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Environmental Auditing Practices in Iraqi Oil Companies for Sustainable Development

Praktik Audit Lingkungan di Perusahaan Minyak Irak untuk Pembangunan Berkelanjutan

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Abstract

General Background: Environmental auditing is essential for assessing corporate environmental performance and ensuring compliance with sustainability regulations**Specific Background:** The Iraqi oil sector significantly impacts the environment, yet environmental auditing remains underdeveloped and underexplored. **Knowledge Gap:** Limited research exists on the role of environmental auditing in achieving sustainability in Iraq's oil industry, particularly regarding regulatory influence. **Aims:** This study examines environmental audit requirements and their impact on sustainable development in Iraqi oil companies. **Results:** Data from 299 auditors and accountants indicate a strong correlation between environmental auditing and sustainable development, despite regulatory challenges. **Novelty:** The study establishes a direct link between environmental auditing and sustainability, offering a structured framework for corporate sustainability strategies. **Implications:** Findings highlight the need for stronger regulations, policy reforms, and systematic audits to align the oil sector with global sustainability goals.

Highlights:

- Audit-Sustainability Link – Environmental auditing significantly impacts sustainable development in the oil sector.
- Regulatory Challenges – Weak enforcement and limited studies hinder effective environmental auditing in Iraq.
- Policy Implications – Strengthening regulations and systematic audits are crucial for sustainability integration.

Keywords: Environmental Auditing, Sustainable Development, Oil Industry, Regulatory Compliance

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Introduction

Environmental accounting and auditing are crucial for understanding social, environmental, and economic aspects of industrial activities, waste, and service sectors[1]. They provide decision-makers with relevant information for compliance with environmental protection laws. However, insufficient audit procedures and weaknesses in environmental performance need further exploration, ensuring compliance with environmental regulations, and addressing environmental risks[2]. However, the impact

The importance of this research lies in exploring the requirements of environmental auditing in oil companies, whose activities have a negative impact on the environment and public health, particularly in oil-producing countries. Environmental auditing contributes to protecting and achieving sustainable development for both current and future generations[3].

The research addresses a scientific gap not covered in previous studies, particularly in identifying ways to mitigate environmental pollution in oil activities and diagnosing the challenges faced by auditors in the sample, which consists of several Iraqi oil companies that have not been previously studied[4].

For instance, the study by Al-Hasani and Hamdan (2018) focused on environmental auditing in the agricultural sector and concluded that there is no audit program for agricultural activities within the Federal Board of Supreme Audit and the internal audit departments of agricultural institutions. However, it did not address the oil sector. Similarly, the study by Khalil and Barzan (2022) examined the challenges facing green internal auditors in the absence of audit programs to support their work in verifying the accuracy of achieving goals in one of Iraq's oil refineries, without considering the requirements of external auditing. On the other hand, Hamdan (2014) focused on the application of environmental auditing within the Federal Board of Supreme Audit in accordance with international agreements and local legislation, but without specifying an activity for the application of the research.

conclusions of the research (the presence of Iraqi oil companies' interest in environmental auditing in order to achieve sustainable development)

Method

A. Research Problem

The problem of research through the inadequacy of environmental audit procedures is to determine the extent of environmental damage and contributions to the economic unit and to identify weaknesses in environmental performance by indicating the extent of compliance with the relevant laws in maintaining sustainable development and protecting the environment and humanity from pollution of various kinds, by examining the financial statements contained in the financial reports and lists.

The importance of research is highlighted by maintaining sustainable development, especially environmental pollution resulting from several reasons, including the activities of industries and production waste, as well as the effects of the service sector, taking into account the social and environmental dimensions as well as the economic dimensions, which requires the adoption of environmental accounting and a contribution to providing accounting information to decision makers and disclosing it in the financial statements and statements, after being audited by auditors in accordance with the relevant requirements to indicate the extent of compliance of those economic units with the laws regulating the field of environmental protection from pollution[5].

B. Research Objective

The research aims to determine the environmental audit requirements that the auditor should carry out through the audit procedures of the financial statements, and the disclosures made by the management in the field of environmental responsibility and in light of the relevant laws and instructions in order to achieve the objectives of sustainable development[6].

C. Research Hypotheses

The research is based on the following hypotheses:

1. There is a statistically significant relationship between environmental auditing and achieving sustainable development.

2. There is a statistically significant impact relationship between environmental auditing and achieving sustainable development.

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D. Research Population and Sample

The research population is the oil sector represented. A sample research, who are working with job titles as accountants and auditors in the Basra Oil Company, the Oil Projects Company, the Central Refineries Company in Iraq and some private oil companies in Iraq, was selected in 2023[7].

E. Research Methodology

The research adopted the deductive approach in the theoretical aspect and in the practical aspect the inductive approach Through the analysis of the questionnaire results.

F. Data Collection Methods

On the theoretical side, the researcher relied on books and research collected from various Arab and foreign sources, as well as theses related to the subject of the research and what is published on the Internet[8]. As for the practical side, the researcher relied through the research tools on the questionnaire, where (299) participants and statistical analysis were distributed by SPSS v 26and Amos v 26The research hypotheses were tested using statistical methods, specifically the Pearson correlation coefficient[9].

D. Overview of Environmental Audit and Sustainable Development

1. Definition of Environmental Auditing

There are many definitions of environmental financial auditing from several international professional organizations, including:

a. It is a type of assessment intended to identify environmental compliance and management system implementation gaps, along with related corrective actions[10].

b. An environmental audit is a systematic investigation of an organization's facilities to ensure compliance with international environmental standards, including the collection, analysis, interpretation, and documentation of relevant information[11].

c. It can be defined as a comprehensive examination of all administrative, financial and technical systems in the economic unit in accordance with approved standards in order to display the extent of the contribution or impact of activities on the environment and achieving sustainable development[12].

2. Importance of Environmental Auditing

Environmental auditing is one of the important tools in managing the environment and reducing the negative impacts of human activities on the environment. Its importance is as follows[13]:

a. Compliance of economic units with environmental legislation: The economic unit must comply with local and international environmental legislation, and environmental auditing can be used to verify its compliance with such legislation[14].

b. Improving environmental performance: Evaluating the quality of community park environments in terms of, for example, physical activity perspective, the results reflect the level of support that can be provided to the community for physical activity for user[15].

Cost Saving: Environmental audits are necessary to identify unnecessary expenses and opportunities for cost reduction by closely monitoring the cost elements in the production process. These audits provide valuable information to management, enabling efficient production, optimizing resources, reducing waste, controlling pollution, and ultimately leading to the achievement of facility objectives and improved efficiency[16].

In terms of moral commitment, we see the importance of economic unity before society in improving human life[17].

3. Types of Environmental Auditing

Environmental auditing can be categorized into various types, each with unique implementation details based on specific requirements and desired goals, and among these types are:

a. Internal audit: Internal environmental audit is conducted by a specialized team to assess the extent of the

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economic unit's compliance with environmental laws and evaluate procedures to reduce environmental impacts. The primary objectives are to protect resources, achieve administrative efficiency and productivity, and adhere to policies[18].

b. External Audit: An environmental audit is conducted by an accredited third party to systematically collect evidence and evaluate assertions about economic actions and events, with the aim of ensuring compliance with standards. The results of the audit are then communicated to the relevant stakeholders[19].,are fully consistent with the audit of the external financial statements and follow a set of similar logical steps, specifically:[20]

a) Gain an understanding of the organization and the topics and activities under auditing.

b) Planning the audit process.

c) Collecting evidence to prove the audit process.

d) Evaluate evidence, form conclusions, and develop improvements.

e) Report on audit results, conclusions and recommendations.

Regular environmental audits aim to improve environmental performance, ensure regulatory compliance, and promote responsible practices, with specific steps varying based on audit objectives[21].

4. Evolution of Environmental Auditing and Environmental Management Systems

Environmental audit relates to the environmental management system of economic units and its results in the form of environmental performance, and the audit is performed for internal management purposes.

It is a result of the emergence of environmental accounting since the 1970s in Europe. In the mid-1990s, the International Accounting Standards Committee (IASC) developed the concept of international accounting principles, including the development of environmental accounting and human rights auditing. In addition, industry standards are increasing and professional auditors such as the American Institute the Certified Public Auditors (AICPA) has issued global principles on environmental audits[22].

The most important developments in environmental auditing include:

a. Environmental Management Systems: It is part of the overall management system of the economic unit, which includes the organizational structure, planning activities, responsibilities, practices, procedures, processes and resources related to the development, application, achievement, examination and retention of environmental policies[23].

b. Environmental auditing techniques: The implementation of environmental assessment has led to a significant improvement in water quality, since its first application in the U.S. chemical and steel industry in the 1970s[24].

c. Commitment to social responsibility: which is linked to human impacts and working conditions include economic unity and associated society.

5. International Environmental Auditing Standards

Environmental auditing includes a specific assessment of environmental risks and the appropriateness between activities and the environmental requirements to be applied, through the use of specific standards. Among these standards:

ISO 14001 .1-5-3: This standard is the most famous standard used in the field of environmental auditing, and it includes specific requirements for the environmental management system to reduce the environmental impact of industrial activities[25].

EPA Method 21. 2-5-3: This standard is used in environmental auditing to detect gas leaks from industrial equipment and facilities[26].

ISO 50001.3-5-3: This standard is related to the energy management system, and it aims to reduce energy consumption and improve energy efficiency[27].

OHSAS 18001. 4-5-3: This standard includes requirements for the occupational safety and health management system, and is aimed at providing a safe and healthy working environment for employees, products and services and adhering to relevant local, national and international environmental legislation[28].

BS 7750. 5-5-3: It is a system and a means of measuring the effects of the activities of economic units and their compatibility with their environmental policy and the goals and objectives associated with their project. The

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standard was developed by the British Standard Institute in1992 and since its issuance has been adopted by more than 200 British institutions[29].

ISO 19011. 6-5-3: It is an international standard for audit guidelines for management systems, and this standard provides general guidelines for the implementation of internal and external audit of management systems, including environmental management systems[30].

AA1000. 7-5-3: It is an international standard for environmental, social and ethical auditing. This standard includes requirements for evaluating the performance of economic units.

6. Definition of Sustainable Development

The concept of development is no longer limited to the economic aspect, but is addressed in accordance with the relationship to human rights and the social, cultural and political conditions surrounding it, which are effective in evaluating the development process aimed at advancing the capabilities of the individual and the capabilities of society ,

Known as the following:

1) The United Nations defined sustainable development, at the Environment and Development Conference held in (1992) in Brazil, as the necessity of realizing the right to develop, that is, achieving it equally to meet the development and environmental needs of the present and future generations)

2)Sustainable development is also defined as redirecting economic activity and choosing the economic, social and development pattern that is compatible with appropriate environmental concern, preventing environmental damage, as well as social equality and justice[31].

7 . Principles and Dimensions of Sustainable Development

Principles	Dimensions
Equity: It means that each individual receives a fair share of the wealth of society.	Economic dimension: Improving the individual's level of well-being through his share of goods and services represented in food, housing, transportation and education.
Empowerment: Giving individuals the right to actively participate in decision-making.	The social dimension: to achieve a balance between population and available resources and between competencies and production rules on the other hand.
Solidarity: Solidarity between different groups of society to protect the environment and its nature.	Environmental dimension: Monitoring the current situation and monitoring changes in the environment and its natural resources.
Sustainability: It means continuity in addressing important issues and not causing harm for future generations.	Institutional dimension: Organizational structures capable of performing their functions in the service of society and the participation of the private sector in the service of society as a whole.

Table 1. *Principles and Dimensions of Sustainable Development*

In the opinion of the researcher, the adoption of the principles and dimensions of sustainable development depends on the effectiveness of environmental auditing in assuming legal and social responsibility in advancing the deteriorating development reality.

8. The Importance of Environmental Conservation and Sustainable Development

To achieve sustainable development it is necessary to integrate external and internal business environments while recognizing their mutual impact. Neglecting this link or focusing on isolated aspects of the business environment in sustainable development studies is not enough. Preserving the environment is one of the priorities of the work of countries and economic units because of its effects, which can be summarized as follows:

a. Air and water pollution: It results from industrial, agricultural, and urban activities, such as the dumping of industrial waste that is toxic to environmental systems, the release of toxic gases into the air, or elements with radioactive activity that destroy the environment[32].

b. Agricultural and forest depletion: Due to the overlapping of different types of land uses within the boundaries of agricultural pasture landscapes, achieving mono-functional land use only for livestock grazing is difficult. The simultaneity of multiple land uses can lead to stakeholder conflict and lead to ecosystem degradation[33].

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Environmental sustainability combines economic growth in environmental protection in a way that means investing in saving resources and preserving natural capital while realizing benefits from the development of sustainable technologies and production[34].

The researcher believes that the conservation of the environment is due to the creation of a healthy and beneficial atmosphere to exert efforts in the practice of social and environmental activities and to preserve the land from degradation of its natural elements.

9. Balancing Economic Needs and Preserving the Environment and Wildlife

Sustainable development necessitates a delicate balance between economic demands and environmental conservation, as neglecting these impacts can lead to degradation and destruction, requiring decisive environmental measures.

a. Eliminate hunger.

b. Promote health and wellbeing.

c. Improving the quality of education.

d. Promote gender equality.

e. Increased use of renewable energy significantly increases sustainable growth.

f. Integrating sustainability, ESG issues and climate-related risks into its investment strategies and solutions.

g. Eliminate extreme poverty for all people.

Such actions should be useful in balancing economic needs and preserving the environment and wildlife, thereby achieving sustainable development.

10. Future Developments and Commitment to Achieving the Sustainable Development Goals

The United Nations 2030 Agenda for Sustainable Development, which was adopted in 2015, includes the seventeen sustainable development goals that support the 2030 Agenda with 169 associated goals. These goals include various aspects of sustainability, including eradicating poverty, promoting well-being, and protecting the environment, as they represent the sustainable development goals. A new form of global governance with an emphasis on goal-oriented strategies with flexible implementation approaches and non-binding agreements.

Despite the importance of data for tracking progress and addressing challenges in achieving the Sustainable Development Goals, the lack of qualified and timely data sets poses obstacles. However, the increasing importance and reliability of data, including Earth observation using satellites, provides potential solutions. CBAS launched SDGSAT-1 , to develop High-resolution, multi-scale public data to support policy and decision support systems for sustainable development. To accelerate the implementation of the 2030 Agenda, new SDG satellites are being planned for launch into orbit to create a liquid constellation, which will help provide a continuous stream of Earth-scale data. And human-environment interactions to enable multi-scale data support for policy makers and bridge the data gap and conflicts of interest.

The growing demand for comprehensive sustainability reporting has led to the integration of environmental, social, and economic aspects in economic units, resulting in the expansion and diversification of reporting methods and the emergence of new types of reporting and several steps can be followed in the field of strengthening compliance with environmental laws and creating feeling and sensitivity among the employees of the Economic Unit for Environmental Protection, including the following:

1) Preparing a document that includes the economic unit’s pledge of its environmental responsibility for its work and activities.

2) Document the company's clear and detailed policy that provides employees with guidance and procedures on how to prevent, protect and correct environmental problems.

3) Conduct environmental audits periodically to ensure adherence to economic unit policies

4) The goal is to incentivize managers to prioritize environmental performance standards in their evaluation of their performance and to pay attention to this field.

11. Environmental Laws and Legislation

a. Various environmental laws and legislation

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The number of international environmental laws and legislation is complex due to continuous issuance by various economic units and international bodies, with prominent bodies involved in issuing environmental laws and legislation including the following:

1) United Nations: which issues several international conventions on environmental protection, such as the Convention on Biological Diversity and the Convention on Climate Change[35].

2) The European Union: which issues many legislations and laws on the protection of the environment and natural resources, such as the European Union legislations on air pollution, water, waste disposal and hazardous materials management. [31]

3) The International Union for Conservation of Nature (IUCN): which works to define standards for the protection of wildlife and the oceans, and helps to prepare environmental policies and legislation in different countries.

In Iraq, the Environmental Protection and Improvement Law No. (76) of 1986, amended by the Environmental Protection and Improvement Law No. (3) of 1997 and also amended by another law No. (27) of 2009 , was issued, as well as the relevant regulations and instructions, according to which financial penalties were imposed on any company that harms the environment.

b. The importance of environmental auditing in reducing penalties resulting from non-compliance with environmental laws and legislation

Environmental auditing can ensure compliance with environmental legislation and achieve compliance with local and international environmental standards. [36]Failure to comply with environmental laws and legislation from one country to another is subject to penalties, and these are determined in accordance with the law and legislation in force in each country.

To motivate individuals and economic units to adhere to them, for example, there is a clear economic impact through the development of the oil economic units of the Basra fields (Iraq) without a positive environmental impact. On the contrary, the destructive environmental effects of the fields have increased, which requires those sanctions.

Environmental auditing plays a crucial role in reducing the financial burdens caused by environmental violations, proactively identifying problems and reducing costs through waste recycling. Economic units prioritize environmental sustainability and demonstrate their commitment through reports and disclosures[37].

12. Environmental Audit Program in Which the Auditor Examines the Financial Statements

The failure of accountants to provide information on the effects of the activities of economic units on the environment and society implies supporting and encouraging economic units that pollute the environment and punishing economic units by allocating part of their resources to reduce it.

The data provided by cost accounting plays an important role in supporting quality improvement and waste reduction, if it works to provide management data on material and energy flows and to limit waste and defects in products.

It increased the auditor's responsibility to exert the necessary professional care in order to verify the presentation of information related to environmental activities in the financial statements and periodic reports, which facilitates the task of users of financial information when evaluating environmental performance, and guides their decisions.[3]

Through the degree of disclosure in financial reports and the availability of a number of qualities to judge their efficiency, the most important of these qualities are:

a. Suitability.

b. Reliability.

c. Verifiability and comparability.

Environmental auditing is similar to regular auditing by financial control bodies, ensuring consistent performance in environmental and sustainable development. It can be covered by all types of financial regulatory controls and compliance, as well as performance auditing when auditing financial statements. The auditor examines the environmental audit program, is as follows:

1. Examining the extent of the economic unit’s compliance with environmental regulations and laws.

2. Evaluate the appropriateness of the environmental accounting system, and that the report on environmental

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matters has been done appropriately.

3. Determine the effects of production processes and services on the environment.

4. Ensure the effectiveness of the environmental management system

5. Ensure whether the consumer is liable to bear obligations or actually bears them.

6. Ensure that the economic unit has worked to raise pollution, waste and toxic substances that have already been contaminated.

7. The efficiency of the internal control system in accounting for and addressing environmental impacts from an accounting perspective. [4]

8. The extent of compliance with environmental laws and legislation issued by competent bodies and organizations for this purpose

9. Verifying the client's compliance with the requirements of applicable international accounting standards in relation to environmental matters, such as the International Financial Reporting Standard on Environmental Performance (IIRC). By evaluating its performance and identifying the duties carried out by the economic unit towards its obligations.

Therefore, International Auditing Standard (250) refers to: Observance of laws and regulations. When auditing financial statements, the auditor must, when designing and performing audit procedures, and when evaluating and reporting audit results, verify that the economic unit's non-compliance with laws and regulations may have a fundamental impact on the financial statements[38].

Result and Discussion

In this topic, we present and discuss the results that have been reached because they form the basis for proving or denying the hypotheses of the research, which states that (there is a statistically significant relationship between environmental auditing and achieving sustainable development, and there is a statistically significant impact relationship between environmental auditing and achieving sustainable development , (299) forms were distributed to participants, and they were analyzed using statistical indicators for the purpose of measuring (environmental auditing and its reflection in achieving sustainable development).

It is found in the statistical program SPSS v 26 and AMOS v 26 to analyze data and obtain accurate results, which can help in reaching the desired goal. Among these methods are the following: Cronbach's alpha coefficient and descriptive statistics (arithmetic mean, standard deviation), as well as the correlation coefficient and Simple linear regression as well as structural equation modeling (SEM).

1. Description of the Population and Individuals of the Research Sample

The research community is represented by the economic units in the oil sector represented by the Ministry of Oil and its departments. A sample of this community, who are working with job titles as accountants and auditors in the Basra Oil Company, the Oil Projects Company, the Central Refineries Company in Iraq and some private oil companies, was selected during the research period in 2023.Table (2) indicates the most prominent features of the research sample in terms of age, academic qualification, scientific specialization, job position and practical experience

R	Details	Number	Percentage
1.	Age Range		
	20-25 Years	19	6%
	26-30 Years	32	11%
	31-35 Years	45	15%
	36-40 Years	55	18%
	41-45 Years	68	23%
	46- more	80	27%
	Total	299	100%
2.	Academic Qualification		
	Diploma	41	14%
	Bachelor's	88	29%
	Master's degree or	89	30%

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	equivalent		
	Doctorate or equivalent	81	27%
	Total	299	100%
3.	Specialization		
	Accounting	109	36%
	Accounting and Auditing	69	23%
	Accounting and Financial Control	21	7%
	Legal accounting	41	14%
	Business management	39	13%
	Other	20	7%
	Total	299	100%
4.	Job Title	Number	Percentage
A.	Accounting jobs		
	Audit clerk	8	3%
	Auditor assistant	17	6%
	Accountant	16	5%
	Senior accountant	24	8%
	Assistant account manager	22	7%
	Account manager	22	7%
	Senior account manager	18	6%
	Financial expert	19	6%
	Total Accounting Jobs	146	49%
B.	Auditing Jobs		
	Audit clerk	10	3%
	Auditor assistant	19	6%
	Auditor	21	7%
	Senior auditor	20	7%
	Assistant Audit Manager	23	8%
	Audit Manager	21	7%
	Senior Audit Manager	19	6%
	Audit expert	20	7%
	Total Audit jobs	153	51%
Total Job Title		299	100%
5.	Experience		
	1-5 Years	17	6%
	6-10 years	38	13%
	11-15 Years	65	22%
	16-20 Years	74	25%
	20-25 Years	40	13%
	26- more	65	22%
	Total	299	100%

Table 2. *Description of the research sample*

It is clear from Table (2) that the members of the selected sample have characteristics that suit the objectives of the research, as the majority of the sample members were within the age group of 31 years and older, constituting 84%, and that the majority of them fall within the category of 41 years and older, which constitutes 50% of the research sample, and this indicates that they have the necessary knowledge and experience to conduct the research.

The majority of the sample members have their scientific specialization within the scope of accounting and auditing.

The scientific qualification of the research individuals indicated that they had master's and doctoral qualifications

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with 57% of the sample, which indicates that they have characteristics that enable them to answer the research questions. The job title indicates that the most prominent members of the sample have job titles that fall within the audit titles and by 51% and the remaining percentage of accounting jobs.

The practical experience of the sample members indicates that the majority of the sample members have significant practical experience, as their most years of experience ranged between 16 and more, which indicates that the majority of the sample members have significant practical experience.

2. Variables Coding and Stability Testing

The research measurement tool consists of two main variables as well as the demographic data part of the respondents to the research sample.Table (3) shows the components of the measurement tool and the number of items for each of the research variables. The five-point Likert scale was adopted. Clarity and accuracy were taken into account when formulating the paragraphs of the scales to give a great ability to understand the variables and their purpose. The researcher ensured the stability and consistency of the research procedures using the Cronbach alpha method. The reliability coefficient of the scales was calculated using Cronbach's alpha correlation coefficient. The values of the Cronbach alpha coefficient ranged between (0.869-0.785), which is statistically acceptable in social research because its value is greater than (0.75), which indicates that the scales of the measurement tool in the research were characterized by stability and internal stability.

No.	Main Variables	Code	Number of Paragraphs	Alpha Cronbach
1	Environmental Auditing	F1	16	0.869
2	Sustainable Development	F2	15	0.875

Table 3. *Variables coding and stability testing*

3. Testing the Normal Distribution of Research Variables

Table (4) below presents the results of testing the normal distribution of the research variables represented by the environmental audit variable represented by 16 paragraphs and the sustainable development variable, whose scale consists of 15 paragraphs. It is noted that all the results of torsion and kurtosis were within the required rate, which is between (1.96 to-1.96). This indicates that the distribution of the research sample data for the environmental audit and sustainable development variables is similar to the natural distribution, and free of the problem of torsion and kurtosis, and this supports the assumption that the data of the environmental audit and sustainable development variables were taken from a society whose data is characterized by natural distribution.

Variable	Min	Max	Skew	c.r.	Kurtosis	c.r.
F1	2.750	5.000	-.262	-.894	.062	.105
F2	2.167	5.000	-.061	-.209	-.186	-.317

Table 4. *Normal distribution of research variables*

4. Validity of the Research Scale. It includes the Following Paragraphs

a. Apparent validity of the current research scale .1-1-4

In order to identify the apparent validity of the research scale and the possibility of adopting the scale, it was presented to a group of experts, and in order to give their observations, a number of necessary adjustments were made according to the opinions of experts, to be the questionnaire in its final form. The questionnaire was presented in its initial form to a group of arbitrators specialized in the field of accounting

b. Confirmatory construct validity of the current research scale .1-1-4

(Factor analysis) of any research scale is of great importance in determining content validity. It also represents part of structural equation modeling, which is widely used in social science research, which is one of its main benefits. The environmental auditing variable was measured through its significant items. 16 paragraphs, and through Figure (1) and Table (5).

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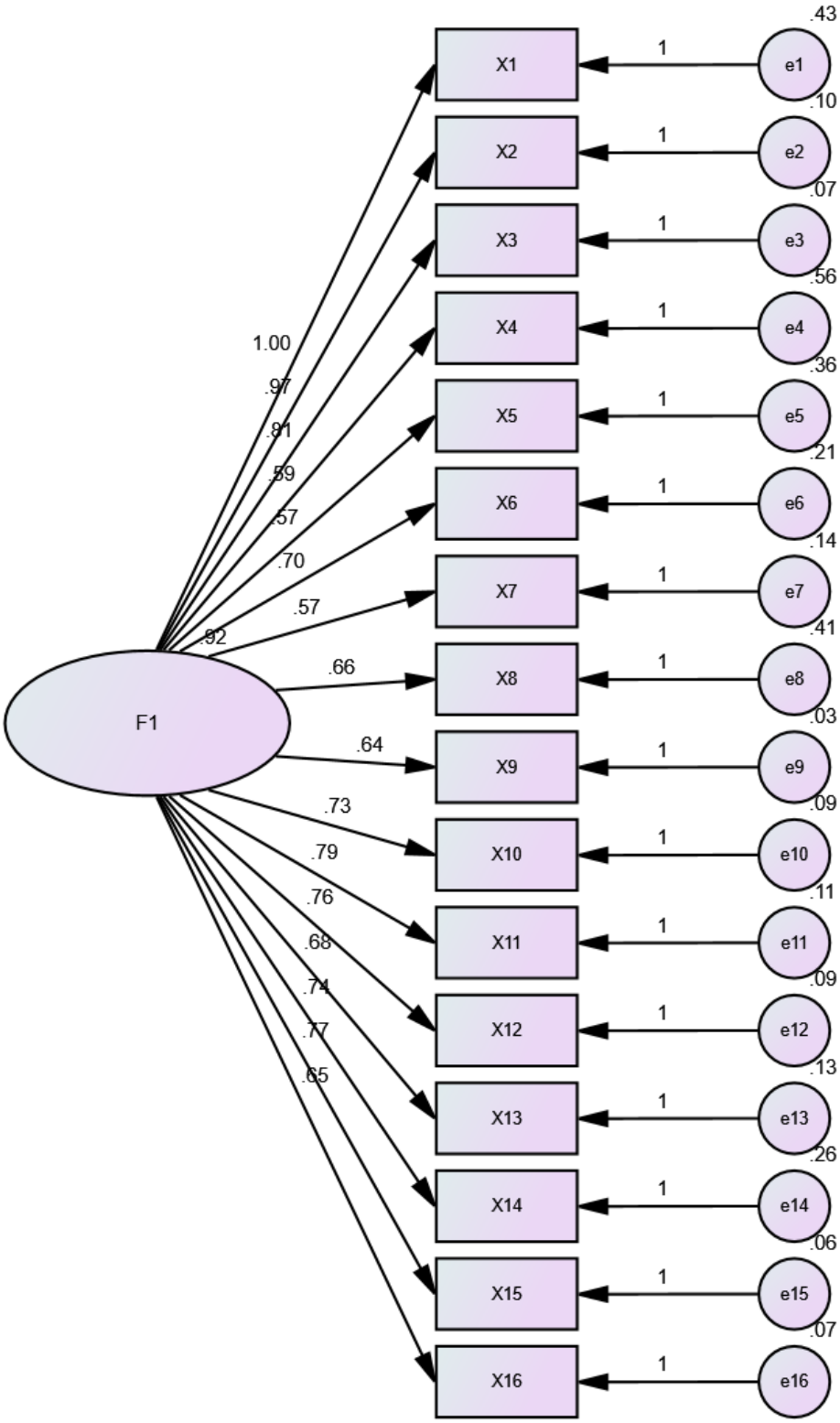

Figure 1. *Structural equation model (factor analysis) of the environmental audit variable*

Through the figure above, the validity of the questionnaire items can be judged because their value is greater than (40.0) shown on the arrows that link the latent variables with each item of the scale, which showed that all indicators of the quality of conformity for the environmental auditing variable.

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			Estimate	S.E.	C.R.	P	Label
X1	<---	F1	1.000				
X2	<---	F1	.975	.043	22.625	***	
X3	<---	F1	.810	.036	22.535	***	
X4	<---	F1	.593	.051	11.550	***	
X5	<---	F1	.568	.043	13.266	***	
X6	<---	F1	.700	.039	17.752	***	
X7	<---	F1	.568	.032	17.903	***	
X8	<---	F1	.663	.047	14.097	***	
X9	<---	F1	.635	.027	23.203	***	
X10	<---	F1	.734	.034	21.484	***	
X11	<---	F1	.786	.037	21.162	***	
X12	<---	F1	.756	.035	21.626	***	
X13	<---	F1	.680	.035	19.700	***	
X14	<---	F1	.738	.043	17.318	***	
X15	<---	F1	.768	.034	22.638	***	
X16	<---	F1	.650	.030	21.325	***	

Table 5. *Conformity quality indicators for the environmental audit variable*

Through Table(5), the validity of the questionnaire paragraphs can be judged because the (Estimate) values are greater than (40.0) shown in Table (5), which links the latent variables with each paragraph of the scale, which showed that all the conformity quality indicators for the environmental audit variable had a value higher than (0.40).

The factor analysis of the sustainable development variable was also measured through three paragraphs and through Figure (2), it is possible to judge the validity of the phrase of no value greater than (40.0) shown on the arrows, which links the latent variables with each paragraph of the scale, which showed that all the indicators of the quality of conformity of the sustainable development variable.

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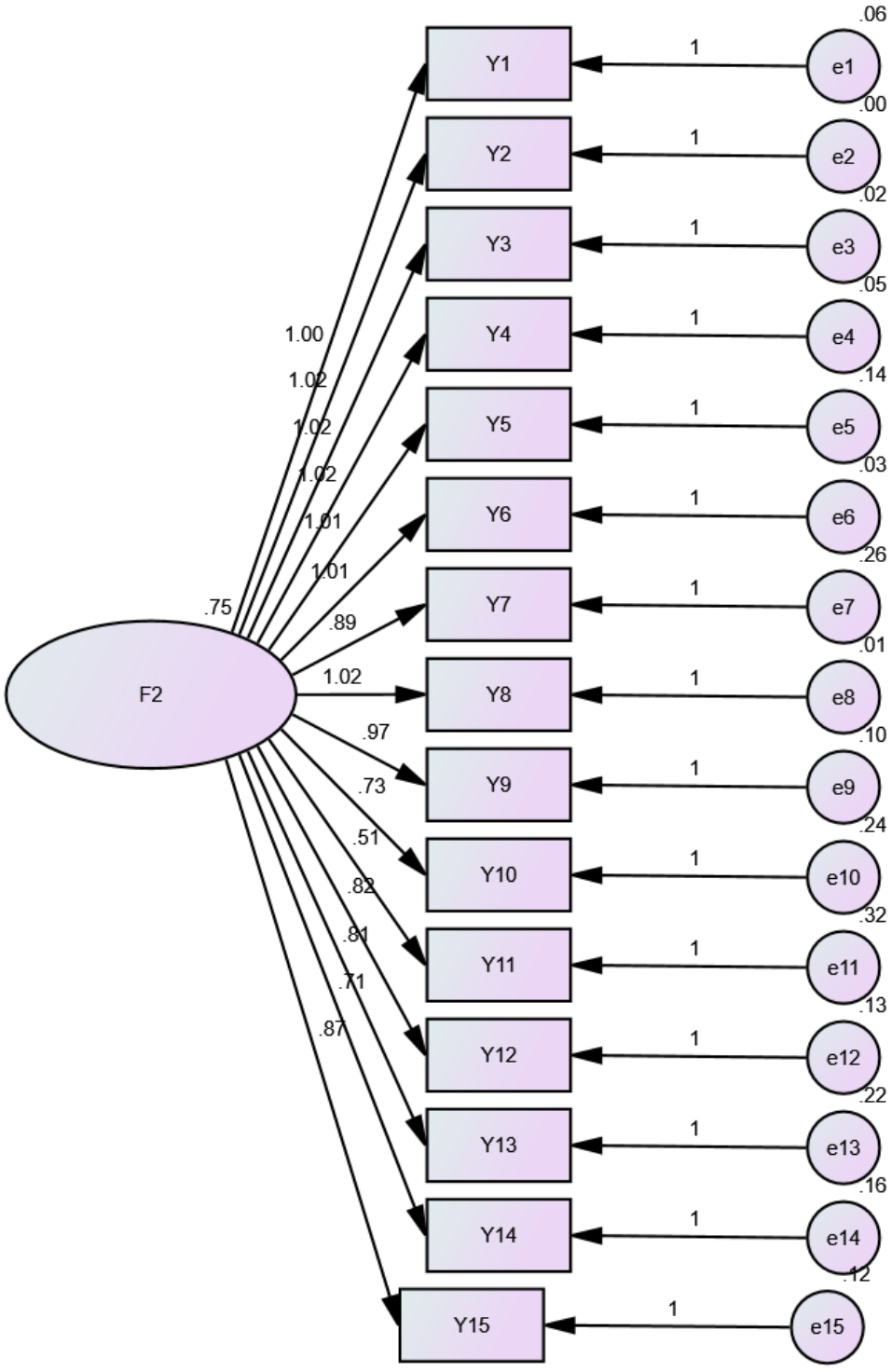

Figure 2. *Structural equation model (factor analysis) of the sustainable development variable*

			Estimate	S.E.	C.R.	P	Label
Y1	<---	F2	1.000				
Y2	<---	F2	1.018	.017	59.586	***	

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Y3	<---	F2	1.021	.020	52.107	***	
Y4	<---	F2	1.021	.023	44.463	***	
Y5	<---	F2	1.007	.030	33.565	***	
Y6	<---	F2	1.012	.021	47.710	***	
Y7	<---	F2	.887	.037	23.916	***	
Y8	<---	F2	1.016	.018	55.883	***	
Y9	<---	F2	.974	.027	35.991	***	
Y10	<---	F2	.727	.035	20.804	***	
Y11	<---	F2	.510	.039	13.101	***	
Y12	<---	F2	.824	.028	29.770	***	
Y13	<---	F2	.813	.034	23.884	***	
Y14	<---	F2	.713	.030	23.994	***	
Y15	<---	F2	.873	.027	32.093	***	

Table 6. *Conformity quality indicators for the sustainable development variable*

Through Table(6), it is possible to judge the validity of the questionnaire paragraphs because the values of (Estimate) are greater than (40.0) shown in Table (6), which links the latent variables with each paragraph of the scale, which showed that all the conformity quality indicators for the sustainable development variable had a value higher than (0.40).

5. Description of Research Variables

Table (7) presents a statistical description of the arithmetic means, standard deviations, the level of the answer and their importance to the research variables. The environmental audit variable, which is represented by three dimensions, has a total arithmetic mean of this dimension (3.882) and a standard deviation (0.5396). This indicates that the agreement of the members of the research sample on this variable was high. At the level of the variable related to sustainable development, where the total arithmetic mean of this dimension was (4.029) and a standard deviation (0.6875), this indicates that the agreement of the research sample on this variable was high.

Relative Importance	Answer Level	Standard Deviation	Arithmetic Mean	Variable
0.7765	High	0.6396	4.198	Environmental Auditing
0.8057	High	0.6875	4.029	Sustainable Development

Table 7. *Statistical description of the research variables*

a. Testing the first hypothesis

For the purpose of testing the first hypothesis, which states (There is a statistically significant relationship between environmental auditing and achieving sustainable development). The respondents' answers about the two variables were analyzed and the correlation relationship was measured using the SPSS V.26 program using the correlation test between the variables (Pearson) and the results were as in Table (8)

Variable		F2
F1	Pearson Correlation	0.773**
	Sig. (2-tailed)	.001
	N	299

Table 8. *Correlation Matrix between Customer Experience Dimensions and Behavioral Intentions Variant*

The results of Table (5) showed that there is a significant correlation between environmental auditing and sustainable development, amounting to (0.773), which is a strong relationship and at a significant level of (0.001), that is, and with a level of confidence of (0.99), which indicates the interest of Iraqi oil companies in environmental auditing in order to achieve sustainable development. Iraqi oil companies should pay more attention to environmental auditing in order to ensure sustainable development. From the above, it is clear that the first hypothesis is accepted, which states that (there is a statistically significant relationship between environmental auditing and achieving sustainable development.)

b. Testing the second hypothesis

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For the purpose of testing the impact hypothesis, which states (There is a statistically significant relationship between the impact of environmental auditing in achieving sustainable development.) The method of modeling the structural equation was used in the Amos 26 program for the purpose of verifying the validity of this hypothesis. The results of the test were in Figure (3), which indicates the nature of the effect between the two variables. Table (9) shows the results of the simple regression test between environmental auditing and sustainable development

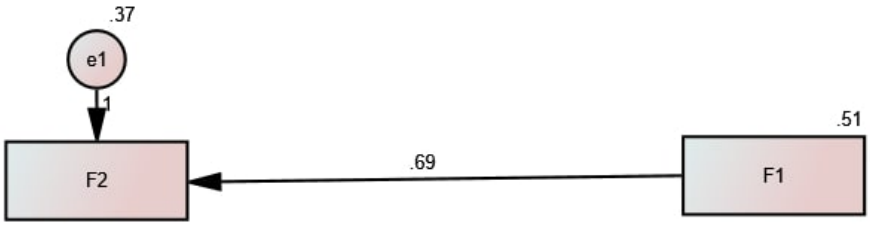

Figure 3. *Structural equation to measure the impact of environmental auditing in achieving sustainable development*

It is clear from Figure (3) that there is a positive and significant impact of the environmental audit variable in achieving sustainable development, and it was also found that the value of the standard impact coefficient has swallowed (0.686) It is also clear from Table (8) that the value of (r2) has reached (0.39), which means that the independent environmental audit variable is able to clarify (39%) of the changes that occur on the variable related to sustainable development in the Iraqi oil companies , the research sample, and that (61%) is due to other variables that have not been used in this research. The critical value in Table (9) of (13.928) was greater than (1.96) and in terms of the intangible value (P.value.) Which amounted to (0.000), which is less than (0.05), which indicates that the level of impact of environmental auditing in sustainable development among Iraqi oil companies, the research sample, all that increased its adoption of environmental auditing, reflected positively on achieving sustainable development. Based on the above, the second hypothesis can be accepted, which states that (there is a statistically significant relationship between the impact of environmental auditing in achieving sustainable development).

Result	R2	P significance value	C.R. Critical value	S.E. Standard error	Estimate Impact value	Direct regression path		
Hypothesis acceptance	0.39	0.000	13.928	0.049	0.686	F2	<--	F1

Table 9. *Estimates of the standard model of the impact of environmental auditing in achieving sustainable development*

Conclusions

1. Presence the interest of Iraqi oil companies in environmental auditing in order to achieve sustainable development

2. Presence impact of environmental auditing on sustainable development among Iraqi oil companies, the research sample, all that increased their adoption of environmental auditing, reflected positively on achieving sustainable development

3. Commit these economic units adhere to the principles of sustainable development and meet environmental and social obligations.

4. Environmental auditing contributes to guiding economic units towards adopting best environmental practices and using clean and sustainable technology to mitigate their environmental impact.

5. Through environmental auditing, transparency and integrity in EFU reports on environmental performance can be enhanced, enhancing investor and public confidence in EFU information.

Recommendations

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1. It is recommended to enhance awareness about the importance of environmental auditing and its benefits in achieving sustainable development. Economic units and economic units should be encouraged to adopt this process as an essential part of their environmental and social strategies[39].

2. Governments and regulatory bodies should support environmental auditing and encourage economic units to implement it regularly and sustainably. Environmental conservation and sustainability can be among the environmental performance standards to be achieved[22].

3. Economic units should be encouraged to improve their environmental reporting and increase their transparency when providing information on the environmental impact of their activities. These reports should be comparable and reliable by independent auditors[40].

4. Economic units should enhance cooperation and coordination between different entities (governmental, private and civil) to achieve environmental auditing more effectively and achieve the desired results in terms of preserving the environment and achieving sustainable development[41].

5. Academic research and future studies in this field should be encouraged to better understand the impact of environmental auditing on sustainable development and to continuously develop the standards and tools used in this type of auditing[41].

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