

Identifying and ranking the main components of environmental auditing to monitor the executive organs of the country

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Abstract

In the tenth axis of general environmental policies, the Supreme Leader has emphasized the establishment of environmental auditing, identifying and ranking the main components of environmental auditing to monitor executive bodies from the point of view of the type of auditing is the goal of this research. In this study, first, the initial indicators were identified based on the study of research literature and the statistical method of qualitative content analysis. Then, in the fall of 1400, by interviewing 35 auditors of the Court of Audit as experts who were selected initial indicators identified by the Delphi statistical method, were finalized. Then, using a questionnaire and a new analytical methodology, Interpretive-Structural Modeling and the relationships between the indicators were determined by MATLAB and Excel software, and the ISM graph was plotted in an integrated manner. Finally, using MICMAC analysis, the penetration power and dependence of the identified indicators were evaluated and the final pattern was drawn. Validity was calculated as content and reliability was calculated using the kappa coefficient. The main components of environmental auditing to monitor the executive bodies of the country from the perspective of the type of auditing include environmental compliance auditing, environmental financial auditing and environmental performance auditing. The components of environmental compliance auditing and environmental financial auditing with high power of influence and low dependence are placed as independent components on the second level and have the most importance and impact, the component of environmental performance auditing with low power of influence and high dependence as The dependent component is placed at the first level and the influencing component.

Keywords: Environmental auditing, Monitoring, executive organs, Interpretive-Structural Modeling (ISM)
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1 Introduction

The health of the environment has a tight relationship with the healthy life of a society, as prevention and health are prioritized in treatment and care, and providing healthy space and a suitable environment is prior to compensation for because of polluted environment. Currently, security departing from its traditional and military concept with other concepts such as public, the social and economic well-being of individuals, and generally their surrounding environmental protection has created an inseparable link. The new theorists of security believe that topics including destroying environmental resources and intense limitations for acquiring new environmental resources are among the

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most important human society threats that, in the case of neglecting, it will lead to domestic and cross-border disagreement and conflicts. The environment with all economic, social, and cultural sections is considered comprehensive and influential due to its interactions. Therefore, the existence of legal infrastructure and upstream documents and establishing a controlling and governing system along with using motivational and financial incentives are undeniable necessities in order to protect the environment. Environmental protection is also considered a governmental subject and public responsibility in the Islamic Republic of Iran, which is emphasized in the Constitution and the Islamic Republic of Iran's 20-Year Vision Plan and General Environmental Policies announced by the Supreme Leader, as well as Act for 6th Developmental Plan. Despite seriously neglecting the issue of sustainable development, environmental economics, not calculating environmental destruction in the Iranian economic system, and finally, the lack of sufficient understanding of the importance and necessity of environmental topics and, therefore, the weakness of committing to implementing development plans have led in the failure in environmental plans. Despite serious attempts by responsible organs to implement this affair, the condition of the environment in Iran is not considered appropriate; because of the air pollution of megalopolises, a huge tent of dust of Arabic countries in Iran's sky, accumulation of oil pollution and agricultural pesticides on sea shores and rivers, the continuous destroy of wetlands in Iran, the complicated condition of wildlife destroying protected forests along with other numerous environmental problems show the more regrettable condition of the environmental condition of Iran in these years more than before. Therefore, the Supreme Leader announced General Environmental Policies in 2015 that its 10th axis emphasized the establishment of environmental accounting, which highlights the duty of Iran's financial tribunal in this field [10]. Environmental auditing becomes an important tool for maintaining and achieving the standards of environmental pollution control. This type of auditing is defined as a systematic, document, periodic, and even-handed investigation of observance of environmental rules and principles by economic organizations and corporations [6]. In different countries, the financial tribunal (supreme audit firm) is a supreme regulatory body and independent public auditor and the executor of public auditing and the regulatory arm of legislative power [4]. According to article 54 of the Constitution of the Islamic Republic of Iran, the national financial tribunal is to be directly under the supervision of the Islamic Consultative Assembly [24]. In fact, article 54 of the Constitution interprets the financial tribunal agency and its special position as a supervisor arm for legislative power. According to the note of article 2 in national financial tribunal law, each executive unit which is considered a public section under articles (44) and (45) of the Constitution, is subject to investigation by the financial tribunal. Therefore, the responsibility of the national financial tribunal is to protect the vast range of public treasury of environmental resources and public wealth that this issue is the source of the legal qualification of environmental auditing by the national financial tribunal. According to the article (47) of national financial tribunal law, this tribunal became a member of The International Organization of Supreme Audit Institutions (INTOSAI), and the Asian Organization of Supreme Audit Institutions (ASOSAI) has commitments especially in the field of environmental auditing to these organizations.

One of the main obstacles to environmental auditing is the lack of identifying the main components of environmental auditing. Therefore, the fundamental problem is "what are the main components of environmental auditing from the point of view of the type of auditing in order to monitor executive bodies by the national financial tribunal?"

2 Literature Review and Background

There are different theories that explain the motivation of companies for environmental and social information disclosure. These theories include political economy theory, legitimacy theory, stakeholders' theory, and organizational theory [18], which are explained in the following.

2.1 Political Economy Theory

This theory confirms that auditing can play a pivotal role in the method of organizational structure economically, politically, and socially, and it suggests in the form of a social contract concept that the existence of an organization relies on the general support of society. If an inappropriate social activity of an organization is observed, society calls the confirmation of that society off, and this issue leads to its failure. In order to protect its position in society, management may publish related information to the environmental and social activities of this organization. This theory confirms that individuals or organizations have this right to follow their individual goals and their favourites. These rights are balanced by the environment and society they live in [12].

2.2 Legitimacy Theory

Legitimacy theory is derived from the political economy paradigm and focuses on the assumption that an organization should protect its social role by responding to the needs of society and giving whatever society wants. According

to this theory, the survival of an organization is sustainable by the pressures of the market and the expectations of society and so understanding more extended concerns of society states the expectations of society [2].

2.3 Stakeholders' Theory

The literature emphasizes two main variables of stakeholders' theory. Normalized branch (moral) and managerial (tools). This theory reflects the establishment of social responsibilities in the framework of the company plan, an attempt to develop strategies in order to be confirmed by the organization's key stakeholders, and also provides a potential explanation of environmental and social disclosure in the word of company response to the intense of stakeholders' demand, company strategic orientation toward environmental and social responsibilities and exchange between social, environmental and economic purposes of the company [17].

2.3.1 Moral Branch of Stakeholders' Theory

The moral approach indicates that stakeholders are rightful about the activity of organizations, and managers should govern the organization in order to maximize the benefits of all stakeholders. According to this approach, the manager should pay attention to the benefits of shareholders and other stakeholders equally, and when there is a contradiction between their benefits, the manager should try to reduce these contradictions and balance between them [2].

2.3.2 Managerial Branch of Stakeholders' Theory

The managerial point of view pays more attention to social and environmental reports and focuses on meeting stakeholders' needs who have a direct and important impact on the company. The main point of expanding social and environmental disclosure is to fulfill commitments toward the accountability and responsibility of the company. Supporting the company's disclosure is very strong and influential due to responses to stakeholders at first. In this branch of stakeholders' theory, special groups of individual stakeholders are paid attention to more. Therefore, the organization doesn't respond to all interests of stakeholders equally, but its response to more influential stakeholders. An organization is successful in considering the demand of all-powerful and influential groups of stakeholders [2].

2.4 Organizational Theory

The organizational theory deals with the test and explanation of how organizational norms and pressures on social changes influence organizations. According to organizational theory, the activities of the organization are limited by different kinds of external pressures. According to the assumptions of this theory, organizations should provide responses to external demands and the expectations of society in order to protect their legitimacy. This theory explores how organizational structures and activities are formed by cultural, political, and social pressures that are surrounded them [2]. according to article (8) of the Civil Service Management Act (approved in 2007) governance affairs include affairs that the realization of which leads in the authority and governance of the country and its benefits are for all levels of society unlimitedly and utilizing this service doesn't lead in limiting the utilization of others. According to the close (t) of this article, environmental protection is also a governance affair [25].

2.5 Executive Organizations

According to article (5) of the Civil Service Management Act (approved in 2007), executive organizations include all ministries, governmental institutions, non-governmental public institutions, governmental firms, and all organizations on which the inclusion of law requires mentioning or affirming names such as National Iranian Oil Company, Industrial Development and Renovation Organization of Iran, Central Bank of Iran, banks and governmental insurances [25].

2.6 Environmental Auditing

According to the World Bank definition, "environmental auditing" is the systematic investigation of environmental information about organizing facilities or spaces in order to change something that should fit to international standards. Mentioned criteria are based on global, national or domestic environmental standards. Therefore, environmental auditing is the process of collecting, analyzing, interpreting and documenting sufficient information to realize auditing purposes [10].

2.6.1 Criteria in Environmental Auditing

The criteria of environmental auditing reflect standards or rules and components which are used to investigate audited organizations. The results of comparing the current performance of audited organizations to existing criteria create the findings of auditing. Determining primary and basic reasonable and applicable criteria is essential for the successful implementation of auditing. The type of using auditing, purpose, and possible resources for auditing are two main bases for creating auditing criteria [10].

2.6.2 Environmental Compliance Auditing

Environmental compliance auditing has been determined to study whether organizations and bodies under auditing obey or execute the procedures, laws, or environmental rules determined by legal entities [10].

2.6.3 Environmental Financial Auditing

Environmental financial auditing is implemented to determine the adaptation of financial statements to predetermined criteria. Normally, these criteria are the standards of accounting [10].

2.6.4 Environmental Performance Auditing

Environmental performance auditing is a process that acts by collecting accessible evidence and professional judges evaluating economic efficiency, efficiency, and effectiveness in order to improve and enhance performance in the effective fields of the environment [10].

Environmental health has a close relationship with the healthy life of society; providing healthy space and a suitable environment is also prior to compensation for a polluted environment. Therefore, the Supreme Leader emphasized establishing environmental auditing in the 10th axis of general environmental policies; one of the main obstacles to implementing environmental auditing in Iran is the lack of determining the main components of environmental auditing. Therefore, the main problem is what are the main components of environmental auditing in the sight of the type of auditing in order to monitor national financial tribunal on executive bodies?

The two following questions are presented and studied in order to achieve this main question:

1. What are the main components of environmental auditing in the sight of the type of auditing in order to monitor national financial tribunals on executive bodies?
2. What is the priority of the main components of environmental auditing for the monitoring of national financial tribunal on executive bodies?

In the following, some researches of conducted studies are mentioned in regard to the current research. Sarraf and Aghabalayi Bakhtiar [29] conducted research as "Environmental Auditing: a new tool for the environmental management of organizations," and they studied issues such as accepting the commitment to perform environmental auditing, costs, and benefits of environmental auditing, the role of environmental auditing in the environmental management system and environmental costs in environmental accounting. Zia Vakilifard and Sarrafi [31] studied the importance of environmental, social, and economic factor disclosure of companies in research entitled "Providing Relationship Pattern between Influential Factors on The Level of Disclosure of Environmental, Social and Economic Factors of Companies and Information Asymmetry based on Positive Accounting Theory with the Approach of Industry Effect" and concluded that the level of disclosure of environmental and social information has a significant difference affecting by industry and information disclosure leads in reducing information asymmetry in the mentioned fields. Namazi and Ismailpour [26] studied the impact of auditing quality on the value added of companies by emphasizing the mediating role of the social responsibility of companies listed in the Tehran Stock Exchange in a research entitled "Investigating Auditing Quality on the Value Added of Companies by Emphasizing on the Mediating Role of the Social Responsibility" and concluded that the performance of companies improves by increasing social responsibility.

Rozei [28] concluded in research entitled "Providing Suitable Pattern of Auditing and Financial Supervision in Police Force of Islamic Republic of Iran" that the strategies of pattern include having strategic thought, creating motivation between employers, teamwork and synergy, comprehensive quality management, composing auditing program, auditing based on risk, time management, suitable reporting, and strategic auditing and efficient and influent auditing, reduced financial violence and increased discipline in works and economic, optimum and effective source utilization are the consequences of the pattern. Behroozinejad [5] concluded in a research entitled "Mechanisms Coping with Political Corruption in the Constitution of the Islamic Republic of Iran" that we can mention principles (174) and (55)

in the Constitution in the field of establishing specialized organizations in terms of anti-corruption such as General Inspection Office of Islamic Republic of Iran and National Financial Tribunal as fundamental ways of anti-political corruption. Cho, Senn and Sobkowiak studied [8] the environmental consequences and economic improvements after Covid-19 in a research entitled "Sustainability in risk in Covid-19: Investigating the Role of Accounting in Solving Environmental Crises" and concluded that accounting mechanisms and current response applied in motive economic plans as well as the traditional approaches of environmental accounting is insufficient and limiting for obtaining a long-term sustainability change.

Cao et al. [7] concluded in a research entitled "Governmental Auditing and Environmental Governance: Evidence of Modifying China Auditing System" that the environmental effect of auditing modification mainly results from the improvement of environmental performance. Tan and Jiang [30] concluded in a research entitled "National Environmental Auditing and Regional Energy Efficiency in the Point of View of Institution and Development" that national environmental auditing can improve regional energy efficiency significantly. Liu, Wang and Wu [19] concluded in a research entitled "Environmental Rules and Green Innovation: Evidence of New Laws of China Environment Protection" that companies intend to provide more requests for environmental patents after implementing new laws of environmental protection.

Cook et al. [9], in research entitled "Environmental auditing, Objectivity and Transparency Effectiveness," investigated the distinction between transparency, objectivity and effectiveness norms of environmental auditing and concluded that auditing literature shows these norms in an algorithm that these norms are uncritically used as the characteristics of good auditing or as the other tools from which auditing cannot achieve their goals. Also, transparency, objectiveness, and effectiveness are applied as norms that can be used. Ikani Ocheni [15] studied environmental destruction and damages and the necessity of environmental auditing in research entitled "Environmental Auditing of Press Conference for Sustainability in Nigeria's Environment and concluded that performing environmental auditing is necessary. As can be observed basically, there is no special research entitled "Identifying and Ranking the Main Components of Environmental Auditing to Monitor the Executive Organs": however, there are some similar and related researches in this field mentioned in this study, which are mainly related to environmental disclosure, auditing quality, governmental auditing, national environmental auditing, and environmental rules. The obvious difference between this research and the current research is that the topic of identifying the components of environmental auditing has not been addressed until now, especially in terms of the type of auditing; therefore, the topic of this article is new.

3 Research Methodology

The tools for gathering information will be mainly taking notes, interviews, and questionnaires. The library method is used to study the literature of research. Published books, as well as articles related to this topic in magazines and reputable scientific sites, are studied and reviewed in this regard. Then, in order to achieve the research goals, field studies are conducted, and the main components of environmental auditing to monitor executive organizations based on the qualitative content analysis method by asking for the opinions of experts who were selected by the snowball sampling are collected. Reliability as content and reliability has been calculated using Cronbach's alpha coefficient. In the current research, primary information has been provided through the study of research literature and library information in order to identify the indicators; the opinions of experts are analyzed using the qualitative content analysis method to identify final factors. Excel software will be used in this regard. Then, the ranking will be accomplished by using Interpretive Structural Modelling (ISM) and MICMAC analysis with the assistance of MATLAB and Excel software.

4 Research Findings

The primary components of environmental auditing are extracted as the following table by using the study of literature review and library information and by using the qualitative content analysis method.

Table 1: primary components of environmental auditing in terms of the type of auditing

Components	References	Frequency
Financial and environmental auditing	[10], "Environmental auditing."	5
	[3], "Principles of environmental auditing and its challenges by the national financial tribunal."	

	[23], "Environmental auditing and the role of national financial tribunal in environment protection."	
	[21], "Environmental accounting and auditing."	
	[16], "Guidance on conducting audits of activities with an environmental perspective."	
Management environmental auditing	[13], "Environmental auditing: a new challenge in the auditing profession"	1
	[10], "Environmental auditing."	
Performance environmental auditing	[3], "Principles of environmental auditing and its challenges by the national financial tribunal."	5
	[23], "Environmental auditing and the role of national financial tribunal in environment protection."	
	[21], "Environmental accounting and auditing."	
	[16], "Guidance on conducting audits of activities with an environmental perspective."	
Environmental compliance auditing with a combined approach to performance auditing and compliance auditing	[3], "Principles of environmental auditing and its challenges by the national financial tribunal."	3
	[21], "Environmental accounting and auditing."	
	[16], "Guidance on conducting audits of activities with an environmental perspective."	
	[10], "Environmental auditing."	
Compliance environmental auditing	[13], "Environmental auditing: a new challenge in the auditing profession"	6
	[3], "Principles of environmental auditing and its challenges by the national financial tribunal."	
	[23], "Environmental auditing and the role of national financial tribunal in environment protection."	
	[21], "Environmental accounting and auditing."	
	[16], "Guidance on conducting audits of activities with an environmental perspective."	
Environmental assessment auditing	[13], "Environmental auditing: a new challenge in the auditing profession"	1
Waste auditing	[13], "Environmental auditing: a new challenge in the auditing profession"	1
Commitment environmental auditing	[13], "Environmental auditing: a new challenge in the auditing profession"	1
Supplier auditing	[13], "Environmental auditing: a new challenge in the auditing profession"	1
Environmental auditing with the pathological approach	[3], "Principles of environmental auditing and its challenges by the national financial tribunal"	1

After identifying references and indicators, categories (indicators) were coded and given to two coders to assess reliability.

Table 2: coding categories

Code (password)	Components	Number of observation	percentage	Squared percentage
EA1	Financial and environmental auditing	13	17.6	308.619
EA2	Management environmental auditing	3	4.05	16.4354
EA3	Performance environmental auditing	22	29.7	883.857
EA4	Environmental compliance auditing with a combined approach to performance auditing and compliance auditing	5	6.76	45.6538
EA5	Compliance environmental auditing	16	21.6	467.495
EA6	Environmental assessment auditing	4	5.41	29.2184
EA7	Waste auditing	4	5.41	29.2184
EA8	Commitment environmental auditing	3	4.05	16.4354

EA9	Supplier auditing	3	4.05	16.4354
EA10	Environmental auditing with the pathological approach	1	1.35	1.82615
		74	100	1815.19

Table 3: coding categories

Code (password)	Coder 1	Coder 2	Agreement
EA1	13	13	+
EA2	3	3	+
EA3	22	22	+
EA4	5	5	+
EA5	16	16	+
EA6	4	4	+
EA7	4	4	+
EA8	2	3	-
EA9	3	3	+
EA10	1	0	-

A Kappa coefficient greater than 70% is acceptable, which is calculated, and a coefficient of 93.4% for identified categories has reliability:

$$Po = \left(\sum_{i=1}^{10} (\%EA) \right) - (\%EA8 + \%EA10) = 94.6\% \quad (4.1)$$

$$Pe = \left(\sum_{i=1}^{10} (\%EA)^2 \right) = 18.15\% \quad (4.2)$$

$$Kappa = \frac{(Po - Pe)}{1 - Pe} = 93.4\% \quad (4.3)$$

In the diagram 1, environmental auditing is identified as the main category, and financial, environmental auditing, management environmental auditing, performance environmental auditing, environmental compliance auditing with a combined approach to performance auditing and compliance auditing, environmental compliance auditing, environmental assessment auditing, waste auditing, commitment environmental auditing, supplier auditing and environmental auditing with the pathological approach are determined as the sub-categories.

4.1 Stabilization and Identification of the Main Components of Environmental Auditing

After identifying the indicators, in order to ensure the direct relationship of indicators to environmental auditing for the supervision of the national financial tribunal on the executive organizations of the country, and according to the demographic characteristics of the table 4 and using the Delphi method, the indicators were established in two stages.

Table 4: The Demographic characteristics of the qualitative section

Education		Working experience			Position (defined organizational position for the auditors of the national financial tribunal)		
PH.D	Master's degree	10 to 15 years	15 to 20 years	More than 20 years	Senior auditor general	Auditor general	Senior auditor
4	31	16	12	7	8	15	12

Therefore, all the extracted indicators were shared with the experts in the first stage, and each indicator was scored 1 to 10 (1-4 low, 5-6 medium, 7-10 high). After collecting and analyzing information from the questionnaires, the average was calculated, and the answers to previous questionnaires, along with the resulting average, were shared with the experts. The results are shown in the table 5.

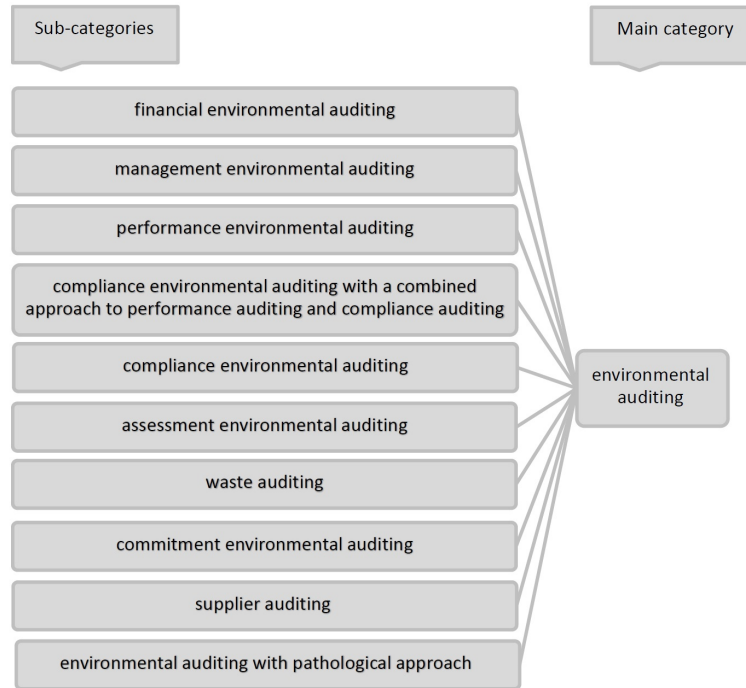


Figure 1: Diagram of the categories of environmental auditing

Table 5: Final indicators of environmental auditing in terms of the type of auditing

Indicators	Average of the first stage	Average of the second stage	Low (1-4)	Medium (5-6)	High (7-10)	Gathering of experts' opinions
Financial and environmental auditing	8	8.307692308	4	3	28	*
Management environmental auditing	3.923076923	3.615384615	24	6	5	–
Performance environmental auditing	9.615384615	9.846153846	0	0	35	*
compliance environmental auditing with a combined approach to performance auditing and compliance auditing	4.076923077	3.846153846	25	7	3	–
Compliance environmental auditing	9.230769231	9.461538462	0	2	33	*
assessment environmental auditing	3.615384615	3.538461538	31	3	1	–
Waste auditing	3.692307692	3.230769231	30	2	3	–
Commitment environmental auditing	3.538461538	3.153846154	31	3	1	–
Supplier auditing	3.230769231	3	33	1	1	–
Environmental auditing with the pathological approach	3.30792308	2.923076923	34	1	0	–

As it is observed, by the agreement coefficient of greater than 80%, the components of environmental compliance auditing, financial, environmental auditing, and performance environmental auditing are confirmed and gathered by the experts, and the indicators of management environmental auditing, environmental compliance auditing with

a combined approach to performance auditing and compliance auditing, environmental assessment auditing, waste auditing, commitment environmental auditing, supplier auditing and environmental auditing with the pathological approach are not under the gathering of experts' opinion and omitted from the main indicators.

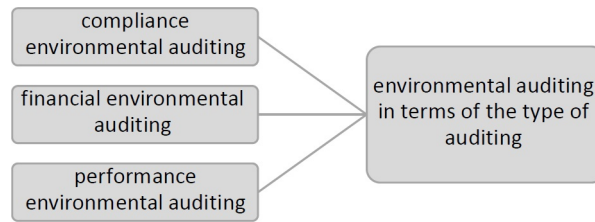


Figure 2: Environmental auditing in terms of the type of auditing

4.2 Structural Self-Interactive Matrix (SSIM)

After identifying the main components of environmental auditing, these factors are placed in the structural self-interactive matrix (SSIM). In order to do it, some questionnaires were designed first in which they asked the respondents to determine the type of the two-by-two communication of factors. Interpretive structural modeling suggests that experts' opinions are used based on different managerial techniques, including brainstorming and name group in the development of content relationships between variables; therefore, the structural self-interactive matrix is formed by using four modes of content relationships and is completed by 50 experts and specialists according to the demographic characteristics of the following table 6.

- Symbol (V) : i causes j
 - Symbol (A) : j causes i
 - Symbol (X) : the bilateral relationship of (i and j) : i causes j as well as j causes i .
 - Symbol (O) : there is no relationship between i and j
- (4.4)

Table 6: The Demographic characteristics of the quantitative section

Education		Working experience			Position (defined organizational position for the auditors of the national financial tribunal)		
PH.D	Master's degree	10 to 15 years	15 to 20 years	More than 20 years	Senior auditor general	Auditor general	Senior auditor
3	25	22	14	18	12	6	5

Group decision-making rule should be determined in order to obtain the collective agreement of the existing relationship between each pair, such as A and B. A common way of using collective agreements is using expert voting. For the majority of votes, if n people have voted about the dominance of element A over element B (or vice versa and ineffective), a relationship of those judgments will be selected for A and B, and more than half of the votes agree with that relation. The logic of interpretive structural modeling is based on non-parametric methods and based on the mode in frequencies.

4.3 Initial Reachability Matrix

The initial reachability matrix is derived from converting the structural self-interactive matrix to a two-value matrix (zero-one). In order to extract the reachability matrix, reachability should be substituted X and V symbols with one and A and O symbols with 0 so that the result is the initial reachability matrix. Then, the secondary relationship has been controlled between dimensions/ indicators. By converting the symbols of the SSIM matrix to 1 and 0, the matrix can be achieved by the following rules [11]:

1. If the entry (ji) in matrix SSIM has taken symbol V, the considered entry in the initial matrix is 1, and its symmetry entry, i.e., entry (ij), is 0.

Table 7: Questionnaire

Indicators	Performance environmental auditing	Financial and environmental auditing	Compliance environmental auditing
Compliance environmental auditing	V	X	
Financial and environmental auditing	O		
Performance environmental auditing			

2. If the entry (ji) in matrix SSIM has taken symbol A, the considered entry in the initial matrix is 0, and its symmetry entry, i.e., entry (ij), is 1.
3. If the entry (ji) in matrix SSIM has taken symbol X, the considered entry in the initial matrix is one, and its symmetry entry, i.e., entry (ij), is 1.
4. If the entry (ji) in matrix SSIM has taken symbol O, the considered entry in the initial matrix is 0, and its symmetry entry, i.e., entry (ij), is 0.

The initial reachability matrix is converted according to Ism group techniques and by using the mode.

Table 8: Initial reachability matrix

Indicators	Compliance environmental auditing	Financial and environmental auditing	Performance environmental auditing
Compliance environmental auditing	1	1	1
Financial and environmental auditing	1	1	0
Performance environmental auditing	0	0	1

4.4 Final Reachability Matrix

After forming the initial reachability matrix by using the transmissivity in variable relationships, the final reachability matrix is formed in order to fit the initial reachability matrix. As if (I,j) has a relationship and also (j,k), then (I,k) has a relationship [27]. the transmissivity of the content relationship between variables is a fundamental assumption in interpretive structural modeling and indicates that if variable A effect variable B and variable B effect variable C, so variable A effect variable C [1].

Huang, Tzeng and Ong [14] used mathematical rules to create fitness, so the reachability matrix is raised to $(k + 1)$ and $k \geq 1$. Of course, the raising matrix should be based on the Boolean rule $(1 + 1 = 1, 1 \times 1 = 1)$. In this stage, all the secondary relations between variables are investigated. Final reachability matrix ia achieved by Boolean rule and performed in MATLAB software.

$$SSIM = Boolean(A^n + A^{n-1} + \dots + A^0) \tag{4.5}$$

4.5 Determining Variable Level

After forming the final reachability matrix, we calculate the set of input (prerequisite) and output (achievement) criteria for each criterion and then determine the mutual factors in this stage [20]. In this stage, a criterion has the highest level of ISM²² that the output set (achievement) is equal to the mutual set.

After identifying these variable or variables, the row and column of this table are omitted, and the operation is repeated on other criteria. The results are mentioned in the following [1].

Compliance environmental auditing and financial environmental auditing indicators become equal in the second step of the output set of the final reachability matrix with the mutual set, so the indicators are effective, and performance environmental auditing indicator becomes equal in the first step of the output set of final reachability matrix with the mutual set, and the indicator is effective.

Table 9: Final reachability matrix

Indicators	Compliance environmental auditing	Financial and environmental auditing	Performance environmental auditing
Compliance environmental auditing	1	1	1
Financial and environmental auditing	1	1	1
Performance environmental auditing	0	0	1

Table 10: determining the first level of environmental auditing variables in terms of the type of auditing

Indicator name	Indicator number	Input	Output	Mutual	First level
Compliance environmental auditing	1	1, 2	1, 2, 3	1, 2	No
Financial and environmental auditing	2	1, 2	1, 2, 3	1, 2	No
Performance environmental auditing	3	1, 2, 3	3	3	Yes

Table 11: determining the second level of environmental auditing variables in terms of the type of auditing

Indicator name	Indicator number	Input	Output	Mutual	First level
Compliance environmental auditing	1	1, 2	1, 2	1, 2	Yes
Financial and environmental auditing	2	1, 2	1, 2	1, 2	Yes

Table 12: Summary of the results of determining the levels of environmental auditing variables in terms of the type of auditing

Indicator	level
Compliance environmental auditing	2
Financial and environmental auditing	2
Performance environmental auditing	1

4.6 Drawing Interaction Network

In this step, according to the level of criteria in Interpretive Structural Modelling (ISM) and the relationships between them, an interaction network is drawn. Level 1 is chosen as the most affected level, and the last level is determined as the most affected level. There is a relation between i and j; it is shown by a directional arrow. A created final diagram is obtained by omitting transitive modes as well as using the division of levels which is shown in the following diagram.

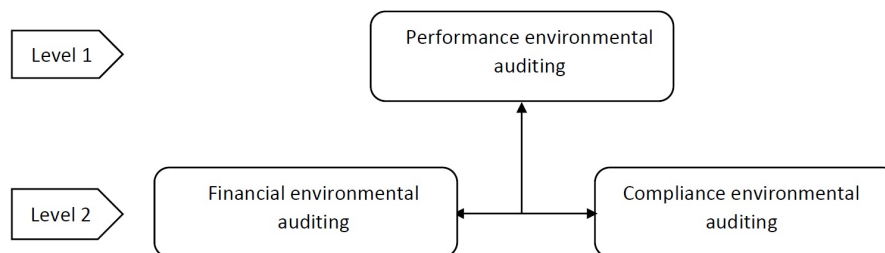


Figure 3: The diagram of the interaction network of environmental auditing indicators in terms of the type of auditing

In the above diagram, environmental compliance auditing and financial, environmental auditing indicators (level 2) are the most effective, and performance environmental auditing indicator (level 1) is the most affected.

4.7 MICMAC Analysis

MICMAC analysis is formed based on driving power (affecting) and dependence degree (affected) and provides the possibility of limited investigation of each variable. A variable with higher driving power and lower dependence degree has the most effect on other variables, and it is affected the least.

- Driving power: the number of elements on which i-th element effect.
- Dependence degree: the number of elements that affect the ith element.

The variables are divided into four categories autonomous, dependent, linkage (connective), and independent.

Autonomous: autonomous variables have low dependence and guiding power. These criteria are generally separated from the system because they have weak linkages with the system. A change in these variables does not lead to a serious change in the system.

Dependent: dependent variables have a strong dependence and weak guide. These variables have been affected the most and effecting the least.

Independent: independent variables have low dependence and high guiding. In other words, they have been affecting the most and affected the least.

Linkage: linkage variables or connective variables have high dependence as well as high guiding power. In other words, they have been affected and affected very strongly, and every little change in these variables causes major changes in the system.

Table 13: MICMAC Analysis of environmental auditing in terms of the type of auditing

Indicator	Driving power	Dependence power
Compliance environmental auditing	3	2
Financial and environmental auditing	3	2
Performance environmental auditing	1	3

The above table shows that environmental compliance auditing and financial, environmental auditing indicators have the highest driving power and the lowest dependence power and are determined as the independent indicators, and performance environmental auditing indicator is determined as the dependent variable because of its low driving power and the highest degree of dependence.

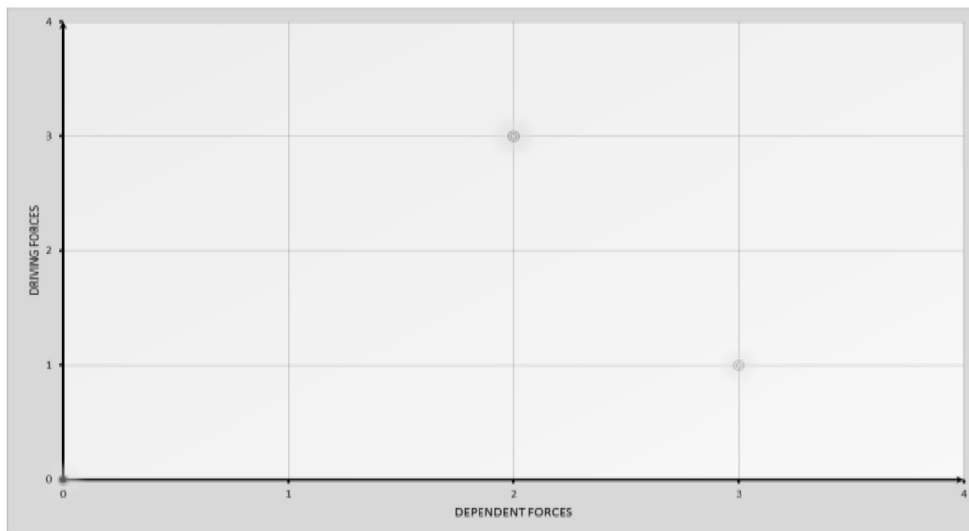


Figure 4: MICMAC diagram of environmental auditing in terms of the type of auditing

According to the figure 4 and calculated driving and dependence power, environmental compliance auditing and financial environmental auditing indicators are effective indicators in the pattern, and performance, environmental auditing has the least impact.

5 Discussion and Conclusion

The health of the environment has a tight relationship with the healthy life of a society, as prevention and health are prioritized in treatment and case; providing healthy space and a suitable environment is prior to compensation for

because of polluted environment. Currently, security departing from its traditional and military concept with other concepts such as public, the social and economic well-being of individuals, and generally their surrounding environmental protection has created an inseparable link. Therefore, the Supreme Leader announced General Environmental Policies in 2015 that its 10th axis emphasized the establishment of environmental accounting, which highlights the duty of Iran's financial tribunal in this field. So the purpose of this research is to identify and arrange the main components of environmental auditing for monitoring executive organizations in terms of the type of auditing.

In this regard, the initial components include financial, environmental auditing, management environmental auditing, performance environmental auditing, environmental compliance auditing with a combined approach to performance auditing and compliance auditing, environmental compliance auditing, environmental assessment auditing, waste auditing, commitment environmental auditing, supplier auditing and environmental auditing with the pathological approach are identified by using qualitative content analysis method, and the opinions of experts about the main components of environmental auditing are determined as environmental compliance auditing, financial, environmental auditing and performance environmental auditing. The findings of this stage were consistent with the results of [3, 10, 21, 22]. Interpretive Structural Modelling (ISM) and MICMAC analysis have been used to analyze the relationships between the components. In Interpretive Structural Modelling (ISM), the results showed that environmental compliance auditing and financial, environmental auditing components are in level (2), and they are effective components, performance environmental auditing component is in level (1), and it is impressive component. In MICMAC analysis, the results showed that environmental compliance auditing and financial, environmental auditing components were determined as independent components with high driving power and low dependence. Also, performance environmental auditing was determined as a dependent component with low driving power and high dependence.

According to the results of the research, it is suggested to prepare an appropriate theoretical framework in order to compose environmental auditing standards by using the determined components of the national financial tribunal for effectively monitoring executive organizations in the field of environmental auditing. Also, the national financial tribunal attempt to provide environmental auditing guidelines for auditors' utilization by using the importance degree of provided components and determining priorities in this research. It is suggested that future researchers perform research in the field of designing environmental compliance auditing for monitoring executive organizations. Also, it is proposed to conduct a search in order to determine indicators and provide patterns for environmental auditing.

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