Prioritization of factors affecting the extra-organizational quality of auditing firms, a combination of fuzzy Delphi survey and fuzzy network analysis

Pouria Yazdani[a], Hassan Ghodrati[a,*], Hossein Panahian[a], Meysam Arabzadeh[a], Esmaeil Mazroui Nasrabadi[b]

[a]Department of Accounting, Kashan Branch, Islamic Azad University, Kashan, Iran
[b]Management Department, Humanities Faculty, University of Kashan, Kashan, Iran

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Abstract

The present study is a quasi-experimental and applied study and has been done through different stages and with a qualitative or judgmental method. The qualitative part of the research includes interviews with experts. The statistical population of the present study consisted of experts familiar with the subject of research (university professors in the field of accounting and finance) and relevant managers and experts of auditing firms and those in charge of affairs in the auditing organization. After counting the comments, the research data were analyzed using the fuzzy Delphi method and fuzzy network analysis. Based on the results obtained from the fuzzy Delphi method, external auditing quality, legal requirements, professional standards, auditors' professional independence, professional ethics standards in auditing, auditing clients, professional staff of auditing firms, competition In the auditing market and finally the general public were the factors affecting the quality of auditing firms. The findings of the study indicated that the standards of professional ethics and legal requirements had the first and second priorities, respectively.

Keywords: Professional ethics, Fuzzy Delphi, Fuzzy network analysis, Quality of auditing institutions
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1. Introduction

The desire to gain long-term benefits in the field of professional credit and income generation has led to the view of auditors, audit quality is considered as a factor in increasing professional competition in the market of auditing services and from this perspective in research Has been noticed and lucky [12]. At the beginning of the 21st century, the general public witnessed the scandal of companies such as Enron, Parmalat or Wordcom and the huge financial losses for shareholders that stemmed from this scandal. The emergence of such a scandal led to a debate about the quality of auditing worldwide. Since almost all of the companies affected by the scandal had previously received unrestricted audit certification, doubts were raised about the quality of the audits performed by these companies, leading to widespread distrust. Nationally and internationally became the work of a statutory auditor. Criticism of the auditing profession in general has led to a loss of public confidence. The United States has passed the Oxley Act in response to this distrust, while the European Union has adopted and promulgated the 2006/43 Declaration [16]. With the announcement of the European Declaration, EU member states, including Germany, were forced to translate the Declaration into national law by 28 June 2009 [10]. One of the features of the directives adopted by the European Union is that it sets out a general framework and the member states are responsible for complying with it. In addition, since 2000, a number of new professional reforms and frameworks have emerged at the national as well as European level that did not previously exist for the entire auditing profession. According to the relevant interpretative notes, these broad regulatory effects should improve the quality of auditors' work and restore the public credibility that underlies statutory auditing [3]. The purpose of introducing external (quality) quality control was to strengthen public confidence in conducting statutory audits, improve quality control systems in auditing firms, and facilitate compliance with international standards [14]. The above research literature, however, has significantly enhanced our understanding of how various factors affect audit quality. However, one of the main limitations of this approach is that in this research, the audit process is generally considered more as a "black box" and only the factors affecting it or the output of this process are considered. Specifically, the purpose of this study is to investigate and prioritize the factors affecting the quality of auditing firms in Iran in terms of external quality using Delphi surveys and fuzzy network analysis.

2. Research background

DiAngelo [1] states the first definition of auditing quality and defines it from two dimensions: And 2) the ability to report significant accounting or financial errors or abuses. The legal principle of professional independence is explicitly stated for quality control arbitrators in this statement. An auditor who has any economic, financial, or personal relationship with the company in question may be defective in qualifying as an audit quality control arbitrator. This is the case if there are other reasons for concern about bias [13]. The system still had its weaknesses, as it was run by the public as a model of self-perception, even if reality only reflected that image [11]. For this reason, Martin stated that in addition to external incentives (enforcement of European regulations), Germany also needs an inherent incentive to really consider its own interests and, accordingly, to introduce a monitoring system that is internationally Known and competitive. This monitoring system is unlike supervisory systems in which external quality control (external organization) is performed by public or professional regulatory bodies [15]. Hai and To [8], in their research, a combination of qualitative research method and quantitative research method based on meta-analysis and synthesis of available information from various sources and the results of interviews, showed that the factors affecting the performance of audit firms include The legal system, quality control and governance

of the company are internal and also factors such as organizational structure and operational mechanism of auditing firms also affect the quality of auditing. Sulanjaku and Shingjergji [16], in their research have examined how the influence of various internal and external factors such as the culture of the audit firm, the quality of people, the management and audit committee as well as general cultural and political factors on the quality of auditing in Albania. In an interview and through a questionnaire, citing International Standards on Auditing, they stated that identifying key factors that could improve audit quality in Albania could help them understand how auditing standards are adopted by Albanian auditors for Assist with quality control and other related reporting responsibilities. Zahmatkesh and Rezazadeh [17], in their research, the effect of work experience, professional competence, motivation, accountability and objectivity of the auditor on the quality of auditing from the perspective of auditors working in companies. According to the results of their research, the professional competence, accountability and objectivity of auditors have a significant impact on the quality of auditing. Hiring highly experienced people increases the quality of auditing by increasing the qualifications of the auditing profession. Zureigat [18] research showed that company size and ownership structure affect the quality of audit services provided by audit firms. In fact, there is evidence that non-audit services improve audit quality. Gao and Zhang [7] identified conditions in which strict auditing quality auditing standards increased or decreased. When audit costs are insufficient, it indicates unfair competition, uncertainty about the quality of the audit report, and therefore more research than ever before [2]. In general, the implementation of the internal quality control system is the responsibility of the relevant auditor. In doing so, the auditor must comply with certain legal requirements established and communicated by the Office of the Auditor General and the auditing firm in a joint statement entitled "Quality Assurance Requirements in Auditing First Edition 2006." The research literature shows that the impact of legal regulations (Francis and Wang [4]), company size (Francis and Yu, [5]), non-audit services (Frese & Keith, [6]), poor referral (DiAngelo, [1]), sovereignty Corporate auditing clients (Lennox and Pittman, [9]) have been defined as factors influencing audit quality.

3. Research methodology

The present research is of quasi-experimental and applied type and is carried out after different stages by qualitative or judgmental method. The qualitative part of the research includes interviews with experts. Therefore, the statistical population consists of experts familiar with the subject of research (university professors in the field of accounting and finance). In order to design the final questionnaire of the statistical population, experts including experts, university professors and specialists in the field of external audit quality control and the factors affecting it. And has been in charge of affairs in the audit organization and in other words, experts. Taking into account the effective return rate of 10%, 105 questionnaires were distributed and 98 questionnaires were finally analyzed by removing incomplete or unusable questionnaires. In the present study, an attempt was made to evaluate and refine the criteria and factors affecting the external quality of auditing, which are based on the analysis of research literature and in other words, analysis of the field of knowledge, through the collective wisdom of a group of experts with the necessary knowledge and experience. To be. For this purpose, fuzzy Delphi method, which is one of the effective methods to reach a group agreement of experts, has been used.

The process of implementing the fuzzy Delphi method consists of two steps:

Step One: Select Experts

The main feature of the selected experts in this study was having the necessary knowledge and experience in the field of external auditing quality and the factors affecting it. These experts must

have at least a master's degree and active participation in the stock market and capital markets. According to the defined characteristics and by non-probability sampling of available people and judgmental method, 19 people were selected as selected experts, and the initial preparation for the implementation of the project was made for them. The members of the expert group by fields and companies working in them are: University faculty member (6 people), managers and senior experts of the companies under study (9 people), other experts in the field External organizational quality of audit (4 people).

Step 2: Define linguistic variables

After interviewing the members of the statistical sample and identifying the factors affecting the quality of auditing firms in Iran, the components were designed in the form of a questionnaire with the aim of obtaining experts' opinions about the extent to which they agree with the components. Experts expressed their agreement through very low, low, medium, high and very high verbal variables. Because different characteristics of individuals affect their mental interpretations of qualitative variables, by defining the range of qualitative variables, experts answer questions with the same mindset.

3.1. Fuzzy network analysis process

Step 1: Calculate the direct connection matrix (D)

In this step, respondents are asked to indicate the effectiveness of criterion i on criterion j based on a questionnaire. In these matrices, $Z_{ij} = (l_{ij}, m_{ij}, u_{ij})$ is a triangular fuzzy number. To take into account the opinion of all experts according to the following formula, an arithmetic mean is taken from them.

$$\widetilde{Z} = \frac{\widetilde{x}^1 \bigoplus \widetilde{x}^2 \bigoplus \widetilde{x}^3 \mu... \bigoplus \widetilde{x}^p}{p} \tag{1}$$

In this formula, p is the number of experts and $\widetilde{x}^1, \widetilde{x}^2, \widetilde{x}^3$ are the matrix comparison of expert 1, expert 2 and expert p, respectively, and Z is a triangular fuzzy number as $\widetilde{Z}_{ij} = (l_{ij}, m_{ij}, u_{ij})$.

Step 2: Normalize the direct connection matrix

According to the following formulas, we normalize the mean of the views and call it the H matrix.

$$\widetilde{H}_{ij} = \frac{\widetilde{Z}_{ij}}{r} = (\frac{l_{ij}}{r}, \frac{m_{ij}}{r}, \frac{u_{ij}}{r}) = (l_{ij}, m_{ij}, u_{ij}) \tag{2}$$

Where r is obtained from the following equation:

$$r = max_{1 \leq i \leq n}(\sum_1^n u_{ij}) \tag{3}$$

Therefore, we divide each element of the direct fuzzy matrix by (r).
$r = 45$

Step 3: Calculate the Complete Correlation Matrix (TC)

After calculating the normal matrix, the total fuzzy relations matrix is obtained according to the following formulas.

$$T = \lim_{k \to \infty} (\widetilde{H}^1 \bigoplus \widetilde{H}^2 \bigoplus ... \bigoplus \widetilde{H}^K) \tag{4}$$

Each component of that fuzzy number is $\widetilde{t}_{ij} = (l_{ij}^t, m_{ij}^t, u_{ij}^t)$ and is calculated as follows:

$$[l_{ij}^t] = H_1 \times (1 - H_1)^{-1} \tag{5}$$

$$[m_{ij}^t] = H_m \times (1 - H_m)^{-1} \tag{6}$$

$$[u_{ij}^t] = H_u \times (1 - H_u)^{-1} \tag{7}$$

In these formulas, I is a unit matrix and $H_l, H_m and H_u$ are each $n \times n$ matrix, whose constituents are the lower number, middle number and upper number of the triangular fuzzy numbers of the H matrix, respectively.

Step 4: Calculate the complete correlation matrix of the main criteria

First, the T_D matrix for the main criteria must be extracted from the complete correlation matrix of the T_c criteria. Therefore, each T_D matrix element can be calculated as follows: If we know that each T_D matrix element is t_{ij}, each t_{ij} is obtained from the mean of each T_C^{ij}.

Step 5- Calculate the intensity and direction of the effect

According to the following equations, we calculate the value of the R_i index representing the sum of the rth row and the D_j index representing the sum of the jth column of the T_D matrix. In order to draw and analyze the chart, we need two indicators of intensity, effectiveness, and direction, which are obtained using r_i and d_j. For each $i = j$ we will have:

$$\widetilde{D} = (\widetilde{D}_i)_{n \times 1} = [\sum_{j=1}^{n} \widetilde{T}_{ij}]_{n \times 1} \tag{9}$$

$$\widetilde{R} = (\widetilde{R}_i)_{n \times 1} = [\sum_{j=1}^{n} \widetilde{T}_{ij}]_{n \times 1} \tag{10}$$

Where D and R are matrices $1 \times n$ and $n \times 1$, Respectively. The next step is to determine the importance of the indicators $(D_i + R_i)$ and the relationship between the criteria $(D_i - R_i)$. If 0 is $(D_i - R_i)$, the relevant criterion is effective, and if $0 > (D_i - R_i)$, the relevant criterion is effective. According to the values calculated above, we get the values of the index $r_i + d_j$ and $r_i - d_j$ for the criteria, as well as the index $(D_i + R_i)$ and $(D_i - R_i)$ for the dimensions And then decaphasize using the following formula:

$$B = \frac{(a_1 + a_3 2 \times a_2)}{4} \tag{11}$$

Step 6- Draw a network relationship map (NRM)

$r_i + d_j$ = intensity of impact (in other words, the higher the value of $r_i + d_j$, the more it interacts with other factors in the system).

$r_i - d_j$ = to influence or be affected (in such a way that if $0 < r_i - d_j$ is d_j, the relevant criterion is effective and if $0 > r_i - d_j$ is relevant, the relevant criterion is effective).
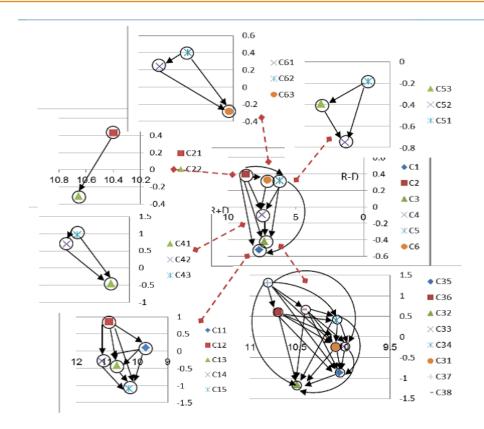
Figure 1: Network relations related to criteria

Normalization of the matrix Complete connection of the main criteria (T_C^∞) and formation of an unbalanced supermatrix

We normalize the T_c matrix using the following formulas; In this step, the sum of each row T_C^{ij} is calculated according to the relevant main index and then in each T_C^{ij}, each element is divided by the sum of the elements of the corresponding row.

$$T_D = \begin{bmatrix} t_{11}^{D_{11}} & \cdots & t_{1j}^{D_{1j}} & \cdots & t_{1m}^{D_{1m}} \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ t_{i1}^{D_{i1}} & \cdots & t_{ij}^{D_{ij}} & \cdots & t_{im}^{D_{im}} \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ t_{m1}^{D_{m1}} & \cdots & t_{mj}^{D_{mj}} & \cdots & t_{mm}^{D_{mm}} \end{bmatrix} \begin{array}{l} \rightarrow d_1 = \sum_{j=1}^m t_{1j}^{D_{1j}} \\ \\ \rightarrow d_i = \sum_{j=1}^m t_{ij}^{D_{ij}}, i = 1, \ldots, m \\ \\ \rightarrow d_m = \sum_{j=1}^m t_{mj}^{D_{mj}}, i = 1, \ldots, m \end{array} \tag{12}$$

Step 8: Form a rhythmic supermatrix

In this step, we multiply the normalized matrix of the main criteria T_D^∞ by the normalized matrix of the sub-criteria W. By multiplying each $T_D^{\infty IJ}$ by W_{ij}. If we consider W^∞(rhythmic supermatrix) to contain a set of W_{ij}^∞, W_{11}^∞ is calculated as follows:

$$W_{11}^{\infty l} = t_D^{\infty_{11}^l} \times W_{ij}^{\infty l} \tag{13}$$

$$W_{11}^{\infty m} = t_D^{\infty_{11}^m} \times W_{ij}^{\infty m} \tag{14}$$

$$W_{11}^{\infty u} = t_D^{\infty_{11}^u} \times W_{ij}^{\infty u} \tag{15}$$

Step 9: Limit the rhythmic supermatrix

According to the following equation, the rhythmic supermatrix is brought to power (consecutive odd numbers) so that all the numbers in each row converge.

$$\lim_{z \to \infty} (W^{\alpha l})^z \tag{16}$$

$$\lim_{z \to \infty} (W^{\alpha m})^z \tag{17}$$

$$\lim_{z \to \infty} (W^{\alpha u})^z \tag{18}$$

4. Research findings

Based on the analysis of the field of knowledge and the application of the content analysis model, the external quality measures of the audit and the most important factors affecting it have been identified and classified and summarized as Table 1:

Table 1: External quality of auditing and the factors affecting it (knowledge domain analysis)

Row	Variable		symbol	Dimension (measurement)
1			QUA01	Timely submission of audit reports
2			QUA02	Audit fee paid
3			QUA03	Person - hours of auditing work performed
4			QUA04	Assess the quality of financial reporting compliance
5	External Organizational	Quality Auditing	QUA05	Evaluate compliance with principles and regulations in reporting
6			QUA06	Requiring the company to resubmit financial statements
7			QUA07	Detection of possible violations and abuses
8			QUA08	Evaluate the quality of the internal control system
9			LIG01	Transparency and transparency of legal requirements for financial reporting
10			LIG02	Awareness of stakeholders about the legal requirements of financial reporting
11	Legal requirements		LIG03	Legal Guarantee Legal requirements for financial reporting
12			LIG04	Justice in enforcing the legal requirements of financial reporting
13			LIG05	Up-to-date financial reporting legal requirements
14			LIG06	Proper information on the legal requirements of financial reporting
15			PER01	Transparency and transparency of professional auditing standards
16			PER02	Awareness of those in charge of professional auditing standards
17	Professional standards		PER03	Executive support for professional auditing standards
18			PER04	Justice in the application of professional auditing standards
19			PER05	Up-to-date professional auditing standards
20			PER06	Proper information of professional auditing standards

21		EER07	A sense of commitment and responsibility towards professional standards
22	Professional independence	IND01	Honesty and integrity in announcing the audit opinion
23		IND02	Realism and documentation of the audit opinion
24		IND03	Relying on professional skepticism in judging and commenting
25		IND04	Avoid any prejudice
26		IND05	Avoid any personal love and hate towards clients
27		IND06	Avoid any tendency and bias of clients
28		IND07	Independence of opinion and unaffected by others
29		IND08	Provide only audit services to clients
30	Standards of professional ethics	ETH01	Transparency and transparency of auditing professional ethics
31		ETH02	Awareness of those in charge of auditing standards of professional ethics
32		ETH03	Executive support of auditing professional ethics standards
33		ETH04	Believing in and adhering to auditing professional ethics
34		ETH05	Up-to-date standards of auditing professional ethics
35		ETH06	Proper information of auditing professional ethics standards
36	Audit clients	CUS01	Level of education of audit clients
37		CUS02	Financial knowledge, accounting or auditing clients
38		CUS03	Clients' awareness of ethical and professional standards of auditing
39		CUS04	Awareness of clients about the standards and legal requirements in reporting
40		CUS05	Clients' personal relationships with auditors
41		CUS06	Motives and personal interests of clients in financial reporting
42		CUS07	Level of commitment and social responsibility of clients
43		CUS08	Level of transparency and accountability of clients to stakeholders
44	Professional staff of auditing firms	EMP01	Level of education
45		EMP02	Extent of accounting or auditing experience
46		EML03	Specialized experience in the industry
47		EMP04	Culture distance from power
48		EMP05	Familiarity with legal requirements, ethical and professional standards
49		EMP06	Belief in and adherence to legal
50		EMP07	requirements, ethical and professional standards Gender Auditor
51	Competition in the auditing	COM01	Audit market size
52		COM02	Number of auditing firms
53		COM03	Herfindahl index (market share)
54		COM04	Auditing Services Segmentation Index
55		COM05	Market focus (market share percentage of 5 major auditors)
56		COM06	Ease of entry of new auditing firms

57		PEO01	People's financial literacy level
58		PEO02	Level of education of the people
59	The common people	PEO03	Level of belief and insistence on people's responsibility
60		PEO04	Level of people's familiarity with professional and legal auditing standards
61		PEO05	The level of importance of people to the quality of auditing
62		PEO06	The level of public confidence in audited financial statements
63		PEO07	Level of public awareness of profit management and manipulation

At this stage, the factors affecting the quality of auditing firms in Iran, which were identified using semi-structured interviews, were provided to experts in the form of a questionnaire. The following equations are used to calculate the fuzzy mean:

$$A_i = \left(a_1^{(i)}, a_2^{(i)}, a_3^{(i)} \right), i = 1, 2, 3, \ldots, n \tag{19}$$

$$A_{ave} = (m_1, m_2, m_3) = (\frac{1}{n} \sum_{i=1}^{n} a_1^{(i)}, \frac{1}{n} \sum_{i=1}^{n} a_2^{(i)}, \frac{1}{n} \sum_{i=1}^{n} a_3^{(i)}) \tag{20}$$

In Equation (20), Ai represents the expert view of i and Aave represents the average view of the experts. After collecting the questionnaires, the number of answers given to each factor was counted and evaluated. Calculation of Triangular Fuzzy Mean for Factors The Minkowski formula and definite fuzzy numbers were used to calculate each factor. The results of fuzzy mean and fuzzy decompression of the components are shown in Table 2.

Table 2: Average views of experts obtained from the first stage survey

Variables	Triangular fuzzy (m, α, β) mean	De-fuzzy mean	Variables	Triangular fuzzy mean (m, α, β)	De-fuzzy mean
ETH04	(0.638,0.875,0.925)	0.65	QUA01	(0.5,0.737,0.875)	0.534
ETH05	(0.6, 0.838,0.913)	0.619	QUA02	(0.6,0.813,0.85)	0.609
ETH06	(0.538,0.75,0.825)	0.556	QUA03	(0.525,0.738,0.825)	0.546
CUS01	(0.55,0.788,0.888)	0.575	QUA04	(0.5,0.725,0.838)	0.528
CUS02	(0.55,0.763,0.825)	0.556	QUA05	(0.55,0.763,0.85)	0.572
CUS03	(0.6,0.838,0.9)	0.616	QUA06	(0.625,0.863,0.9)	0.634
CUS04	(0.513,0.75,0.85)	0.538	QUA07	(0.588,0.8,.085)	0.6
CUS05	(0.45,0.688,0.825)	0.484	QUA08	(0.575,0.813,0.913)	0.6
CUS06	(0.6,0.825,0.863)	0.609	LIG01	(0.563,0.788,0.875)	0.584
CUS07	(0.475,0.7,0.813)	0.503	LIG02	(0.488,0.7,0.8)	0.513
CUS08	(0.625,0.863,0.925)	0.641	LIG03	(0.6,0.838,0.9)	0.616
EMP01	(0.45,0.663,0.788)	0.481	LIG04	(0.625,0.85,0.888)	0.634
EMP02	(0.45,0.633,0.8)	0.484	LIG05	(0.625,0.85,0.888)	0.634
EML03	(0.438,0.675,0.8)	0.469	LIG06	(0.463,.0.7,0.813)	0.491
EMP04	(0.5,0.713,0.825)	0.528	PER01	(0.425,0.663,0.8)	0.459
EMP05	(0.5,0.713,0.8)	0.522	PER02	(0.613,0.825,0.863)	0.622
EMP06	(0.488,0.725,0.838)	0.516	PER03	(0.513,0.725,0.838)	0.541
EMP07	(0.45,0.675,0.8)	0.481	PER04	(0.513,0.725,0.825)	0.538
COM01	(0.525,0.75,0.838)	0.547	PER05	(0.6,0.838,0.9)	0.616
COM02	(0.563,0.688,0.813)	0.494	PER06	(0.563,0.775,0.85)	0.581
COM03	(0.583,0.775,0.875)	0.563	EER07	(0.475,0.688,.0.788)	0.5
COM04	(0.5,0.738,0.85)	0.528	IND01	(0.5,0.625,0.763)	0.434
COM05	(0.488,0.725,0.838)	0.516	IND02	(0.463,0.7,0.825)	0.494
COM06	(0.475,0.7,0.8)	0.5	IND03	(0.538,0.763,0.863)	0.563
PEO01	(0.638,0.863,0.913)	0.65	IND04	(0.55,0.763,0.825)	0.566
PEO02	(0.413,0.625,0.763)	0.447	IND05	(0.525,0.738,0.838)	0.55
PEO03	(0.525,0.75,0.838)	0.547	IND06	(0.55,0.775,0.85)	0.56
PEO04	(0.513,0.738,0.85)	0.541	IND07	(0.588,0.813,0.863)	0.6
PEO05	(0.425,0.638,0.763)	0.456	IND08	(0.5,0.738,0.85)	0.528
PEO06	(0.5,0.713,0.825)	0.528	ETH01	(0.625,0.863,0.9)	0.634
PEO07	(0.475,0.713,0.825)	0.503	ETH02	(0.613,0.825,0.875)	0.625
-	-	-	ETH03	(0.55,0.775,0.875)	0.575

After the end of the survey in the first stage, it is necessary to do the second stage to compare the results obtained from both stages and determine the result. After determining the number of responses to the factors affecting the quality of auditing firms in Iran in the second stage and after calculating the triangular fuzzy mean for the factors, the Minkowski formula and the determined fuzzy numbers for each component were calculated. The fuzzy mean and de-fuzzy factors in the second step are shown in Table 3.

Table 3: Average views of experts from the second stage survey

Variables	Triangular fuzzy (m, α, β) mean	De-fuzzy mean	Variables	Triangular fuzzy mean (m, α, β)	De-fuzzy mean
ETH04	(0.575,0.787,0.85)	0.591	QUA01	(0.512,0.75,0.875)	0.544
ETH05	(0.6,0.825,0.887)	0.616	QUA02	(0.575,0.787,0.85)	0.591
ETH06	(0.575,0.787,0.85)	0.591	QUA03	(0.525,0.737,0.812)	0.544
CUS01	(0.55,0.775,0.862)	0.572	QUA04	(0.512,0.737,0.837)	0.538
CUS02	(0.578,0.8,0.85)	0.6	QUA05	(0.562,0.775,0.85)	0.581
CUS03	(0.625,0862,0.912)	0.638	QUA06	(0.587,0.812,0.862)	0.6
CUS04	(0.537,0.775,0.862)	0.559	QUA07	(0.575,0.787,0.85)	0.591
CUS05	(0.462,0.7,0.837)	0.497	QUA08	(0.562,0.8,0.887)	0.584
CUS06	(0.637,0.862,0.9)	0.647	LIG01	(0.587,0.812,0.875)	0.603
CUS07	(0.5,0.725,0.825)	0.525	LIG02	(0.537,0.762,0.837)	0.556
CUS08	(0.6,0.825,0.887)	0.616	LIG03	(0.612,0.85,0.9)	0.625
EMP01	(0.475,0.687,0.812)	0.506	LIG04	(0.575,0.787,0.85)	0.591
EMP02	(0.475,0.687,0.825)	0.509	LIG05	(0.562,0.775,0.837)	0.578
EML03	(0.5,0.737,0.862)	0.531	LIG06	(0.45,0.675,0.8)	0.481
EMP04	(0.487,0.7,0.812)	0.516	PER01	(0.5,0.737,0.85)	0.528
EMP05	(0.475,0.687,0.787)	0.5	PER02	(0.6,0.812,0.862)	0.613
EMP06	(0.5,0.737,0.85)	0.528	PER03	(0.512,0.725,0.825)	0.538
EMP07	(0.462,0.687,0.812)	0.494	PER04	(0.6,0.837,0.925)	0.622
COM01	(0.537,0.762,0.85)	0.559	PER05	(0.537,0.75,0.825)	0.556
COM02	(0.475,0.7,0.825)	0.506	PER06	(0.575,0.8,0.862)	0.591
COM03	(0.525,0.762,0.862)	0.55	EER07	(0.487,0.7,0.787)	0.509
COM04	(0.5,0.737,0.85)	0.528	IND01	(0.45,0.687,0.812)	0.481
COM05	(0.487,0.712,0.825)	0.516	IND02	(0.45,0.687,0.825)	0.484
COM06	(0.5,0.725,0.825)	0.525	IND03	(0.562,0.8,0.887)	0.584
PEO01	(0.625,0.85,0.9)	0.638	IND04	(0.537,0.75,0.825)	0.556
PEO02	(0.425,0.637,0.775)	0.459	IND05	(0.5,0.712,0.825)	0.528
PEO03	(0.55,0.775,0.862)	0.572	IND06	(0.575,0.812,0.875)	0.591
PEO04	(0.475,0.7,0.825)	0.506	IND07	(0.537,0.737,0.8)	0.553
PEO05	(0.412,0.625,0.762)	0.447	IND08	(0.525,0.762,0.862)	0.55
PEO06	(0.462,0.675,0.8)	0.494	ETH01	(0.575,0.8,0.85)	0.588
PEO07	(0.487,0.725,0.837)	0.516	ETH02	(0.6,0.812,0.862)	0.613
-	-	-	ETH03	(0.55,0.787,0.887)	0.575

After conducting both stages of the survey, the difference between the de-fuzzy mean of the factors affecting the quality of auditing firms in Iran should be examined and analyzed. The difference between the de-fuzzy mean of the factors affecting the quality of auditing firms in Iran in the first and second stages is described in Table 4.

Based on the multi-criteria model of fuzzy network analysis as described above, the total weights of final importance as well as the prioritization of dimensions and components affecting the quality of auditing firms in Iran are presented in Table 5.

Table 4: The difference between the de-fuzzy mean of the first and second stages of the survey

Variables	De-fuzzy mean of the first stage	De-fuzzy mean of the second stage	The difference between the de-fuzzy means of the first and second stages	Variables	De-fuzzy mean of the first stage	De-fuzzy mean of the second stage	The difference between the de-fuzzy means of the first and second stages
ETH04	0.65	0.591	0.059	QUA01	0.534	0.544	0.009
ETH05	0.69	0.616	0.003	QUA02	0.609	0.591	0.019
ETH06	0.556	0.591	0.034	QUA03	0.546	0.544	0.003
CUS01	0.576	0.572	0.003	QUA04	0.528	0.538	0.009
CUS02	0.556	0.6	0.034	QUA05	0.572	0.581	0.009
CUS03	0.616	0.638	0.022	QUA06	0.634	0.600	0.034
CUS04	0.538	0.559	0.022	QUA07	0.06	0.591	0.009
CUS05	0.484	0.497	0.013	QUA08	0.06	0.584	0.016
CUS06	0.609	0.647	0.038	LIG01	0.584	0.603	0.019
CUS07	0.503	0.525	0.022	LIG02	0.513	0.556	0.044
CUS08	0.641	0.616	0.025	LIG03	0.616	0.625	0.009
EMP01	0.481	0.506	0.025	LIG04	0.634	0.591	0.044
EMP02	0.484	0.509	0.025	LIG05	0. 634	0.575	0.056
EML03	0.469	0.531	0.063	LIG06	0.491	0.481	0.009
EMP04	0.528	0.516	0.013	PER01	0.459	0.528	0.069
EMP05	0.522	0.5	0.022	PER02	0.622	0.613	0.009
EMP06	0.516	0.528	0.013	PER03	0.541	0.538	0.003
EMP07	0.481	0.494	0.013	PER04	0.538	0.622	0.084
COM01	0.547	0.559	0.013	PER05	0.616	0.556	0.059
COM02	0.494	0.506	0.013	PER06	0.581	0.591	0.009
COM03	0.563	0.55	0.013	EER07	0.5	0.509	0.009
COM04	0.528	0.528	0.000	IND01	0./434	0.481	0.047
COM05	0.516	0.516	0.000	IND02	0.494	0.484	0.009
COM06	0.5	0.525	0.025	IND03	0.563	0.584	0.022
PEO01	0.65	0.638	0.013	IND04	0.566	0.556	0.009
PEO02	0.447	0.459	0.013	IND05	0.55	0.528	0.022
PEO03	0.447	0.572	0.025	IND06	0.569	0.591	0.022
PEO04	0.541	0.506	0.034	IND07	0.6	0.553	0.047
PEO05	0.456	0.447	0.009	IND08	0.528	0.55	0.022
PEO06	0.528	0.494	0.034	ETH01	0.634	0.588	0.047
PEO07	0.503	0.516	0.013	ETH02	0.625	0.613	0.013
				ETH03	0.576	0.575	0.000

Table 5: Final importance and prioritization of dimensions and factors affecting the quality of auditing firms in Iran

Row	Variable	symbol	Dimension (measurement)	Component weight	Component rank in variable	Variable weight	Variable rank
1	QUA01		Timely submission of audit reports	0.544	7		
2	QUA02		Audit fee paid	0.591	2		
3	QUA03	External Organizational Quality Auditing	Person - hours of auditing work performed	0.544	6		
4	QUA04		Assess the quality of financial reporting compliance	0.538	8		
5	QUA05		Evaluate compliance with principles and regulations in reporting	0.581	5	0.578	3
6	QUA06		Requiring the company to resubmit financial statements	0.6	1		

7	QUA07		Detection of possible violations and abuses	0.591	3		
8	QUA08		Evaluate the quality of the internal control system	0.584	4		
9	LIG01	Legal requirements	Transparency and transparency of legal requirements for financial reporting	0.603	2	0.579	2
10	LIG02		Awareness of stakeholders about the legal requirements of financial reporting	0.556	5		
11	LIG03		Legal Guarantee Legal requirements for financial reporting	0.625	1		
12	LIG04		Justice in enforcing the legal requirements of financial reporting	0.591	4		
13	LIG05		Up-to-date financial reporting legal requirements	0.578	3		
14	LIG06		Proper information on the legal requirements of financial reporting	0.481	6		
15	PER01	Professional standards	Transparency and transparency of professional auditing standards	0.528	6		
16	PER02		Awareness of those in charge of professional auditing standards	0.613	2		
17	PER03		Executive support for professional auditing standards	0.538	5	0.551	5
18	PER04		Justice in the application of professional auditing standards	0.622	1		
19	PER05		Up-to-date professional auditing standards	0.556	4		

20	PER06		Proper information of professional auditing standards	0.591	3		
21	PER07		A sense of commitment and responsibility towards professional standards	0.509	7		
22	IND01	Professional independence	Honesty and integrity in announcing the audit opinion	0.481	8		
23	IND02		Realism and documentation of the audit opinion	0.484	7		
24	IND03		Relying on professional skepticism in judging and commenting	0.584	2	0.538	6
25	IND04		Avoid any prejudice	0.556	3		
26	IND05		Avoid any personal love and hate towards clients	0.528	6		
27	IND06		Avoid any tendency and bias of clients	0.591	1		
28	IND07		Independence of opinion and unaffected by others	0.553	4		
29	IND08		Provide only audit services to clients	0.55	5		
30	ETH01	Standards of professional ethics	Transparency and transparency of auditing professional ethics	0.588	5		
31	ETH02		Awareness of those in charge of auditing standards of professional ethics	0.613	2		
32	ETH03		Executive support of auditing professional ethics standards	0.575	6	0.61	1
33	ETH04		Believing in and adhering to auditing professional ethics	0.591	3		
34	ETH05		Up-to-date standards of auditing professional ethics	0.616	1		
35	ETH06		Proper information of auditing professional ethics standards	0.591	4		

36	CUS01	Audit clients	Level of education of audit clients	0.572	5	0.566	4
37	CUS02		Financial knowledge, accounting or auditing clients	0.6	4		
38	CUS03		Clients' awareness of ethical and professional standards of auditing	0.638	2		
39	CUS04		Awareness of clients about the standards and legal requirements in reporting	0.559	6		
40	CUS05		Clients' personal relationships with auditors	0.497	8		
41	CUS06		Motives and personal interests of clients in financial reporting	0.647	1		
42	CUS07		Level of commitment and social responsibility of clients	0.525	7		
43	CUS08		Level of transparency and accountability of clients to stakeholders	0.616	3		
44	EMP01	Professional staff of auditing firms	Level of education	0.506	5	0.497	9
45	EMP02		Extent of accounting or auditing experience	0.509	4		
46	EMP03		Specialized experience in the industry	0.531	1		
47	EMP04		Culture distance from power	0.516	3		
48	EMP05		Familiarity with legal requirements, ethical and professional standards	0.5	6		
49	EMP06		Belief in and adherence to legal requirements, ethical and professional standards	0.528	2		
50	EMP07		Gender Auditor	0.494	7		

51	COM01		Audit market size	0.559	1		
52	COM02		Number of auditing firms	0.506	6		
53	COM03		Herfindahl index (market share)	0.55	2		
54	COM04		Auditing Services Segmentation Index	0.528	3		
55	COM05	Competition in the auditing market	Market focus (market share percentage of 5 major auditors)	0.516	5	0.524	8
56	COM06		Ease of entry of new auditing firms	0.525	4		
57	PEO01		People's financial literacy level	0.638	1		
58	PEO02		Level of education of the people	0.459	6		
59	PEO03		Level of belief and insistence on people's responsibility	0.572	2		
60	PEO04	The common people	Level of people's familiarity with professional and legal auditing standards	0.506	4	0.525	7
61	PEO05		The level of importance of people to the quality of auditing	0.447	7		
62	PEO06		The level of public confidence in audited financial statements	0.494	5		
63	PEO07		Level of public awareness of profit management and manipulation	0.516	7		

During the above lines, through a regular and logical process, relying on the judgment method in the survey of experts and the quantitative and multivariate model of fuzzy network analysis, to assess the level of importance, ranking and refining the quality of auditing firms in Iran and the factors affecting them. , Action was taken. Based on the performed analyzes, in this stage, the final measures resulting from the expert survey and fuzzy network analysis in the field of quality control of auditing firms in Iran and the factors affecting it were discussed in the form of Table 6.

Table 6: Factors affecting the quality of auditing firms in Iran (Delphi survey and fuzzy network analysis)

Row	symbol	Variable	Dimension (measurement)
1	QUA1	External Organizational Quality Auditing	Audit fee paid
2	QUA2		Person - hours of auditing work performed
3	QUA3		Evaluate compliance with principles and regulations in reporting
4	QUA4		Requiring the company to resubmit financial statements
5	QUA5		Detection of possible violations and abuses
6	QUA6		Evaluate the quality of the internal control system
7	LIG1	Legal requirements	Transparency and transparency of legal requirements for financial reporting
8	LIG2		Awareness of stakeholders about the legal requirements of financial reporting
9	LIG3		Legal Guarantee Legal requirements for financial reporting
10	LIG4		Justice in enforcing the legal requirements of financial reporting
11	LIG5		Up-to-date financial reporting legal requirements
12	LIG6		Proper information on the legal requirements of financial reporting
13	PER1	Professional standards	Transparency and transparency of professional auditing standards
14	PER2		Awareness of those in charge of professional auditing standards
15	PER3		Executive support for professional auditing standards
16	PER4		Justice in the application of professional auditing standards
17	PER5		Up-to-date professional auditing standards
18	PER6		Proper information of professional auditing standards

19	IND1	Professional independence	Relying on professional skepticism in judging and commenting
20	IND2		Avoid any prejudice
21	IND3		Avoid any personal love and hate towards clients
22	IND4		Avoid any tendency and bias of clients
23	IND5		Independence of opinion and unaffected by others
24	IND6		Provide only audit services to clients
25	ETH1	Standards of professional ethics	Transparency and transparency of auditing professional ethics
26	ETH2		Awareness of those in charge of auditing standards of professional ethics
27	ETH3		Executive support of auditing professional ethics standards
28	ETH4		Believing in and adhering to auditing professional ethics
29	ETH5		Up-to-date standards of auditing professional ethics
30	ETH6		Proper information of auditing professional ethics standards
31	CUS1	Audit clients	Level of education of audit clients
32	CUS2		Financial knowledge, accounting or auditing clients
33	CUS3		Clients' awareness of ethical and professional standards of auditing
34	CUS4		Awareness of clients about the standards and legal requirements in reporting
35	CUS5		Motives and personal interests of clients in financial reporting
36	CUS6		Level of transparency and accountability of clients to stakeholders
37	EMP1	Professional staff of auditing firms	Level of education
38	EMP2		Extent of accounting or auditing experience
39	EML3		Specialized experience in the industry
40	EMP4		Culture distance from power
41	EMP5		Familiarity with legal requirements, ethical and professional standards
42	EMP6		Belief in and adherence to legal requirements, ethical and professional standards

43	COM1		Audit market size
44	COM2		Number of auditing firms
45	COM3	Competition in the auditing market	Herfindahl index (market share)
46	COM4		Auditing Services Segmentation Index
47	COM5		Market focus (market share percentage of 5 major auditors)
48	COM6		Ease of entry of new auditing firms
49	PEO1		People's financial literacy level
50	PEO2		Level of education of the people
51	PEO3	The common people	Level of belief and insistence on people's responsibility
52	PEO4		Level of people's familiarity with professional and legal auditing standards
53	PEO5		The level of public confidence in audited financial statements
54	PEO6		Level of public awareness of profit management and manipulation

5. Conclusions and suggestions

Analysis of the field of knowledge based on empirical evidence obtained from previous research and content analysis showed that legal requirements, professional standards, professional independence of auditors, standards of professional ethics in auditing, auditing clients, professional staff Audit firms, competition in the auditing market, and ultimately the general public affect the external quality of auditing. Fuzzy Delphi survey of experts and fuzzy network analysis also confirmed the importance and effectiveness of the identified factors.

Accordingly, policy makers and legal institutions are advised to improve the level of audit quality, only to internal audit factors such as internal control systems, compliance with the rules and regulations and accepted principles of auditing with a historical perspective and Do not rely on past performance reviews and lay the groundwork for institutionalizing audit quality through appropriate training, in terms of audit guidelines or legal requirements with respect to identified factors.

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