx.doi.org/10.22075/ijnaa.2022.27066.3488

The role of the characteristics of the auditing firm and the auditing firm in explaining the risk at the level of the accounts in key audit topics

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(Communicated by Javad Vahidi)

Abstract

The purpose of this study is to identify the factors that explain the risk at the level of accounts in key audit topics, especially the characteristics of the auditor and the client. In this regard, first the most important indicators and effective factors were identified by studying the theoretical foundations and then based on these indicators, interviews were conducted with experts and according to the results of these interviews, codes were extracted. Then, based on the mentioned codes and extracting keywords and key answers, using the information of companies and with a neural network approach and factor analysis, a framework was presented. For this purpose, the opinions of accounting experts and ten-year information of companies listed on the Tehran Stock Exchange were used. The results showed that the audit fee, tenure of the auditing firm, company life, institutional ownership, major ownership, managerial ownership, independence of the audit committee, presence of the internal audit unit, political relations, CEO power and financial knowledge of the audit committee Reducing the number and importance of Rials are the risk points at the level of accounts. In addition, it was found that the presence of the audit organization, change of audit firm, audit firm specialization, company size, financial leverage, cash balance, board independence, accounts receivable, quality of internal audit unit, management uncertainty and audit firm rating increased The number and importance of risk points are at the level of accounts.

Keywords: Audit risk at the level of accounts, Auditor profile, Client profile
2020 MSC: 91B05, 91G15

1 Introduction

Audit risk means the risk that the auditor will express an unprofessional opinion about the financial statements containing significant errors or misstatements. Significant misstatements may be the result of mistakes or fraud. The components of audit risk include inherent risk, control risk and detection risk.

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Received: May 2022 *Accepted:* July 2022

According to the diversity and distribution of information in accounting and financial matters and in order to select and provide the best information needed by the user in the decision-making process, a system is needed that has intelligent properties and can also predict the required information. In the field of accounting and finance, there is a variety of information that is not important for all users, and to select and provide the best information required by each user, there is a need for intelligent systems that are able to predict the required information. The purpose of predicting is to reduce the risk in a decision. In order to reduce the error in each prediction, the need for further information on a related subject is required. Predictions based on available information will be reliable provided that all aspects of the issue are addressed. Nowadays, the use of artificial neural networks in line with predictions that have higher reliability is very important. Artificial neural networks are part of intelligent systems that, by processing experimental data, transfer the knowledge or law behind the data to the network structure, hence they are called intelligent systems. The advantages of using intelligent systems in accounting include providing better services to the customer, reducing the time to perform and complete tasks, increasing production, and making appropriate decisions and predictions. Some of the backgrounds of artificial neural networks can be traced back to the early 20th and late 19th centuries. Neural networks are data processing techniques based on biological neural systems such as the brain. The fundamental concept of neural networks is the structure of the information processing system, which consists of a large number of processing units (neurons) associated with networks. A biological nerve cell, or neuron, is the building block of the human nervous system. The major components of a neuron are the body of the cell in which the nucleus is located and the other parts of the cell from which it originates, the axon nucleus, which is responsible for transmitting information from the nerve cell, and the dendrites, whose function is to transmit data from other cells to the nerve cell. Over the years, neural networks have emerged as a technology that can identify and model data patterns, which is rarely possible with statistical methods.

The focus of the most recent literature on systematic risk prediction was based on the use of accounting variables along with the use of statistical techniques, particularly regression. On the one hand, the results of research focusing on accounting variables are somewhat contradictory such as research conducted by some researchers which are presented in the research background section. On the other hand, some studies done in recent decades showed that different statistical methods for estimating systematic risk in the Tehran Stock Exchange including time series regression and various econometric methods such as Ordinary Least Squares (OLS), Maximum Likelihood (ML), Generalized Method of Moments (GMM), Least Absolute Error Value, and Nonparametric Regression have relatively large differences for systematic risk estimation.

By studying the audit situations, it can be argued that the main role of these care and control processes is a social role. These processes provide useful services in the community for individuals and organizations who need reassurance and reliability, as there are many doubts, unreliability, and uncertainty about the status of the phenomena in the real world. Not only is such reassurance provided by review and verification performance, but it also creates a sense of security by preventing mistakes and fraud or identifying factors that could harm the person or organization interested in the phenomenon [7].

This is only a small part of the benefits of auditing. Scholars have also considered economic, psychological, political, etc. roles for auditing. Independent auditors have the responsibility to review the Company's financial statements and to comment fairly on the Company's financial position and all other significant aspects on the date specified in those statements. Thus, auditors act as professional gatekeepers in the financial reporting process and play an essential role in the effective operation of capital markets around the world [5]. Considering the definition and nature of audit key points, it is argued that, in the present study, the auditor and the audit client specifications are among the most important factors determining the number and type of key audit points.

The usefulness of accounting information in assessing the firms' market risk in Iran examined in some studies. The results of these studies showed that systematic risk has a significant relationship with the ratio of net profit to equity, but it has no significant relationship with the ratio of current assets to current liabilities, sales to equity and total assets.

Other results indicate that the probability of fraud is increased by increasing auditor tenure and decreasing the quality of the audit firms. The results of examining the relationship between the size of the audit firm and the likelihood of fraud did not show a significant relationship between these two variables. Also, there is a significant negative relationship between the size of the audit firm, the auditor's tenure, the auditor's expert knowledge in the industry, the auditing firm's expertise in the industry with the auditor tenure longevity and the control status and audit quality with fraud in financial statements. The results generally indicate that the higher the firms and the quality of the audit, the fewer companies commit fraud.

2 Artificial Neural Networks

Artificial neural networks are analytical and teachable tools that try to mimic the patterns of information processing in the human brain. These networks are dynamic systems consisting of parallel processing units or neurons that have an inner desire to maintain experimental knowledge and make it available for use. The teachability of neural networks is of particular importance. As learning systems, these networks are able to learn from the past, experience and environment and improve their behavior during each learning. Improvement of network learning over time is measured on the basis of a criterion that models the purpose of the learning system.

Other important advantages of artificial neural networks are their nonlinearity and adaptability; whereas most traditional techniques, such as regression, don't have such advantages. Studies carried out in this field like Nielson and Hornik Cybenco show that multilayer perceptron (MLP) networks containing a hidden layer with Sigmoid transfer functions in the middle layer and linear transfer functions in the output layer with the ability to interact with the output layer are capable of approximation all of the functions according to each degree provided that there are enough in the hidden layer of the neuron; however, there are some limitations in this regard: First, the desired functions must be continuous. Second, the number of middle-layer neurons cannot be selected indefinitely.

In the discussion of the practical implementation of neural networks, the most important problem in determining the structure of the network is that there are no proven rules for determining the optimal structure of the network. Almost this structure, i.e. the number of middle layers, the number of neurons in the middle layers, the number of cycles of repetition of learning, etc. is determined experimentally. Since it is difficult to determine an effective linear information model to predict the level of earnings management, and there is no linear relationship between earnings management and the variables in question, neural networks, therefore, can be the best tools to predict the level of earnings management.

3 Material and Methods

The present study is applied research. The network used in this study is a multilayer perceptron neural network that has been trained with the error backpropagation algorithm. The feedforward neural networks have also been used to show how the output of neurons is connected to other neurons. In a feedforward neural network, the current of signals flows from the input layer to the first middle layer and from the first middle layer to the next middle layers and finally to the output layer. Due to the fact that the input and output of the network are known, the learning method of the learning network is supervised or supervised. In supervised learning or with the input and output supervisor, it is known that the purpose of the network is to discover the relationship between input and output. Due to the fact that the input and output of the network are known, the learning method of the learning network is supervised. In supervised learning, input and output are specified and the goal of the network is to discover the relationship between input and output.

The statistical population of this study consists of two groups. The first group are experts in the field of accounting, both at the university and in the accounting profession. In this regard, it was conditioned that the selected persons have at least the following characteristics:

1. PHD degree in Accounting
2. A track record of teaching auditing courses in postgraduate courses
3. A track record of writing or translating a book or article in the field of auditing
4. Professional activity in jobs related to auditing
5. No history of scientific or professional misconduct

According to the above-mentioned characteristics and the approach of the present study, which is to identify experts, 14 professional and university experts were identified and questioned.

The second group are all companies listed on Tehran Stock Exchange from 2009 to 2018.

Using the neural network approach and factor analysis, the information of these companies is used to prepare the final framework and model of the analysis. The reason for choosing these ten years is to use the maximum available data and achieve a comprehensive result. The sample was selected through the systematic elimination method. The information of these companies is used to prepare the final framework and model of the analysis using the neural network approach and factor analysis. The reason for choosing these ten years is to use the maximum available data and achieve a comprehensive result. The sample was selected through the method of systematic removal from the statistical population. Thus, the sample includes all companies in the statistical population that have the following criteria:

1. Be active in the stock market during the research period.
2. Do not change the financial period during the research period.
3. Not be among the companies active in the field of financial activities, including investment companies, banks, insurance companies and financial institutions. Because these institutions are different in nature and their main income is from investment and depends on the activities of other companies, so they are totally different from other companies and therefore, are removed from the studying samples.
4. The data required for the research variables, from 2009 to 2018, should be available.
5. Their financial period should be by 12/29 of each year so that the data can be used together and, if necessary, as a panel.

According to the above-mentioned conditions, 122 companies were surveyed.

4 Findings

In the present study, the views and opinions of professional and university accounting experts as well as data from accepted companies in the Tehran Stock Exchange were used in order to identify the risk explanatory factors at the level of the business unit in key audit issues with an emphasis on the auditor's and the client's specifications. In this regard, extreme interviews, content analysis of received responses and quantitative analysis based on neural networks and factor analysis were used, and subsequently, quantitative analysis was used to obtain an integrated model. The results and analysis are presented in the followings.

In this study, after p several studies, 14 semi-structured interviews were performed. Open-ended questions were used in these interviews. The use of semi-structured interviews leads to flexibility in designing, following up and sequencing questions. The use of semi-structured interviews brings the benefits of two-way communication, achieves in-depth explanations to answer challenging and fundamental questions, and solves the problem of low questionnaire response rates. Semi-structured interviews, therefore, provide in-depth qualitative data collection. All interviews were conducted by a researcher over a period of four months (in the autumn and winter of 2018) and each interview lasted approximately one hour. It should be noted that the initial questions of the interviews were based on pre-designed issues based on domestic and foreign scientific sources and expert consultation. Moreover, during the interview, additional comments were received from the interviewees.

In order to analyze the manuscripts of the interviews, content analysis of the extracted data and coding and identification of keywords were used. In other words, the interview texts were carefully studied. In the following, we will investigate the general framework of the interview, the detailed statistics of the interviewees, the supplementary information obtained in the interviews, the impact of effective factors on the number and financial importance of each of the auditing key issues in the audit report and the preparation a related framework. The results of the detailed statistics of the interviewees' answers to the initial questions are given in Table 1. It should be noted that this section includes the answers received during the interview, which are summarized and the content analyzed. The content analysis performed in this study aims to characterize the interviewees' answers to each of the questions.

Table 1: detailed statistics of interviewees' answers

Result 1: The probability of a positive and increasing impact of the presence of the audit organization on the number and financial importance of risk points at the level of the business unit in the audit report is generally assessed at a very high level.
Result 2: The probability of a negative and reducing impact of audit fees on the number and financial importance of risk points at the level of the business unit in the audit report is generally assessed at a very high level.
Result 3: The importance of the client for the auditing firm on the number and financial importance of risk points at the business unit level in the audit report is generally considered ineffective.
Result 4: The probability of a positive and increasing effect of the change of the auditing firm on the number and financial importance of risk points at the level of the business unit in the audit report is generally evaluated at low, medium and very high levels. Therefore, the results are considered positive.
Result 5: The probability of a positive and increasing effect of the auditing firm's expertise on the number and financial importance of risk points at the level of the business unit in the audit report is generally assessed at low, medium, high and very high levels. Therefore, the results are considered positive.
Result 6: The probability of a negative and reducing effect of the tenure of the auditing firm on the number and financial importance of risk points at the level of the business unit in the audit report is generally assessed at medium, high and very high levels. Therefore, the results are considered negative.
Result 7: The probability of a negative and reducing effect of a partner of the audit firm's tenure on the number and financial importance of risk points at the level of the business unit in the audit report is generally assessed at low to very high levels. Therefore, the results are considered negative.

Result 8: The type of audit opinion on the number and financial importance of risk points at the level of the business unit in the audit report is generally considered ineffective.
Result 9: The probability of a positive and increasing effect of company size on the number and financial importance of risk points at the level of the business unit in the audit report is generally assessed at medium, high and very high levels. Therefore, the results are considered positive.
Result 10: The probability of a positive and increasing effect of financial leverage on the number and financial importance of risk points at the level of the business unit in the audit report is generally assessed at low, medium, high and very high levels. Therefore, the results are considered positive.
Result 11: The financial condition of the company on the number and financial importance of risk points at the level of the business unit in the audit report is generally assessed as ineffective.
Result 12: Debt maturity on the number and importance of risk points at the entity level in the audit report is generally assessed as ineffective. Result 13: Investment opportunities on the number and financial importance of risk points at the entity level in the audit report are generally assessed as ineffective.
Result 14: The probability of a positive and increasing effect of cash balance on the number and financial importance of risk points at the level of the business unit in the audit report is generally assessed at low, medium and very high levels. Therefore, the results are considered positive.
Result 15: Investment opportunities on the number and financial importance of risk points at the entity level in the audit report assessed as ineffective.
Result 16: The probability of a negative and reducing effect of the company's lifetime on the number and financial importance of risk points at the level of the business unit in the audit report is generally evaluated at various levels, especially very high. Therefore, the results are considered negative.
Result 17: The probability of a negative and diminishing effect of institutional ownership on the number and financial importance of risk points at the level of the business unit in the audit report is generally assessed at various levels, especially very high. Therefore, the results are considered negative.
Result 18: The probability of a negative and reducing effect of major ownership on the number and financial importance of risk points at the level of the business unit in the audit report is generally assessed at different levels, especially high and very high. Therefore, the results are considered negative.
Result 19: The probability of a negative and reducing effect of managerial ownership on the number and financial importance of risk points at the level of the business unit in the audit report is generally assessed at different levels from low to very high. Therefore, the results are considered negative.
Result 20: The size of the board on the number and importance of risk points at the business unit level in the audit report was generally assessed as ineffective.
Result 21: The probability of a positive and increasing effect of the independence of the board of directors on the number and financial importance of risk points at the level of the business unit in the audit report is generally assessed at low, medium, high and very high levels. Therefore, the results are considered positive.
Result 22: The size of the audit committee on the number and importance of risk points at the level of the business unit in the audit report is generally considered ineffective.
Result 23: The probability of a negative and reducing effect of the audit committee independence on the number and financial importance of risk points at the level of the business unit in the audit report is generally assessed at low, high and very high levels. Therefore, the results are considered negative.
Result 24: The probability of a positive and increasing effect of the presence of the internal audit unit on the number and financial importance of risk points at the level of the business unit in the audit report is generally assessed at low, high and very high levels. Therefore, the results are considered positive.
Result 25: The current ratio of the number and financial importance of risk points in the business unit in the audit report is generally considered ineffective.
Result 26: The return on assets on the number and financial importance of risk points at the entity level in the audit report is generally considered ineffective.
Result 27: Return on equity on the number and financial importance of risk points at the level of the business unit in the audit report is generally considered ineffective.
Result 28: Profit margin on the number and financial importance of risk points at the business unit level in the audit report is generally considered ineffective.
Result 29: Losses on the number and financial importance of risk points at the business unit level in the audit report are generally assessed as ineffective.
Result 30: Operational complexity on the number and financial importance of risk points at the level of the business unit in the audit report is generally considered ineffective.
Result 31: The level of income on the number and financial importance of risk points at the level of the business unit in the audit report is generally considered ineffective.
Result 32: Inventory on the number and financial importance of risk points in the business unit in the audit report is generally assessed as ineffective.
Result 33: The probability of a positive and increasing effect of accounts receivable on the number and financial importance of risk points at the level of the business unit in the audit report is generally assessed at low, high and very high levels. Therefore, the results are considered positive.
Result 34: Properties, apparatus and equipment on the number and financial importance of risk points at the entity level in the audit report are generally assessed as ineffective.
Result 35: Intangible assets on the number and financial importance of risk points at the entity level in the audit report are generally assessed as ineffective.

4.1 Additional information obtained in the interviews

In addition to the pre-designed issues raised in the interviews, the interviewees were asked to consider and say any factors and issues related to the number and financial importance of key audit issues in the audit report. These responses were placed in two clusters of increasing factors and decreasing factors, which are explained by a different evaluation method than the previous ones. It is necessary to explain that these points have been extracted from the explanations of the interviewees and therefore it has not been possible to determine the level of impact (very low to very high) for some of them. Thus, the issue of determining the level of impact for these factors, which are complementary factors, is not provided. According to the obtained results, considering the repetition and the percentage of emphasis on each factor (majority), the factors of "quality of internal audit unit", "management overconfidence" and "rating of the audit firm" can be considered as factors that increase the number and financial importance of key audit items listed in the audit report, and the factors of "political relations", "CEO power" and "financial knowledge of the audit committee" are factors that decrease the number and importance of key audit items in the audit reports.

Table 2: obtained results of increasing and decreasing factors (*Due to the fact that the presence of the internal audit unit has been established in the vast majority of listed companies, the factors of presence and quality of the internal audit unit were grouped under the heading "Quality of the internal audit unit".)

No.	Increasing Factors	No.	Decreasing Factors
1	The presence of organization	1	Audit fees
2	Changing the auditing firm	2	Tenure of auditing firm
3	Expertise of auditing firm	3	Tenure of the partner of auditing firm
4	Company size	4	Company life time
5	Financial leverage	5	Institutional ownership
6	Institutional ownership	6	Major ownership
7	Independence of board	7	Property management
8	Account receivable	8	Independence of the audit committee
9	Quality of internal audit unit*	9	Political relations
10	Management overconfidence	10	CEO power
11	Audit firm rating	11	Financial knowledge of the audit committee

Accordingly, the variables of quality of the internal audit unit, political relations, management overconfidence, CEO power, audit firm rating and financial knowledge of the audit committee were added to the previous variables and it is necessary to continue the process, a suitable calculation method for them that is as follows:

- **The quality of internal auditing:** this variable is assessed by three following criteria:

  1. If the years of experience of the internal audit director are more than average, he/she will get number one, otherwise, it will be zero.
  2. If the internal audit director has the scientific and professional expertise, he/she will get number one, otherwise, it will be zero.
  3. If the internal audit director is a member of domestic or foreign professional bodies, he/she will get number one, otherwise, it will be zero.

  Thus, the internal audit quality score of each company year will be a number between zero and three.

- **Political relations:** Signs of a company's political relations include the presence of board members affiliated with the government, parliament, and political institutions, or the presence of major governmental and quasi-governmental shareholders in the ownership structure of the company. This variable is denoted by one and zero. In the case of political relations, its value will be one, otherwise, it will be zero.

- **Management overconfidence:** This variable is equal to the ratio of the company's investment to the total investment made in the industry. It is worth mentioning that to calculate the investment of companies, the net ratio of investment activities extracted from the cash flow statement to total assets is used.

- **CEO power:** This variable is equal to the number of uninterrupted cooperation years of the CEO with the company under his/her management.

- **Audit firm rating:** If the firm auditing the company is an audit firm or an audit institution with grade A, this variable is equal to one, otherwise it is equal to zero.

- **Financial knowledge of the audit committee:** assessing of this variable will be in the scoring method. For bachelor's, master's and doctoral degrees in accounting or finance, it is equal to one, two and three, respectively. This scoring is done separately for each member of the audit committee and the sum of its values is used for the entire audit committee.

4.2 The effectiveness of the number of risk points at the level of the business unit

In order to perform interference analysis in a neural network method, in a MATLAB environment, we defined data and trained them according to the target. Finally, the graphs and the information obtained from them are examined and the outputs are analyzed. In all cases, the neural network consists of two layers, including the hidden layer and the output layer, and the number of neurons in the hidden layer in each case is known. It should be noted that in all cases of neural network calculations, the time limit was not used as a stop condition, but the maximum epoch = 1000 was used as a stop condition of the neural network, and also in the case of repeating six times without change, the network was stopped. Data in neural networks are divided into three categories: Training: This data is provided to the network for learning. For example, five observations (5%) are given to the system to learn how to relate. Validation: According to the provided training, the neural network checks itself with Valid to see how close the teachings are to the actual data and to correct them if they are faulty. This step is done, for example, with 10% of the data. Testing: This step is the touchstone to determine how similar the result of the neural network is to the actual result, which is done with the rest of the data. It should be noted that the learning algorithm or function used in this study is Levenberg-Marquardt, and as mentioned, it consists of two hidden and output layers the first neuron is nonlinear and the second neuron is linear. The outline and weights of the layers are given in Figure 1.

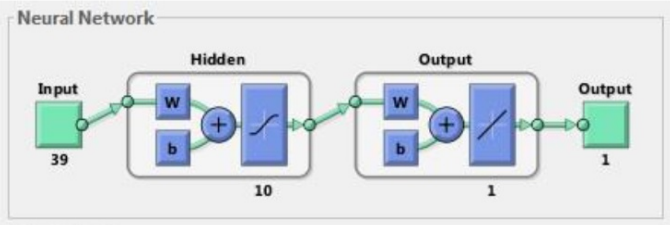
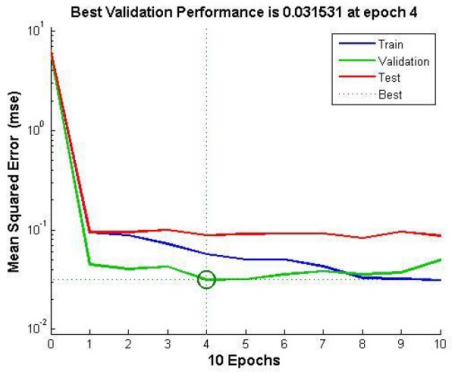


Figure 1: Artificial Neural Network

The best performance of the selected network in the validation data obtained in the epoch is four. It should be noted that epochs indicate the number of learning repetitions in the neural network, which is shown in the performance diagram, the optimal number of epochs in each network.

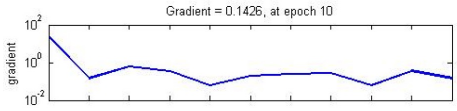


Graph 1: the best performance of the selected network

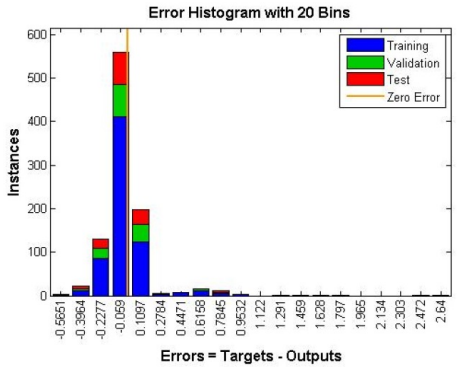
Diagram 2 shows the gradient values. If no improvement is observed in six consecutive times and the ascending trend continues continuously, the process will stop.

In the Error Histogram graph, the degree to which each set of data belongs to different errors is examined. This graph shows the lowest and the highest error rate.

The regression diagram for training and test of final results are presented in diagram four. This general structure is so adjusted and optimized by a Training Algorithm that it can behave appropriately and reach the Test Algorithm.

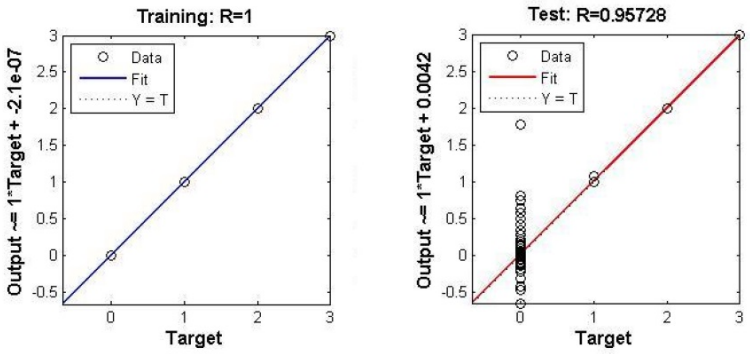


Graph 2: gradient values



Graph 3: Error Histogram

Due to the high power of the final algorithm (R = 0.957), the process can be considered successful. Using the influencing factors identified in this study and using this network, it is possible to predict the number of risk points at the company level in the audit report.



Graph 4: regression diagram of results

4.3 Influence of financial amount of risk points at the level of the business unit on the characteristics of the auditing firm and the audit client's specifications

The learning algorithm or function used in this study is Levenberg-Marquardt, and as mentioned, it consists of two hidden and output layers the first neuron is nonlinear and the second neuron is linear. The outline and weights of the layers are given in Figure 2.

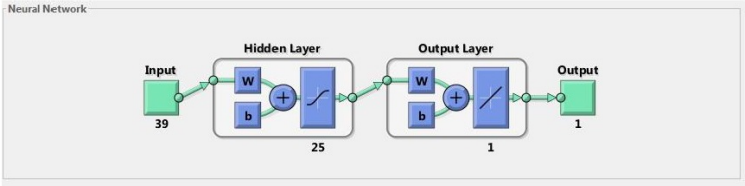
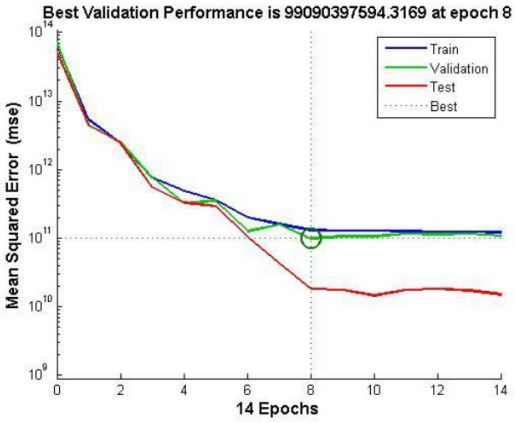


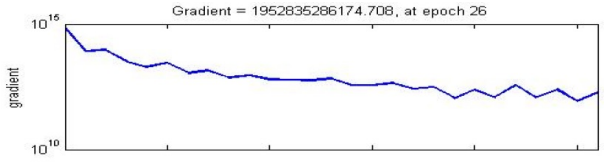
Figure 2: Artificial Neural Network

The best performance of the selected network in the validation data obtained in the epoch is eight. It should be noted that epochs indicate the number of learning repetitions in the neural network, which is shown in the performance diagram, the optimal number of epochs in each network.



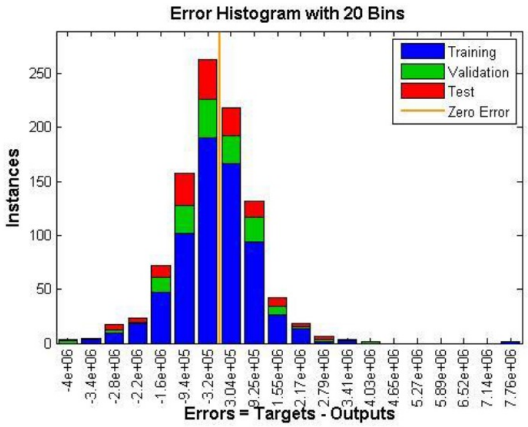
Graph 5: the best performance of the selected network

Diagram 6 shows the gradient values. If no improvement is observed in six consecutive times and the ascending trend continues continuously, the process will stop.



Graph 6: gradient values

In the Error Histogram graph, the degree to which each set of data belongs to different errors is examined. This graph shows the lowest and the highest error rate.

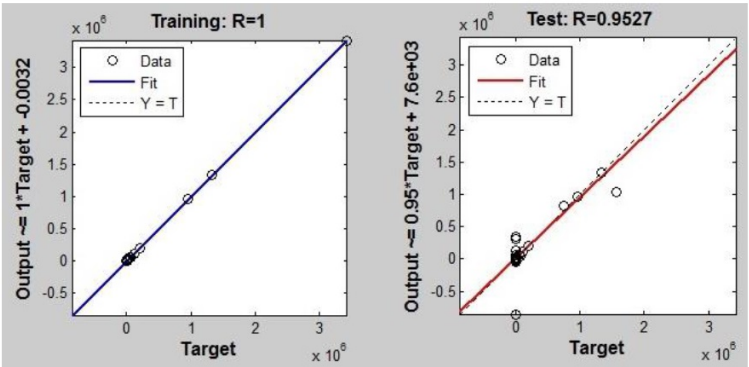


Graph 7: Error Histogram

The regression diagram for training and test of final results are presented in diagram 8. This general structure is so adjusted and optimized by a Training Algorithm that it can behave appropriately and reach the Test Algorithm. Due to the high power of the final algorithm (R = 0.952), the process can be considered successful. Using the influencing factors identified in this study and using this network, it is possible to predict the financial amount of risk points at the company level in the audit report.

5 Factor Analysis

Factor Analysis is used in the continuation of the process of analysis and determination of positive and negative coefficients based on the weight of the role of variables to explain and predict the number and financial importance



Graph 8: Regression Diagram of results

of key audit issues mentioned in the audit report. Factor analysis is used because it is able to put different factors together in a balanced way according to the convergence and structure of their values. Hence, this analysis is the most appropriate solution for combining several factors and forming a framework for factors affecting the number and financial importance of key audit issues mentioned in the audit report. The characteristics of factor analysis are presented in Table 3.

It should be noted that the KMO value always fluctuates between zero and one, and if the value is less than 0.5, the data are not suitable for factor analysis. Therefore, considering the value of the KMO index, which is higher than 0.5, the identified factors were suitable for factor analysis. In addition, since the significance level of the Bartlett test is less than 0.05, factor analysis has been performed successfully. Factor coefficients are also evident in Table 3, which are used as a weight in explaining the compositional pattern. As can be seen, all coefficients and factor loadings have the same direction as the predicted directions.

Table 3: Factor analysis test results

Factors	**Factor loading (coefficient)**
Audit firm size	0.624
Audit fees	−0.71
Changing of audit firm	0.708
Auditor knowledge and expertise in the industry	0.634
The tenure term of the auditing firm	−0.675
The tenure term of the partner of the auditing firm	−0.671
Size of the company	0.735
Financial leverage	0.504
Financial leverage	0.479
Life time	−0.648
Institutional ownership	−0.747
Major ownership	−0.487
Property management	−0.644
Independence of the board	0.965
Independence of the audit committee	−0.875
Quality of internal audit unit	0.643
Accounts Receivable	0.485
Management overconfidence	0.537
CEO power	−0.401
Company political relations	−0.673
Financial knowledge of the members of the audit committee	−0.635
Audit firm rating	0.211
KMO index	0.864
Bartlett test statistics	185.448
Significance level of Bartlett test	0.000

6 Discussion

The higher expertise and quality of large auditing firms are not just because of possessing more resources, but also because of their higher willingness to train staff, conduct more research, and invest in information technology [2].

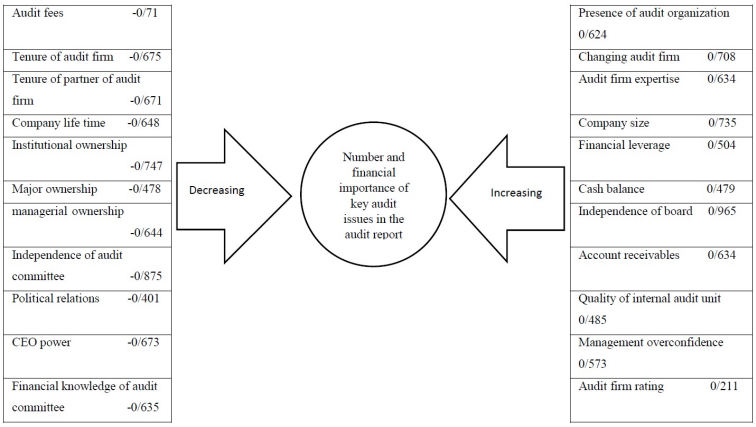


Figure 3: the framework of effective factors on the number and financial importance of key audit issues

On the other hand, the higher independence of large audit firms is due to their greater reputation compared to other ones. There is a difference between the performance of these firms and the auditing organization, and the presence of the auditing organization as the auditor of the company increases the number and importance of the key audit issues listed in the audit report.

Changing the audit firm will increase the number and financial importance of key audit issues listed in the audit report. The long-term presence of the client next to the auditor creates a tendency to maintain and observe the views of the client's management, a situation that undermines his/her independence and impartiality [4].

It is argued that the financial leverage of the company increases the number and financial importance of the key audit issues listed in the audit report.

It should be noted that cash is an important and vital resource of any economic unit. In this way, increasing the level of cash balance of the company leads to increasing the number and financial importance of key audit issues that are listed in the audit report.

In addition, the increase in the number of irresponsible managers on the company's board, due to the diminishing effect it will have on the quality of the board's supervisory activities, increases the number and financial importance of key audit issues listed in the audit report.

The concept of internal auditing in today's business includes assurance and independent review of the business unit's activities, along with advice to managers on how to properly manage revenues and expenses and improve operations.

The target economies theory suggests that providing audit services to the client creates an economic link between the audit firm and the client, which in turn may jeopardize the auditor's independence. As a result, as the audit fee increases, the quality of the audit decreases, and the audit fee lead to a reduction in the number and financial importance of key audit issues listed in the audit report.

The audit committee, as a supervisory tool, plays an important role in the company and reduces the intentional and inadvertent errors in accounting measurements and disclosures of financially significant cases, as well as fraud and illegal management practices through monitoring the financial reporting process, including the internal control system and the use of accepted accounting principles, as well as monitoring the performance of independent auditors and internal auditors. By strengthening the quality of oversight of the company's financial and operational activities, an independent and effective audit committee can reduce the number and financial importance of key audit issues listed in the audit report.

7 Conclusion

The results of the present study briefly showed that the presence of the audit organization, changing of the audit firm, audit firm expertise, company size, financial leverage, cash balance, board independence, accounts receivable, quality of internal audit unit, management overconfidence and rating of the audit firm has an increasing effect on the number and financial importance of key audit issues listed in the audit report, and the audit fees, audit institute tenure, audit partner tenure, company lifetime, institutional ownership, major ownership, managerial ownership,

independence of audit committee, political relations, CEO power and audit committee financial knowledge decrease effects on the number and financial importance of the key audit issues listed in the audit report. Using these factors and combining them with interviews, content analysis, neural network analysis and factor analysis, a framework was constructed for the factors explaining the number and financial importance of key audit issues listed in the audit report. The results also showed that the financial knowledge of the audit committee reduces the number and financial importance of key audit issues listed in the audit report. In this regard, it is necessary to explain that the audit committee is one of the mechanisms that is expected to act effectively to protect the interests of different groups using accounting information. In fact, the most important responsibilities of the audit committee in complying with laws, regulations and requirements are to ensure the existence of an effective approach and processes for monitoring the following: Compliance with the rules, regulations and requirements in the company; the existence of a strategic plan and the pursuit of the implementation of corporate strategy in order to achieve general and operational goals; the existence of organizational ethics charter and adherence of senior management and employees to it; follow up the signs of changes in relevant laws and regulations on the company's activities; and follow up of received reports, regulations and requirements on non-compliance with laws including the approvals of the Board of Directors [6]. Many theoretical and practical perspectives in researches suggest that the expertise and education of audit committee members make it more effective and as one of the mechanisms of corporate governance, having members with financial and accounting knowledge and education is necessary for better and more effective supervision, and the presence of certified accountants on the audit committee reduces mandatory action by legislators or the resubmission of quarterly reports [3]. Due to having superior financial knowledge and understanding of financial issues and reporting problems, professionals and individuals with higher education have more responsibility in the financial reporting process. Therefore, these individuals are more motivated to use conservative accounting approaches to increase the reputation of retaining capital, increase the likelihood of appointment to other management positions, and reduce the risk of litigation [1]. Therefore, the audit committee with financial knowledge can reduce the number and financial importance of key audit issues listed in the audit report by strengthening the quality of oversight of the company's financial and operational activities.

In spite of the previous research, the probabilistic neural network model is not a model that can only be used for prediction, but a model that has its own methodology. The performance of this model was compared with a widely used model in this field called the multilayer perceptron neural network. The results showed the superiority of the probabilistic neural network model compared to the multilayer perceptron neural network.

The results of the present study briefly showed that the presence of the audit organization, changing of the audit firm, audit firm expertise, company size, financial leverage, cash balance, board independence, accounts receivable, quality of internal audit unit, management overconfidence and rating of the audit firm has an increasing effect on the number and financial importance of key audit issues listed in the audit report, and the audit fees, audit institute tenure, audit partner tenure, company lifetime, institutional ownership, major ownership, managerial ownership, independence of audit committee, political relations, CEO power and audit committee financial knowledge decrease effects on the number and financial importance of the key audit issues listed in the audit report. Using these factors and combining them with interviews, content analysis, neural network analysis and factor analysis, a framework was constructed for the factors explaining the number and financial importance of key audit issues listed in the audit report.

References

[1] A. Bilal, S. Chen and B. Komal, *Audit committee financial expertise and earnings quality: A meta-analysis*, J. Bus. Res. **84** (2018), 253–270.

[2] A. Craswell, J. Francis and S. Taylor, *Auditor brand name reputations and industry specializations*, J. Account. Econ. **20** (1995), 297–322.

[3] D.A. Mcmullen and K. Raghunandan, *Enhancing audit committee effectiveness*, J. Account. **182** (1996), no. 2, 79–81.

[4] R. Rajabi, *Challenges of chenging the auditor*, Certif. Account. **8-9** (2006), 53–69.

[5] Securities and Exchange Commission, *SEC news digest 2013–2015*, https://www.sec.gov, 2016.

[6] Tehran Stock Exchange Organization, *Charter of the audit committee*, Tehran Stock Exchange Organization, 2016. [In Persian]

[7] Y.H. Yeganeh, *Philosophy of Auditing*, Elmi va Farhangi Publications, Tehran, 2016. [In Persian]