Modern Scientific Methods
and
Innovation in Audit Work

Fourteenth Scientific Competition
(ARABOSAI)

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Thanks and appreciation

Praise and thanks to Allah, by whose grace good deeds are done, and prayers and peace be upon the Messenger of Allah.

I extend my sincere thanks and appreciation to His Excellency the President and Deputy of the Libyan Audit Bureau and the Center for Strategic Research and Studies for their constant encouragement of Bureau members to pursue scientific research and professional development. I also extend my sincere thanks and appreciation to the leaders of the Arab Organization for International Cooperation (ARABOSAI) for their continuous support and encouragement of scientific research and the promotion of innovation and creativity in scientific fields.

I express my deep gratitude to everyone who contributed and participated in the preparation and completion of this scientific research. Thanks to Allah, and then to their efforts and fruitful cooperation, this work was accomplished with merit and professionalism.

I ask Allah Almighty to make this research a blessed step toward advancing knowledge and serving society, and that it may gain your approval.

Researcher

Abu Bakr Abdullah Al-Akroum

Abstract

This research aims to identify modern scientific methods and innovations in auditing work in light of the rapid technological development in information systems and the trend toward digital auditing. This research explores the impact of digital auditing using expert systems as an artificial intelligence technique in supporting audit strategy and reducing audit risks, as well as its impact on the quality of auditing work. This research is applied to the Audit Bureau of Libya. The researcher addresses auditing developments and future trends, as well as artificial intelligence and expert systems as AI techniques, and digital auditing as a modern auditing method.

The researcher reached several results, as follows:

1-There is a statistically significant relationship between digital auditing using expert systems as an artificial intelligence technology and supporting the audit strategy, reducing audit risks, and achieving audit quality.

2- The significant progress in the use of information and communications technology by business organizations has imposed a new reality on auditing agencies and companies that requires auditors to keep pace with this development and move towards utilizing information and communications technology in providing auditing services.

3- One of the obstacles to using electronic programs in auditing is the cost of purchasing or developing and introducing electronic software, which requires the auditor to have scientific knowledge of the most important software and applications. This may increase the cost of auditing services, as general programs may contribute to completing some auditing tasks.

4- It became clear that artificial intelligence technologies are being used by many professional organizations, which supports the researcher's view of the importance of relying on them to develop the auditing process.

5- Accounting and auditing firms and bodies should conduct training courses on the use of modern auditing methods, particularly the use of artificial intelligence

technologies, and draw on specialized and expert academic and professional expertise to qualify and develop the capabilities of their external auditors.

6- Those in charge of the accounting and auditing profession in Libya should adopt the infrastructure for electronic professional services, such as continuous auditing, ensuring trust in company websites, and real-time accounting systems.

The researcher made several recommendations, including:

1. The need to enhance auditors' awareness of the importance of using digital auditing in providing audit services and its role in achieving quality auditing processes for audit firms in an information technology environment.

2. The need to enhance auditors' awareness of the importance of information technology in supporting audit strategies in an IT environment.

3. The need to develop auditors' professional performance in areas such as leveraging digital auditing in planning the audit process, collecting audit evidence, and preparing the audit report through training courses.

4. Encouraging auditors to enroll in specialized training courses in information technology and artificial intelligence and their use in auditing.

5. Completion of specialized studies in the use of artificial intelligence technologies in various financial and accounting fields, such as studying credit risk and combating money laundering.

Keywords: digital auditing, artificial intelligence, expert systems, innovation in auditing.

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Introductory Chapter

General Framework of Research

First: Introduction

Since the emergence of the Fourth Industrial Revolution until now, technological development has not stopped, which has led to an increase in interest in the use of modern technologies and the transformation into a digital society based on digital data through the use of artificial intelligence, which led to an increase in accuracy and reliability in work in addition to the ease of saving, retrieving and processing data and information, and this has affected audit tasks as it led to overcoming some aspects of human shortcomings when practicing professional judgment, which is reflected in improving the efficiency and effectiveness of the process Auditing, as the new audit methodologies adopt the concept of risk, which includes a strategic dimension with regard to the ability of the economic unit to achieve its objectives, which requires auditors to rely on advanced technology.

The reality indicates that the functions of the auditing profession in their current form are no longer sufficient to meet the requirements of the profession and to ensure that it plays its active role to keep pace with these successive developments, which requires radical changes to implement its functions. (Muhammad, 2017, 20: 21)

Hence, this research provides a picture of modern and innovative methods in the field of external audit of government organizations and the extent of the use of expert systems as one of the tools and techniques of information technology, and the impact of this on the practices of the audit process and improving the quality of audit reports, as well as the role of this research in identifying opportunities and diagnosing future challenges in order to develop a comprehensive future vision for the auditing profession and enable it to improve and develop its practices and performance in providing the best services to its users on the one hand, and increases its ability to Keeping pace with the successive digital changes on the other hand.

Second: Previous Studies

Within the limits of the survey carried out by the researcher for studies and academic research related to the subject of his research, the researcher reviews a summary of these studies and their results and recommendations as follows:

Studies in Arabic

1. **Study: Al-Arabiyat, Safaa Ali, 2022 entitled The extent to which information technology is used in the audit process**

The study aimed to identify the impact of information technology on accounting and internal audit systems, by highlighting the ability of computer systems in the audit process, and the developments that have occurred in information technology.

The study found that:

- The importance of developing audit procedures, including audit standards, to suit the automated system such as the chart of accounts, financial report and documentary cycles.

- The use of information technology in the audit process facilitates the audit process and reduces the cost required to carry it out.

- Information technology plays an important role when used in the audit process as it helps small enterprises to develop and grow.

2. Akrim study, 2019 entitled: "The Role of Expert Systems in Developing the Performance of the External Auditor and Improving the Efficiency of Electronic Auditing", A Field Study on External Auditors Registered at the Central Bank of Libya".

The study aimed to know the role of expert systems in developing the performance of the external auditor and improving the efficiency of electronic auditing, and the study found that the use of expert systems in the audit process contributes to improving the performance of the auditor in information technology in commercial banks, and these systems also address the problem of the scarcity of experienced auditors and specialists in performing electronic audit tasks in the banking sector. The study recommended the need to develop the professional performance of the

external auditor in the environment of expert systems by conducting specialized training courses, and holding seminars and workshops for auditors.

3.Study: Gharibi et al., 2017 entitled The impact of information technology on the efficiency and effectiveness of the external auditor in improving audit quality

The study aimed to highlight the role played by information technology in improving the audit process by improving the auditor's performance and facilitating his task, by highlighting the relationship between information technology and external auditing, and the study dealt with identifying the risks of using information technology in the external audit process.

The study reached a set of results. They are:

- The use of information technology has improved external audit procedures and methods.

- It enabled the auditor to take advantage of the possibilities of carrying out these works more quickly and accurately.

- Facilitated the auditor to verify the authenticity of the currencies at a lower cost and effort.

Studies in English

1.Study: Babayeva, & Manosaridis, 2020

"The Effects of Digitalization on Auditing".

The study aimed to identify the perceived benefits and challenges that modern technologies in the context of digitization bring to the auditing profession, and this was examined through the scope of professional auditors, with the aim of contributing the latest field data and research results to the academic community of information systems in order to help the research community to recognize and deal with the various impacts in the context that digitization leads to transformation within the auditing profession.

Among the most important results of the study are the following:
- Identify some of the benefits that digitization and the use of modern technologies bring in the audit process: improved skills, improved audit quality, flexibility and efficiency, reputation growth, increased accreditation, and finally, reduced expectations gap.
- Identify the new auditor profile and resistance to change as the two factors that pose challenges to digital transformation in auditing.

2. Study: L-Delbeh, & Zghoul, 2019

Applications and Analysis of Expert Systems: literature review

This study aimed to identify the impact of expert systems in improving the general controls of computerized accounting information systems in Jordanian public shareholding industrial companies listed on the Amman Stock Exchange. To achieve this goal, the researchers relied on the descriptive and analytical approach. The study population consisted of all Jordanian public shareholding industrial companies, and the study sample was selected from the 32 companies that use the expert systems. A questionnaire was drafted and 140 copies were distributed.

The researchers found that there is an impact of expert systems in improving the general controls of computerized accounting information systems with four pillars, regulatory controls, access controls, and control controls.

Based on the results, the researchers recommended the need to develop training programs for workers in Jordanian industrial companies to increase their awareness and understanding of the uses of expert systems, as this can help them avoid errors while using the system, which leads to strengthening general controls in companies.

3.Study (Chokwoody et al., 2018) entitled: Effect of Artificial Intelligence on the Performance of Accounting Operations among Accounting Firms in South East Nigeria."

The study aimed to find out the impact of artificial intelligence (expert systems, smart agent) on the performance of accounting operations among audit firms in

southeastern Nigeria, and the study found that the application of artificial intelligence positively affects the performance of accounting and auditing functions. Accordingly, the study recommended that companies continuously improve their knowledge regarding artificial intelligence because of its impact on enhancing accounting performance and eliminating some accounting costs.

Third: Commenting on previous studies and the research gap

Table (1) Comment on Previous Studies and Research Gap

Previous studies	Research gap	Current study
- Previous studies agreed that carrying out the audit process using technology leads to the efficiency of the audit process and the quality of the report, and some studies agreed that there are some challenges to the use of technology and innovation in the audit work that must be overcome according to professional standards regulating this.	- Previous studies did not address the development in the field of auditing and future trends. - did not address the use of digital auditing using expert systems - Previous studies did not deal with the application to the Libyan Audit Bureau or any other audit body.	- The current research reviewed developments in the field of auditing as well as future trends - Addressing digital auditing through the use of expert systems as one of the artificial intelligence techniques - The research dealt with the application to the Libyan Audit Bureau as the supreme audit institution in Libya

Fourth: The research problem

The absence of technical knowledge and sufficient experience of the auditor using information technology in the implementation of audits, which makes the use of modern technologies in the implementation of the audit task arduous and complex.

The lack of automated audit programs covering audit work (planning, examination and evaluation of the internal control system, selection of samples, implementation of control tasks. etc).

In their quest to achieve audit quality, audit bodies are subject to a range of internal and external factors and constraints, perhaps one of which is digital auditing using expert systems.

Through the above, the problem of this research revolved through the following question:

What is the role of digital auditing using expert systems as one of the artificial intelligence techniques in the implementation of audit tasks by the Libyan Audit Bureau?

The following sub-questions arise from the main question:

- What is the role of digital auditing using expert systems in supporting audit strategy?
- What is the role of digital auditing using expert systems in reducing audit risk?
- What is the role of digital auditing using expert systems in achieving audit quality?

Fifth: Research variables

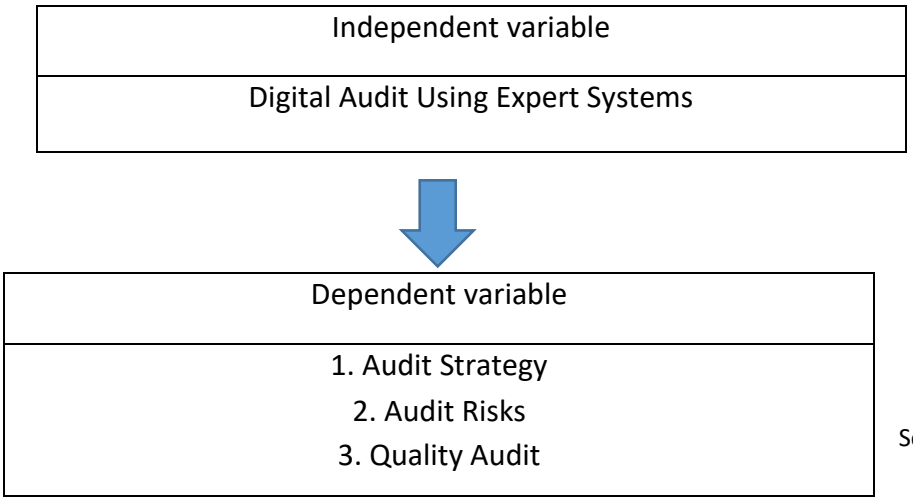
The variables of the study are as follows:

Independent variable: digital auditing using expert systems.

Dependent variable: audit strategy, audit risk reduction, audit quality.

Sixth: The structure of research variables

Figure 1: The structure of research variables



Source: Researcher Preparation

Seventh: Research hypotheses

The research is based on the main hypothesis that

The use of digital auditing using expert systems as an artificial intelligence technology in the stages of the audit process will support the audit strategy, reduce audit risks and enhance its quality.

To achieve the objective of the research, the following hypotheses were developed:

First hypothesis:

There is a statistically significant relationship between digital auditing using expert systems and supporting the audit strategy in the Libyan Audit Bureau.

Second hypothesis:

There is a statistically significant relationship between digital auditing using expert systems and reducing audit risks in the Libyan Audit Bureau.

Third hypothesis:

There is a statistically significant relationship between digital auditing using expert systems and achieving audit quality in the Libyan Audit Bureau.

Fourth hypothesis:

There are challenges in benefiting from digital auditing using the expert systems of the Libyan Audit Bureau.

Eighth: Research Objectives

The objectives that the research seeks to achieve can be crystallized as follows:

- Identify the development of auditing and future trends.

- Identify the conceptual framework of artificial intelligence techniques, expert systems and digital auditing.

- Identify the risks resulting from the use of information technology in audit tasks.

- Demonstrate the role and importance of digital auditing in achieving audit quality and supporting audit strategies in the Libyan Audit Bureau.

- Statement of the challenges facing the use and application of digital auditing in the Libyan Audit Bureau.

Ninth: The importance of research

The importance of this research lies in the fact that it dealt with an important and modern topic, which is the role of digital auditing using expert systems as one of the artificial intelligence techniques to support the audit strategy and to achieve its quality. The audit sector is one of the important sectors in making the financial statements reliable, which requires the presence of factors that make supreme audit institutions provide high quality services through the use of digital auditing using expert systems in the performance of audit services.

Tenth: Research Method

To achieve the objectives of the research, the researcher used the descriptive and analytical approach, which depends on the study of reality or phenomenon, where he is interested in describing it accurately and quantitatively through the use of the applied method. Data and information have been collected, and the available references and the Internet have been used to cover the theoretical side. The questionnaire form was adopted on the practical side, which is the main means of

research, as its paragraphs were formulated in line with the research variables by benefiting from the studies mentioned in the theoretical aspect that dealt with those variables. The drafting of the paragraphs of the questionnaire took into account simplicity and clarity, as well as subjecting them to scientific and objective tests to measure their apparent stability and truthfulness.

Eleventh: Research population and sample

The research community was represented by the members of the Libyan Audit Bureau, and the sample was represented by 50 members of the General Administration in Tripoli.

Twelfth: Research Contents

To achieve the goal of the research and address its problem scientifically, the research included both theoretical and applied chapters the following:

Introductory Chapter: General Framework of Research

Chapter One: Recent Trends in Audit

The first topic: the development of auditing and future trends

The second topic: digital auditing using expert systems through artificial intelligence.

Chapter Two: Applied Study.

Chapter Three: Conclusions and Recommendations

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Chapter One
Recent Trends in the Field of Audit

Chapter One
Recent Trends in the Field of Audit

The world of auditing and control is witnessing radical transformations and continuous developments that meet the requirements of the digital age and the rapid economic and regulatory transformations. With the increasing volume of data and the complexity of business operations, it has become imperative that audit and control practices adopt new and sophisticated methods to cope with these challenges and achieve their goals more efficiently.

Recent trends in the field of audit and control vary to include a wide range of concepts, techniques and practices that seek to improve quality and effectiveness and increase confidence in audits and controls.

Understanding and adopting these recent trends is essential to enhance the quality of audits and control processes and meet the expectations of beneficiaries and stakeholders. This research aims to explore and analyze these trends and provide appropriate guidance and recommendations for audit practitioners in the digital age.

The first topic: the development of auditing and future trends

2.1.1 Introduction:

Auditing is becoming increasingly important in the current era, as it is an essential support for integrity and transparency in the financial and accounting operations of institutions and companies. As digital technology advances at a tremendous rate, it embodies a paradigm shift in audits, as new and effective methods are being developed to ensure data accuracy and analysis more comprehensively and quickly. (Al-Mashhadani and Al-Abadi, 2014, 273: 276)

Understanding the evolution of audits in light of digital technology and considering future trends in this field is essential to ensure the continuity of transparency and integrity in financial and accounting operations, which we will seek to achieve through this section. (Cherkaoui, 2017, 20)

2.1.1 Audit under information technology

As a result of the use of information technology by organizations in the processing of financial and accounting data, the so-called audit using accounting information systems has emerged, where professional standards have been issued that guide auditors in the use of information technology in the audit process, which is called audit automation or electronic auditing. (Moussa and Bilal, 2019, 30)

3.1.1 The impact of electronic audit on the efficiency and quality of the audit process

Electronic auditing relies on the use of software and digital systems to facilitate data collection, analysis, evaluation, and documentation as part of the audit process. Thanks to this technology, audits have many advantages that improve their efficiency and quality, including: (Mokrani, 2021, 25: 30) (Omar & Nashat, 2017, 1330: 1343)

1. Increase speed and efficiency: Thanks to the use of software for electronic auditing, data collection and analysis are significantly accelerated, reducing the time required to complete audits and increasing their efficiency.

2. Reduce errors and increase analysis accuracy: Thanks to automation and automated analysis, human error in audits is reduced, increasing the accuracy of results and reducing the likelihood of errors.

3. Provide electronic documentation and monitoring: Electronic audit software can accurately document all processes and results, which facilitates the process of monitoring audit processes and submitting periodic reports in a more comprehensive and transparent manner.

4. Increase communication and information exchange: Electronic audit tools facilitate communication between teams, clients and partners in the audit process, increasing the effectiveness of collaboration and information exchange.

5. Improve strategic analysis and direction: Powerful graphical analysis powered by digital technology provides deeper and more accurate insights into audit processes and outcomes, helping to improve strategic directions and informed decision-making.

From the above, it is clear that electronic audit enhances the efficiency and quality of auditing, which contributes to improving confidence in financial and accounting operations and enhancing transparency and integrity in the commercial environment.

4.1.1 Continuous Audit

Continuous auditing is an approach to the audit process that consists in carrying out audits continuously and regularly over time rather than at certain time intervals as happens in a traditional audit. Continuous auditing relies on the use of digital technologies and automation to monitor and evaluate processes and risks in real time, allowing auditors to quickly identify and correct issues and abuses.

The idea of continuous auditing is to recognize that business environments change rapidly, and therefore audits must be flexible and continuous to ensure changes are tracked and responded to effectively. Continuous auditing allows auditors to monitor and analyze processes periodically and regularly without having to wait a certain period to carry out audits. (Yassin, 2023, 407: 428)

The continuous audit process includes the use of digital technologies such as artificial intelligence, big data analysis, statistical analysis to monitor models and trends, and analysis of financial and operational data on an ongoing basis. Findings, observations and changes are documented instantly, enabling auditors to prepare periodic reports and make recommendations to improve operations and reduce risk.

Continuous auditing is therefore a powerful tool to improve the internal system of audit and audit of institutions and companies, which helps in enhancing trust, transparency and integrity in the business environment.

5.1.1 Advantages of Continuous Audit

The advantages of continuous auditing are as follows:

There are several advantages of continuous auditing that contribute to improving the quality and effectiveness of auditing, including the following: (Wahdan et al., 2020, 1:33)

1. Immediate response to changes: Continuous auditing can monitor changes in operations and the business environment in real time, allowing auditors to react to these changes and take action without delay.

2. Increase the accuracy of detections: Thanks to continuous process monitoring, auditors can detect errors and abuses more accurately and effectively, which contributes to improving the quality of the analysis and reports they provide.

3. Reduce risk and loss: Continuous auditing can minimize risks and losses by identifying matters related to internal audit and compliance and taking preventive action early.

4. Improve transparency and accountability: Continuous auditing facilitates continuous follow-up of processes and results, which increases the transparency of operations and enhances accountability for stakeholders.

5. Save costs and time: Thanks to the use of digital technologies and automation, the costs and time required to complete audits can be reduced, increasing the efficiency of operations and optimizing the use of resources.

6. Increase communication and collaboration: Continuous auditing facilitates communication and collaboration between various stakeholders, including auditors, management and staff, enhancing understanding and coordination in work.

Overall, continuous auditing represents an innovative approach that enhances the ability of organizations to adapt to changing challenges in the business environment and contributes to enhancing integrity, transparency and confidence in financial and accounting operations.

6.1.1 Remote Audit

Remote audit can be defined as the process through which the auditor uses artificial intelligence and information technology techniques in data analysis to assess the accuracy of financial statements and internal controls, by sharing files via e-mail or using search engines, etc. In addition, the company can provide documents through desktop screen sharing or video conference via the use of some popular platforms such as Skype or Zoom, which are also used for phone interviews, and interaction with the operations of the audited entity, all without the need for physical presence. (Thomson Reuters, 2023)

7.1.1 Advantages of conducting a remote audit

Among the advantages of remote auditing are the following: (Assia Baghli, 2023) (Icar Gallo, 2020)

1. Save time and costs: Remote auditing helps reduce the costs and time required to conduct audits, as it does not require long commuting or travel.

2. Increase comfort and flexibility: The two parties involved in the audit process can work from any place that suits them and at times that suit their schedule, which increases the level of comfort and flexibility.

3. Easy access to information: Thanks to digital technology, auditors and customers can share files and documents easily and securely, facilitating access to the information needed to complete audits.

4. Effective communication: Remote auditing provides effective means of communication such as video conference that enable auditors and customers to interact and exchange ideas and observations effectively.

5. Maintain health and safety: In emergencies such as pandemics, remote auditing can contribute to keeping visitors and customers safe by avoiding physical presence in the same location.

6. Provide flexible solutions: Remote auditing can provide flexible and innovative solutions for organizing audit sessions and distributing tasks among team members, facilitating the process of collaboration and coordination.

The researcher believes that remote auditing is an important tool that helps enhance efficiency and effectiveness in audits and provide flexible and innovative solutions for communication between auditors and customers in different circumstances. Facilitate information sharing and documentation of results, enhancing transparency and accountability and contributing to more effective audit objectives.

8.1.1 Information Technology Audit

Auditing information technology and electronic or computerized information systems is an audit process aimed at evaluating controls and processes related to information and information technology in institutions and organizations. This type of audit aims to ensure the integrity and security of data and information, verify the application of policies and procedures for information protection, in addition to evaluating the efficiency of the use of technology in achieving the objectives of the organization. (Isabel, & et al., 2019, 565: 584)

The objectives of the audit on information technology and electronic information systems include: (Zangiabadi, 2015, 196: 203)

1. Evaluation of security controls: The audit aims to evaluate the effectiveness of security controls followed in the system such as access management, data encryption and protection of the system from breaches.

2. Assess the reliability of data: Audit includes verifying the accuracy and completeness of the data in the system and determining its compliance with legal standards and requirements.

3. Evaluate the performance of the system and applications: Audit includes evaluating the performance of the system and various applications to ensure their compliance with performance requirements and the effective provision of services.

4. Compliance Assessment and Legal Guidance: The audit shall verify the organization's compliance with legislation and legal directives related to data preservation and privacy rights.

5. Strategy Assessment and Technology Planning: The audit aims to assess the alignment of the IT strategy and technological planning with the organization's current and future goals and needs.

In this type of audit, auditors use advanced tools and technologies such as system monitoring software, automated testing software, security control assessment software, and statistical data analysis tools. This aims to provide comprehensive reports that illustrate the strengths and weaknesses of the information system, and

provide the necessary recommendations to improve performance and enhance security and reliability.

9.1.1 Advantages of IT System Audit

IT auditing offers many advantages, including the following:

1. Risk-Based Auditing:

- IT Audit can provide a comprehensive assessment of risks related to information systems and technological processes in an enterprise.

- Advanced automation audit techniques make it easy to analyze data specifically to identify vulnerabilities and extreme risks.

- Risk-based analysis can direct resources and efforts to areas that need improvement and make appropriate recommendations.

2. Enhance information security and protection from cyber attacks:

- IT control can provide a comprehensive assessment of information security and identify security vulnerabilities and potential cyber threats.

- Audit helps in early detection of cyberattacks and immediate response to threats thanks to the use of automated monitoring and response tools.

3. Ensure the accuracy of data and information:

- An IT audit provides the tools to analyze and evaluate the accuracy of data and information stored and processed.

- Systems control can verify that necessary procedures have been implemented to ensure data accuracy such as input monitoring and continuous testing.

4. Enhance trust and credibility:

- IT auditing promotes confidence and credibility in the data and information used in business processes.

- Systems control can provide periodic reports showing the extent to which systems comply with legal and regulatory standards and directives.

5. Improve productivity and efficiency:

- IT auditing improves productivity and efficiency by identifying opportunities to improve processes and better use technology.

IT control provides a variety of advantages that contribute to improving the quality of auditing, enhancing information security, and ensuring the accuracy of data and information, which enhances trust and credibility and improves efficiency and effectiveness in the use of technology in organizations.

10.1.1 Future Trends in Audit

1. Analytical and predictive audit

Analytical and predictive auditing is an innovative approach to auditing that uses graphical analysis techniques and artificial intelligence to analyze data and predict future trends in organizations. This approach aims to improve the quality and effectiveness of auditing, and to bring greater added value to the organization. Key aspects of analytical and predictive auditing include: (Serag, & Dauod, 2021, 1:10)

A- Using graphical analysis techniques: Analytical and predictive auditing involves the use of advanced graphical analysis techniques to examine big data and extract patterns and trends from it. Statistical and predictive analysis tools can be used to directly analyze data and extract key messages from it.

B- Predicting risks and opportunities: Analytical and predictive auditing can analyze data to identify potential risks and upcoming opportunities, enabling the organization to take the necessary actions to reduce risks and take advantage of opportunities.

C. Detection of abuses and fraudulent behaviors: Analytical and predictive auditing can use statistical analysis models to detect abuses and fraudulent actions in financial statements and business operations, which helps improve the quality and reliability of audit.

D. Interactive Analysis and Smart Decisions: Analytical and predictive auditing allows data to be analyzed interactively and the results to be used to make intelligent and informed decisions. Auditors and administrators can make the right strategic decisions based on comprehensive graphical analysis.

E. Provide improved recommendations: Analytical and predictive auditing can guide improved recommendations directed towards the organization's key priorities based on data analysis and future trends, contributing to improving business performance and achieving corporate goals.

Analytical and predictive auditing is an innovative approach that contributes to improving the quality of audit and increasing its value to the organization by taking full advantage of available data and directing attention and efforts to areas of high importance.

2. Intelligent auditing and automation

Smart auditing and automation are an integral part of recent developments in auditing. This approach is based on the use of technology and artificial intelligence to improve audits and make them more effective and efficient.

The use of technology such as robotics and artificial intelligence in audits is expected to increase to improve work efficiency and continuous verification, freeing up auditors for more analytical and strategic tasks.

Key aspects of intelligent auditing and automation include: (Jameel & Othman, 2015, 210: 235)

A- Comprehensive Automation: Intelligent auditing and automation involves the use of cloud computing, intelligent robotics, and artificial intelligence techniques such as machine learning and natural language processing to fully automate audit processes, from data collection to the generation of final reports.

B- Big Data Analysis: Smart auditing allows the use of graphical analysis techniques to directly examine and analyze big data, which helps in detecting important patterns, trends and conclusions from data more quickly and accurately.

C- Early detection of abuses and risks: Smart auditing relies on the use of statistical analysis and artificial intelligence models to detect potential abuses and risks in data and processes early, which helps in taking immediate corrective action.

D- Improving efficiency and accuracy: Thanks to automation, audit efficiency can be improved, manual stress reduced, results can be increased accuracy and potential human errors can be reduced.

D- Data-based reports and recommendations: Smart auditing relies on generating detailed reports and recommendations based on graphical analysis and artificial intelligence, which helps leaders and officials make data-driven strategic decisions.

E- Continuous self-audit: Smart auditing and automation enable continuous self-audit of systems and processes, contributing to improved performance and reduced risk in real time.

With intelligent auditing and automation, organizations can improve the efficiency and effectiveness of audits, achieve the best results and analytics from data, and enhance confidence in the processes and reports they provide.

3. Cloud auditing and cloud technologies

Cloud auditing and the use of cloud technologies are an important part of technology advancements in auditing. This approach includes using cloud computing to store data, run applications, and provide online technical services and solutions instead of using traditional on-premises infrastructure. Here are some key aspects of cloud auditing and cloud technologies: (Kamble, 2018, 50:55)

A- Cloud data storage: Cloud auditing allows companies to store their data on cloud servers instead of relying on on-premises infrastructure. This approach is flexible, scalable, and cost-effective, providing new opportunities for data analysis and new benefits.

B- Remote Access and Flexibility: Cloud auditing can provide access to data and applications from anywhere and at any time, enhancing flexibility and effectiveness in audit and review procedures.

C- Security and protection: Cloud technologies offer advanced security and protection features that include data encryption, two-factor verification, and access control, which contributes to protecting sensitive data and preventing leaks and intrusions.
D- Graphical analysis and prediction: Cloud technologies can be used to directly

analyze big data and generate useful reports and analytics for auditors. This approach provides valuable insights that help in strategic decision-making.

E. Sustainability: Cloud technologies offer high levels of sustainability, ensuring the continuity of cloud-based services and applications without unexpected interruptions.

F. Low cost and rapid expansion: Cloud auditing can deliver technology solutions at a lower cost compared to traditional on-premises infrastructure, and can scale quickly and easily as enterprise needs increase.

With cloud auditing and cloud technologies, organizations can realize numerous benefits in terms of cost savings, increased productivity, and enhanced security and flexibility in audits and audits.

4. Integrated and interactive audit

Integrated and interactive auditing is an innovative approach to auditing that combines traditional audit processes with advanced graphical analysis and strategic directions of the organization. This approach aims to achieve comprehensive and useful insights that contribute to improving business performance and making strategic decisions.

It is expected that the focus will increase on integrated auditing that combines traditional audits with graphical analysis and strategic directions of the organization, so that auditors can direct attention and efforts to areas of high importance.

Key aspects of an integrated and interactive audit include: (Perez, 2017, 60:70)

A- Multi-source data analysis: Integrated and interactive auditing allows the analysis of multi-source data including financial data, operations, sales, marketing, and others. Advanced graphical analysis techniques are used to examine this data and extract key messages from it.

B- Effective communication with other departments: Integrated and interactive auditing encourages communication and cooperation between different departments within the organization, which helps in the effective exchange of information and data and achieve common goals.

C- Comprehensive and in-depth insights: Integrated and interactive auditing enables comprehensive and in-depth data analysis, allowing auditors to better understand the financial processes, analytics and overall performance of the organization.

D- Strategic Direction and Strategic Decision Making: Integrated and interactive auditing is based on the organization's strategic directions, and helps in data analysis to support strategic decision-making processes and achieve business objectives.

E- Continuous self-auditing: An integrated and interactive audit can be a continuous process, where data is analyzed and reports and recommendations are generated repeatedly to contribute to improving performance and achieving goals.

F. Rapid Response and Real-Time Analysis: Integrated and interactive auditing enables the use of real-time graphical analysis of data, allowing auditors to react quickly to challenges and opportunities and take appropriate action.

By using integrated and interactive auditing, organizations can achieve significant benefits in terms of data analysis and strategic decision-making, improving overall performance and operational effectiveness.

5. Smart Blockchain Auditing

Blockchain technology is expected to be at the center of innovation in the field of auditing, as it can be used to provide reliable and transparent records of transactions and operations.

Blockchain Smart Auditing represents an innovative approach in the field of auditing that leverages blockchain technology to improve the quality and security of audits.

This approach is based on the use of distributed and secure digital ledger to record operations and transactions, reliable and transparent records that ensure transparency, security and accuracy in audits.

Key aspects of blockchain smart auditing include: (El Din, 2023, 87:118)

A- Transparency and Reliability: Blockchain ensures transparency and reliability in audits by recording all operations and transactions on a connected and secured blockchain. Auditors can access this log and validate the data easily.

B- Digital Documentation and Chronological History: Blockchain provides digital documentation of each operation and transaction that takes place, in addition to recording the chronological date of each transaction. This facilitates the process of auditing, and accurately tracking the history of operations.

C- Distribution and Decentralization: Blockchain data is stored on multiple distributed devices, making it resistant to manipulation and forgery. The digital registry is decentralized, ensuring that data cannot be changed without the consent of all participants.

D- Access Control and Privacy: Blockchain technology can provide effective mechanisms to control access to data and ensure privacy and security. Permissions and permissions for each user can be selected according to business needs.

E- Smart Audit and Graphic Analysis: Blockchain can be used to facilitate graphical analysis and extract key messages from data. Auditors can use intelligent analysis techniques to explore data and identify patterns and trends.

F. Reduce costs and time: Smart blockchain auditing can reduce costs and time spent on auditing and auditing processes, as it reduces the need for human intervention and manual processes.

By using blockchain smart auditing, organizations can improve the quality and effectiveness of audits, and enhance trust and transparency in financial data and operations.

6. Cross-wall Auditing

The focus will be on auditing cross-border companies and global institutions, requiring the use of advanced technologies and attention to diverse legal and regulatory challenges and requirements.

Cross-wall auditing, also known as remote auditing or virtual auditing, is an approach that allows auditors to perform audits and audits fully or partially from outside the respective organization. This approach is based on the use of technology to achieve communication and interaction between auditors and the auditing entity in a secure and efficient manner.

Key aspects of cross-wall auditing include: (Icar Gallo, 2020)

A- Use of Virtual Technologies: Cross-wall auditing allows the use of virtual technologies such as video conferencing, screen sharing, and online communication to exchange information and data between auditors and audited entities.

B- Increase flexibility and efficiency: Cross-wall auditing is a flexible and effective way to conduct audits, where auditors can work from anywhere and at any time that suits them, increasing the efficiency of the process.

C- Cost savings: Cross-wall auditing can reduce costs associated with travel, accommodation, and transportation, as auditors can do the necessary operations from their office instead of traveling to client sites.

D- Security and Privacy: Cross-wall auditing includes advanced security mechanisms to ensure the confidentiality and privacy of data exchanged between auditors and the auditee, including the use of encryption and two-factor authentication techniques.

E- Increase productivity and quality: Cross-wall auditing can increase productivity and quality through the use of virtual technologies to easily access and exchange information and data instantly and effectively.

F- Direct Interaction and Effective Communication: Cross-wall auditing enables direct interaction between auditors and auditees, facilitating effective communication and exchange of ideas and guidance.

By using cross-wall auditing, organizations can achieve greater efficiency and effectiveness in audits by employing virtual technologies to achieve set goals more smoothly and effectively.

7. Audit using expert systems

It is an innovative approach in the field of auditing based on the use of technology to develop advanced analytical systems capable of acquiring and applying the knowledge and experience of auditors to solve problems and make smart decisions.

This approach aims to enhance the quality and efficiency of audits by leveraging specialized news knowledge and intelligent data analysis.

Key aspects of expert systems audit include: (Yassin, 2023, 407: 428)

A- Accurate data analysis: Expert systems can analyze large amounts of data with high accuracy and speed, which helps in detecting important patterns and trends in data and providing useful reports to auditors.

B- Decision Guidance: Expert systems rely on auditors' previous knowledge and experience to direct audits and make the right decisions more accurately and quickly.

C- Increase efficiency and effectiveness: Expert systems can increase the efficiency and effectiveness of auditing, and reduce time and resources consumed through the use of automated analysis and artificial intelligence techniques.

D- Smart Problem Diagnosis: Auditing using expert systems helps diagnose problems and abnormalities in processes and verify their compliance with approved standards and regulations.

E- Real-time guidance and recommendations: Expert systems enable auditors to provide immediate guidance and recommendations based on intelligent data analysis, helping to take immediate action to improve performance and reduce risk.

F- In-depth and comprehensive analysis: Expert systems can analyze data in depth and comprehensively, which helps in discovering relationships and correlations between various factors and identifying factors affecting the overall performance of the organization.

By using expert systems, organizations can achieve significant benefits in terms of increasing the quality of audits, improving efficiency and effectiveness, and making strategic decisions based on intelligent data analysis and expert knowledge.

8. Audit with AI

Auditing using artificial intelligence (AI) is a modern and innovative approach that uses smart technology to enhance audits.

This approach is based on the use of big data and intelligent analysis to improve audit accuracy and increase efficiency.

Key aspects of auditing using expert systems include: (Perez, 2017, 45: 50)

A- Big Data Analysis: AI can analyze large amounts of data quickly and accurately, allowing important patterns and trends in data to be detected.

B- Error Verification and Detection: Artificial intelligence uses analysis techniques to verify the accuracy of data and detect errors and imbalances in financial and accounting operations.

C- Provide intelligent recommendations and analytics: AI can generate intelligent recommendations and analytics based on data analysis, helping auditors make the right decisions and identify potential risks.

D- Statistical and Predictive Analysis: AI can apply statistical and predictive analysis to data, helping to identify future trends and predict the potential outcomes of financial operations.

E- Machine learning and continuous adaptation: AI can learn from data and continuously adapt to changes in the environment and conditions, helping to continuously improve the quality of auditing and auditing.

F. Reduce time and costs: Using AI in audits can reduce the time and costs associated with manual processes, contributing to increased efficiency and improved performance.

By using AI auditing, organizations can achieve significant benefits in terms of increasing audit accuracy, reducing financial risk, and improving efficiency and effectiveness in audits.

Overall, technological development and innovation in the field of audit are expected to continue to meet new challenges and improve the quality of services provided and the effectiveness of auditing in various industries and sectors.

The second topic: digital auditing using expert systems through artificial intelligence

1/2/1 Introduction

Artificial intelligence has revolutionized information technology, as artificial intelligence is a subfield of computer science, and involves the creation of intelligent devices and programs that work and interact like humans (Kamble and Shah, 2018), which is "a commonly used designation to refer to the field of science that aims to provide machines with the ability to perform functions such as logic, planning, learning and perception. Although this definition refers to "machines", it can be applied and generalized to any type of "living intelligence", so the meaning of AI can be expanded to include a range of different and intertwined abilities, such as creativity, emotional knowledge, and self-awareness (Perez et al., 2018).

In this section, we will address the subject of artificial intelligence, expert systems, and digital auditing, considering that digital auditing using expert systems is one of the techniques of artificial intelligence.

2.2.1 Artificial Intelligence

The steady acceleration of the development of strategic AI is driving the restructuring of their businesses and models, which supports the association of AI with business processes and its interference with business processes, but the consequences of this adoption are still almost unknown (Soni et al., 2019). We will address artificial intelligence as follows:

1.2.2.1 The concept of artificial intelligence

Intelligence is a term that usually includes a lot of mental abilities related to the ability to analyze, plan, and solve problems, and the speed of mental simulations, as well as the ability to think abstractly, collect and coordinate ideas, pick up languages, and speed of learning. (Qamoura, 2018, 150: 180)

Artificial intelligence can be defined as intelligence that appears when an abnormal "man-made" artificial entity, and artificial intelligence is one of the branches of informatics that study the development of intelligent algorithms and technologies to be applied in computers and robots so that they have intelligent behavior in

performing tasks or solving problems. In a way that simulates human thinking and that the central purpose of the artificial intelligence model is that the human and the model both place the expectation about a particular phenomenon through signs or signals or some clues. The broader definition can be the ability to think and make good decisions using a non-human mind.

This science works on a fundamental fact that depends on understanding the nature of human intelligence through the work of computer programs capable of simulating human behavior characterized by intelligence, so the intellectual definition of artificial intelligence is embodied as (one of the computer applications is interested in building programs capable of studying and implementing repetitive activities carried out by humans), so this science aims to understand the complex mental processes carried out by the human mind during its practice of the thinking process, and then translate these processes Mental to the equivalent accounting processes increase the ability of the computer to solve complex problems.

Therefore, Stair & Reynolds (2006) agree that artificial intelligence is the study and design of systems or devices that visualize the surrounding environment in order to behave in a manner that mimics human behavior (Stair & Reynolds, 2007: 47), so (John, McCarthy, 2007) defined it as "an experimental branch of computer science that seeks to achieve its goal in an intelligent machine that performs various tasks using its intelligence." Copeland (2018) defined AI as "a field of study that studies how computers create programs capable of intelligent behavior. AI is also seen as the ability of a device to carry out activities that we only expect from the human brain, and these activities include the ability to know, the ability to acquire it, as well as the ability to judge, understand relationships, and produce original ideas.

The researcher believes that this science embodies the language of simulation between human behavior characterized by intelligence and computer, which seeks to reach the intellectual leadership of computing used by companies and organizations aimed at local and global leadership.

2.2.2.1 The importance of artificial intelligence

The importance of AI for any company is embodied in the following: (Abdel Nour, 2014, 166) (Al-Rotimi 2012, 78)

1- Use a comparative method of the human method in solving complex problems.

2- It deals with the hypothesis synchronously, accurately and at high speed.

3- The existence of a specialized solution for each problem and for each homogeneous category of problems.

4- It works at a fixed scientific and advisory level that does not fluctuate.

5. Non-numerical symbolic data is processed through logical analysis and comparison processes.

6- Raising new ideas that lead to innovation and immortalization of human experience.

7- Reducing dependence on human experts and economy in expenses and reducing the human effort expended.

3.2.2.1 Characteristics of Artificial Intelligence

The most important characteristics of artificial intelligence are as follows:

A- Use of a method similar and somewhat identical to the human method in solving complex problems, characterized by synchronization, accuracy and high speed in receiving and addressing the hypothesis, and the ability to find a solution to each problem, as well as the ability to process non-digital data of a symbolic nature and artificial intelligence is also characterized by the difficulty of preparation, as it requires the representation of huge amounts of knowledge specialized in certain areas, and its objectives are to simulate the human in the way of thinking and the way they behave or respond, and to create new creative and innovative ideas (Abdel Nour, 2005).

B- Artificial intelligence works to immortalize human expertise and provide multiple alternatives to the system, allowing dispensing with experts and compensating their expertise, and the absence of fatigue and boredom, and reducing dependence on human energies are among the most important other characteristics of artificial intelligence (Abdel Nour, 2005).

C. Independence and prediction: It is the ability of artificial intelligence to act independently, as artificial intelligence systems are able to perform complex tasks, such as driving a car and building an investment portfolio without effective human control or even supervision. There are high prospects for the economic challenges and disruptions to the labor market that AI applications are bringing, and how these applications are likely to accelerate the way forward (Scherer, 2016).

D- Monitoring: The risks that arise from AI autonomy include not only predictability problems, but also control problems. It can be difficult for humans to maintain control over machines programmed to operate with a great deal of autonomy, as there are many problems with mechanisms that cause loss of control: malfunction, file damage, physical damage to input equipment, or a security breach. The great response speed of these applications is superior compared to humans, as AI is designed with features that allow it to learn and adapt. These are the characteristics that make AI a potential source of public risk on a scale far beyond the familiar forms of public risk that result only from human behavior (Scherer, 2016).

The characteristics of AI can also be classified as follows (Bakr, 2008: 4):

A- Representation of knowledge by symbols (Symbolic Representation) : This is one of the first characteristics of artificial intelligence programs used by companies, as they generally deal with non-numerical symbols, and this is the opposite of what is known and accepted in most computers today that deal with numerical quantities and numbers.

B- Artificial intelligence programs, unlike statistical programs, contain a method of representing information, as they use a special structure to describe knowledge, as this structure includes facts and the relationships between these facts and the rules that bind these relationships within the companies applying them.

C- Using of experience:

One of the important qualities in the field of artificial intelligence is that it focuses on adequate solutions and does not confirm optimal or accurate solutions as is the case in current traditional programs.

D- Ability to deal with incomplete data:

AI programs have the ability to find some solutions even if the information is not fully available at the time the solution is required, and the consequences of the lack of information integration lead to less realistic or less worthy conclusions.

E. Ability to learn:

An important quality of intelligent behavior is the ability to learn from past experiences and practices as well as the ability to improve performance taking into account past mistakes.

4/2/2/1 Types of Artificial Intelligence

Artificial intelligence used under entrepreneurial companies includes the following types (Ajam 2018):

A- Expert systems: They are computer programs that imitate the procedures of expertise in solving difficult problems. The expertise of experts is transferred to expertise systems for users to benefit from in solving problems. O'Brien, 2000:322 says that it is a knowledge-based information system that uses his knowledge about Special and complex applications to act as a consultant for end users The primary purpose of experience systems is to help a person in thinking processes and not to provide him with information, thus making a person wiser and not just knowledgeable.

B- Neural networks: Also called industrial networks, which try to mimic the way the brain works, (Kenji, 2013: 25) believes that neural networks depend in their work on a simple view of nerves, as the nerves are arranged in levels consisting of a large network and the function of the network is determined by both learning and communication.

C- Genetic Algorithms: An algorithm is a set of instructions that are repeated to solve a problem, and the word genetic refers to the behavior of algorithms that can resemble biological processes of evolution, also defined by (O'Brien, 2000, 339-340) as methods of solution that help create solutions to special problems using methods compatible with their environment, and they are programmed to work the way that

humans solve problems by changing and usually organizing component parts using means such as reproduction, conversion and natural selection, and thus provide us with ways to research possible combinations of numbers to identify integer non-numeric variables that represent the best possible structure of the problem are useful in situations where thousands of solutions are possible and must be evaluated to produce an optimal solution.

D. Intelligent agents: It is a knowledge-based experience system implanted within computer-based information systems or components to make them smarter, it is an end-user program or a way to accomplish events, and (O'Brien, 2000: 320) believes that the intelligent agent uses the knowledge base stored in it about a particular person or process to make decisions and accomplish tasks in a way that achieves the user's goals.

5/2/2/1 Artificial Intelligence Applications

AI is used in many applications, including:

A- Computer games: Most of us have tried using computer games and seen how artificial intelligence works in those games. With artificial intelligence, computers have become a match that can sometimes be difficult to overcome in many games.

B- Expert systems: These are complex computer systems based on collecting specialized information (i.e. in a specific field only) from human experts, and placing it in a form that enables the computer to apply that information to similar problems.

C- Human language processing: or natural language processing, which is concerned with the development of programs and systems that have the ability to understand or generate human language, that is, the user of these programs enters data naturally and the computer understands and extracts from it.

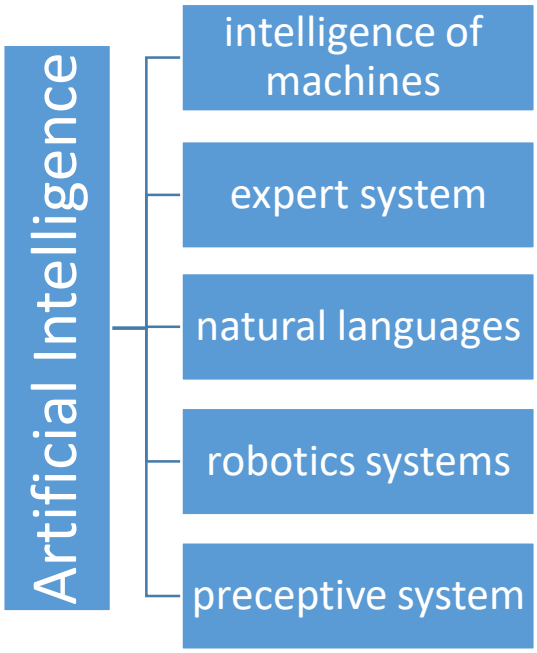
D- Machine learning: or machine learning, which is making the computer learn how to solve problems by itself, either by learning from acquiring previous experiences or by analyzing the correct solutions and deriving a way to solve them or even from learning through examples.

E - robot.

6/2/2/1 Artificial Intelligence Family

The artificial intelligence family consists of a group of systems represented in expert systems and computerized networks, as well as knowledge base systems, and the following figure shows those components:

Figure 2: Components of the AI family



Source: Researcher Preparation

In the same context, knowledge base systems seek to achieve a set of objectives, including:

A- Work on the representation, storage and analysis of knowledge.

B- Storing methodological bases for dealing with this knowledge.

C- Working on the acquisition, updating and preservation of accumulated human knowledge.

D- Optimal investment of scientific and applied knowledge and expertise and overcoming the problems of damage and deficiency.

E- Creating and developing modern knowledge and expertise.

F- Activating computerized knowledge and using it in the decision-making process.

7.2.2.1 The expected impact of AI on the future of business organizations

Artificial intelligence is no longer seen as a means to complete operations with the aim of increasing production efficiency, but rather an emerging technology that contributes to overcoming local and global challenges and competition, and plays an important role by anticipating possible scenarios and future crises, which leads to a radical shift in the business models of projects, and the most important positive aspects that artificial intelligence applications affect in business organizations are as follows:

A- Raising the efficiency and accuracy of future predictions.

Artificial intelligence technologies play a pivotal role in creating a more predictable and less risky work environment, as they support a complex set of algorithms that enable them to manipulate all types of data to detect available opportunities and potential future risks that require immediate decision-making.

B- Improve business efficiency.

Provide more efficiency at work through deep learning software applications that will provide business organizations with real-time insights into how the company gets business done.

C- Benefit from globalization.

The interconnectedness of the world can be used as an advantage by business organizations by applying artificial intelligence software such as machine learning, helping companies understand markets through a common approach to communication.

D- Improving investment decision.

Organizations can generally use their smart systems to help compare investment alternatives with opportunities to help make investment decisions, or provide guidance on investment decisions (Asma Azmy, 2020, 199:200).

8/2/2/1 Application of Artificial Intelligence in Accounting and Auditing

With the tremendous development in artificial intelligence applications, professional accountants and auditors have had the opportunity to add more value to their clients and participate in a greater advisory role, and this point is addressed as follows: (Samhadan, Salmo, 2021, 5:26)

A- Factors affecting the adoption of artificial intelligence technology by the auditing profession:

Auditors are influenced by AI from two different aspects. On the one hand, auditors are affected by all the changes that occur in their clients' environment. Clients' tendency to adopt new innovative technologies will bring about a change in all stages of the audit, from the planning stage of the audit project, through the field work, to the report on audit observations. On the other hand, auditors are directly affected by the need to adopt artificial intelligence technologies, to be able to perform their work in line with customer expectations, keep pace with developments, and improve the quality and accuracy of their services.

Audit clients now have an increasing expectation from auditors, given the need for more support as their business grows and new risks emerge. However, this is not the only factor influencing the adoption of AI technology by the auditing profession. Regardless of the need to respond to the requirements of stakeholders and clients, the auditing profession will not be able to survive without adapting to the surrounding changes, such as those related to technical changes. For example, how can an auditor examine the vast and growing amount of data available to clients without using modern technologies? Is it possible to plan an audit without taking into account the risks arising from these changes in clients' business models? And what if customers now provide audit evidence in other forms? How can the auditor perform his job if he does not keep pace with these changes?

All these questions invite us to review the opportunities and solutions that AI technologies provide to the auditor.

B- The role of artificial intelligence in enhancing audit quality:

We pointed to the growing expectations from auditors, and the urgent need for change to satisfy customers and stakeholders. Artificial intelligence may be one of the most important modern technologies that will qualify the auditor to bring about this change.

However, what can AI add to the auditing profession? The use of artificial intelligence techniques may help reduce the risk of auditing that revolves around expressing an incorrect opinion or, in other words, failing to detect material errors in the internal control system or in the financial statements due to the examination of a limited sample of the population. Here, the importance of artificial intelligence techniques emerges due to their high ability to examine the entire population, regardless of its number. Thus, enabling the auditor to identify unusual or suspicious operations, which are difficult to detect if the examination is carried out using a sample.

Efficiency considerations are also seen as one of the most important benefits of using artificial intelligence in auditing, as it qualifies the auditor to reach the highest levels of assurance with less time and effort. Instead of spending long hours reviewing contracts, the machine does it in record time, which helps the auditor save time and devote more time to more important aspects that cannot be achieved using machines such as communicating with customers, building a strong relationship with them and better understanding their needs.

C- The contribution of artificial intelligence to examining the entire population:

Auditors always rely on samples during the performance of audit projects due to the difficulty of manually examining large amounts of information and documents. However, the use of samples is associated with so-called "sample risk", resulting from the lack of representative of the sample to the population, which may lead to an erroneous conclusion or an inaccurate opinion and thus incorrect decisions. For example, an auditor may assess the internal control system as adequate or robust, while it contains material weaknesses that were not detected by the use of samples.

Also, in cases where the auditor tests the financial statements, which are more common in external auditing, the auditor usually estimates the non-compliance ratio at the level of the entire population based on the percentage of non-compliance in the sample (Extrapolation), in order to reach the accounting adjustment constraints to correct the population. If the sample is essentially unrepresentative of this population, such an estimate will not give accurate results.

Instead of relying primarily on community-representative sampling and manual examination by auditors, machine learning algorithms can provide auditors with an opportunity to audit the entire population. In this way, they can now conduct their tests in a more specific and practical way, thus avoiding the risks of the samples we pointed to earlier. In addition, these algorithms can learn from auditors' conclusions about certain cases, and apply the same logic to other cases with similar characteristics.

D- The ability of artificial intelligence to detect fraud:

According to general auditing standards, whether we are talking about internal or external auditing, fraud detection does not fall directly under the auditor's responsibilities, despite what many believe. Fraud detection and prevention is primarily the responsibility of management.

However, internal auditors are responsible for discovering material weaknesses in the internal control system that may create opportunities for fraud.

In the case of external auditors, they are responsible for detecting material misstatements in the financial statements, whether caused by error or fraud. So in both cases, auditors are indirectly responsible for detecting and preventing fraud.

Artificial intelligence and machine learning can be used to detect fraud, as these technologies help enhance the effectiveness of data analysis models. AI can study data and identify patterns that constitute fraudulent transactions to identify suspicious transactions that may constitute fraudulent transactions. The continued effectiveness of these models requires continuous updating to keep pace with the change and evolution of fraud methods.

Note that the data to be analyzed is directly related to the detection of suspicious transactions or out-of-the-box situations, including those that may indicate fraud. Data sources should therefore include processes in which an employee can influence a transaction, such as employee expense reports, accounts payable, and other cash transactions. Data must be accurate and up-to-date and data sources must be known and reliable.

E- Shift from traditional auditing to continuous audit:

Auditors in the past relied on historical information in their work. No matter how periodical their audit projects are, they usually audit operations related to the last month, quarter, or year. Of course, increasing the periodicity of auditing is preferable, as it lies in detecting shortcomings and exceptions early. Thus mitigate these risks as soon as possible to prevent similar errors in the future. But due to ever-changing work environments, this is no longer enough. Auditors need to adapt to the constant changes that occur in their clients' environment, otherwise their work will not be feasible because it may come late. Which leads us to what is called continuous auditing and monitoring using real-time data. (Real time data). Leveraging innovative IT tools, such as AI-powered data analysis, is now more needed than ever.

Auditing seeks to be more flexible and forward-looking for real-time feedback. An audit should be able to make rapid changes to audit plans and enhance the depth and breadth of fieldwork without spending more time and effort.

From a planning perspective, dashboards help highlight areas of work that may require internal audit attention, as well as provide insight into the organization's operations and activities. These analyses not only help in the preparation of the annual audit plan, but also allow the third line of defense (internal audit) to review the plan on a quarterly basis in light of the new data received. As for fieldwork, the advantage of using modern techniques in data analysis is that it can be left running in the background once it is set up.

An internal audit can then create a library consisting of AI software tools and use them for the long term. Of course, assuming that the systems and areas analyzed have not undergone material change that affects the effectiveness of the audit process.

F- Building a stronger relationship with audit clients:

Building a strong relationship with customers based on current or past experience is always required. Auditors need customer engagement throughout the audit project, as it is the only way they can better understand the client's business and complete the audit work. In addition, the client adds value through their interactions, as auditors are not experts in the technical aspects related to customer activities, unlike those who have experience and skills in the field of work, better knowledge of business risks, knowledge of weaknesses, and ways to remedy them. Note that the client's experiences supported by the auditor's expertise reflect positively on the quality of audits.

It is not always easy to allocate enough time to meet with clients and discuss business, according to a specific schedule, as the auditor needs to examine many documents and contracts while implementing audit programs.

The auditor spends most of his time working on audit tests and ends up holding meetings at the end of the audit project to present the feedback report to the client, resulting in a lack of proper understanding on the part of both the client and the auditor of the nature of the auditing operations and will not be aware of each other's task.

But the use of artificial intelligence and innovative audit techniques would enable the auditor to focus his attention on hazardous areas that require professional expertise and judgment, as trained machines can do most of the basic work that does not require "human intelligence". In this way, the auditor is able to free up time to interact with clients, ask questions, build a strong relationship, answer customer questions and clarify the mission and purpose of audit projects.

F- The challenges of using artificial intelligence in the field of auditing:

As is well known, the constant thing in life is constant change. Progress cannot be achieved without a change in the way things are done. In general, there is a correlation between the existence of challenges and the occurrence of change.

G- Increase the expectations gap between auditors and stakeholders:

There has always been a gap between the expectations or understanding of others for the auditor's job and what is actually required of the auditor in accordance with established auditing standards. Many believe that the auditor's primary task is to detect fraud, while others believe that the unqualified opinion of the external auditor means that the financial statements are completely free of any errors. It is no secret that some have blamed auditors for failing to detect or prevent the bankruptcy of some of the huge companies that negatively affected the global economy as a whole in previous years. Although there is some validity in such beliefs, the auditor, whether external or internal, operates on the basis of sampling. Therefore, no 100% guarantee or confirmation of fraud attempt can be expected. In addition, auditors rely on historical data, which indicates mistakes made in the past.

While auditors are already looking to the future in the audit process in terms of verifying the ability of audited firms to continue operating for at least one year in the future, in order to achieve the "continuity principle" required by ISAs, this still represents a limited and insufficient view, given the auditor's use of historical information that may not be representative of the future.

But with the increase of modern technologies such as artificial intelligence, the expectations gap has increased even more, as there is a so-called "development gap", which means that there is a need to evolve in some areas of auditing, to respond to the increasing requirements and take into account technical progress and how to enhance the audit process to add more value.

3.2.1 Expert systems

Although expert systems are newly established, they are considered one of the most important areas that have been relied upon in recent decades, due to the role that the latter has become in solving various problems encountered by humans in various fields.

The researcher addresses the expert systems in the following points:

1.3.2.1 Concept of expert systems

There are many different definitions, but the most important of them can be summarized as follows:

Expert systems are computer applications that are designed for decision-making in different areas of life, based on a knowledge base representing human experience in a specific field, and are usually used in the fields of medicine, education, law, biology and others.

It is also defined as an electronic program based on a set of experience-based components assembled from human experts through which various problems are solved and advice is given. According to Wellbank (1983), an expert system is a program that has a broad base of knowledge, operating on the basis of a set of complex interactions that approach the human mind. But in order to reach a good understanding of this concept, we must touch on the concept of the human expert. According to Art 1988, experts are people who have acquired a certain amount of knowledge that they use to provide solutions to a specific problem. In addition, an expert system is defined as a system that relies on human expertise to solve problems or make suggestions based on solutions provided by the user on a set of questions.

Expert systems have become one of the most widely used commercial forms of artificial intelligence, where the computer, using experience systems technology, applies inference methods in a specific field of knowledge in order to give the necessary recommendations (just as humans do), achieving a high level of performance in tasks that require humans many years of education and training. (29. Foltin, 1994, P)

In order to identify the areas of use of accounting expert systems, it is necessary to first identify its concept, components, types, methods of construction, mechanism of work, the difference between them and traditional systems, their benefits and the difficulties that can face their use. The following is a detailed explanation of expert systems.

What distinguishes expert systems from traditional systems is that the person who uses them does not necessarily have to be skilled in using the computer, as the process

of using them begins with the user asking a question to the expert system and the system in turn directs inquiries to the user and so this process is repeated until the appropriate solution to the problem is reached and the system then provides the necessary justifications and explanations that show the reason for choosing this solution from the reality of the base and information engine associated with it. (Foltin & Smith, 1994, p. 4)

2.3.2.1 Characteristics of expert systems

The importance and characteristics of using expert systems in providing problem solutions can be shown by comparing them with the mechanism of work of traditional information systems, while expert systems rely in their work on acquisition and the use of the knowledge of specialized experts to help those who do not have this amount of experience in performing their work, traditional information systems deal with the flow of data and information through the business unit they serve, and the process of building and developing them requires certain inputs that are the responsibility of the end users of the system. Thus, traditional information systems of all kinds have experts as end users, unlike experience systems where a domain expert is a person who possesses a high level of professionalism in a particular professional field Al-Dhalai.

Therefore, the importance of experience systems appears that their operation and use does not require people with high experience and skills, while in traditional systems the user of the system is supposed to have two main types of skills, namely his ability to use the computer and its various software, as well as the availability of a minimum level of experience about the scope for which the information system is used. The differences between expertise systems and traditional information systems are also evident through the mechanism applied by those systems in performing their tasks. Traditional information systems can be divided into data processing systems that record and process the daily routine operations necessary to carry out the work such as recording and posting sales and calculating payroll.

Decision Support Systems (Decision Support Systems) are limited to the use of statistical and logarithmic models to advise on a particular problem or decision, such

as decisions to double the volume of production, and usually serve middle management levels and executive support systems (Al-Shuwaihi, 2019, 25: 50). It is used for strategic issues of senior management levels only and relies on the outputs of other systems for its work. (Laudon,2010, P 75:81)

As for the experience systems, they apply diligence based on previous knowledge and experience in solving problems and therefore they do not need to use mathematical or statistical models, and their work is not limited to routine matters, and can be used at most administrative levels, whether executive or operational. It is also characterized by its ability to work and give solutions in the absence of all the data required for decision-making due to its reliance on experience in problem-solving methods and the possibility of applying fuzzy logic.

On the other hand, the importance of using expert systems in solving problems and making decisions appears if compared with the expert human element, there are a large number of properties and advantages in which expert systems outperform their counterparts from human experts. It is characterized by the stability and stability of decisions and the results it gives, and is not affected by any psychological, social or health factors that may limit its ability to produce decisions of the required quality, and is also characterized by its ability to preserve knowledge and experience and disseminate it for many generations, not to mention the great speed it shows in performing its work compared to the speed of human experts, and one copy of the system can be used in distant geographical areas thanks to the development of communication technology, which the facility cannot provide in light of the scarcity of Human experts in the required fields. (Jumaili, 2018, 35: 45)

Through this element, it is possible to develop a set of basic characteristics that must be available in the expert system:

- The expert system contains a basic knowledge base similar to the experience gained in man and the methods of dealing with a particular subject in order to finally identify the appropriate decisions;

– This system is capable of handling the large database describing the target;

- The expert system includes highly efficient search methods due to the multiplicity of databases and knowledge bases;

– the system is able to handle incomplete data;

- The possibility of entering data for knowledge bases containing conditions that represent new experiences to define the system and reach greater confidence in decision-making.

3.3.2.1 Advantages and disadvantages of expert systems

The advantages of expert systems can be summarized in the following points: (Dweik and Al-Salem, 2016, 25: 30)

- The expert system is not subject to forgetfulness while the human expert does not have this advantage;

- Building an expert system in itself may be expensive, but the cost of development and maintenance can be distributed to several investors;

- The expert system treats similar issues in the same way, while the expert human being can be influenced by several factors;

– The expert system can document decisions on a permanent basis, and the experience of more than one person can be pooled into a single system;

- Expert systems can perform a range of tasks such as education, monitoring, monitoring, simulation, and design.

As for the disadvantages, they are as follows:

- The expert person is characterized by cognition while the expert system is not;

– An expert human can respond to an unusual situation when the expert system cannot do so;

– The expert adapts to changing circumstances while the expert system needs to be updated;

- Expert systems are deficient in problems beyond their capacity.

As a result, it can be said that the expert system can be an alternative to humans in some cases, such as predicting the weather, for example, or searching for malfunctions in a program, but in some fields, such as medicine, the expert system

cannot be an alternative to the human element, but can only be an assistant to humans when performing its tasks.

4.3.2.1 Use of expert systems in auditing

Expert systems in the field of auditing can be defined as computer programs that contain the knowledge and experience gained from one or more experts in auditing. It is designed to simulate the thinking methods and decision-making rules of the auditor who is an expert in a particular field so that he can solve new and infrequent problems. It is also defined as applications in which human expertise is combined in the field of accounting and auditing, which simulates human thinking in solving problems and making decisions to help accountants and auditors improve the quality of the audit process in the field of planning, evaluating the internal control system and identifying audit risk. (Abdulaziz, 2016, 38)

We conclude that expert systems in auditing are artificial intelligence applications designed based on three main pillars. The database stores the facts and experiences collected from expert accountants and auditors, and the database of laws, which contains the principles, standards and procedures that govern the accounting and auditing profession, in addition to the inference engine that is defined as the beating heart through which various problems and issues are solved and various decisions are made by simulating the way the human mind thinks.

a. Objectives of expert systems in the field of auditing

According to the report of the American Society of Certified Public Accountants entitled Introduction to Artificial Intelligence and Expert Systems, the use of expert systems in the field of auditing aims to achieve the following:

1- Preserving human knowledge from loss and maintaining professional experience in the various specialized fields of audit bodies by documenting them within expert systems, adding to them and refining them according to the accumulation of practices, as the majority of knowledge suffers from a lack of experts. Their loss often leads to significant loss and expert systems are a safe repository of this expertise.

2- Improving the productivity of employees in audit offices and bodies, where the technical expertise gained by experts in the office is placed at the disposal of beginners.

3- Dissemination and distribution of expertise within audit offices and bodies through expert systems, which is easier than the movement of the human element and is less expensive.

4- Increasing the ability to process complex analyses that may be accessible to the average individual in part. However, the large amount of details, data and facts to keep in mind may require an expert.

5- Expert systems are given a deep training and understanding of knowledge, which may lead the institution's experts to reconsider their practice by placing it in front of them in a conscious and deep manner, as well as helping beginners acquire knowledge and use these systems as training aids.

6- Monitoring the quality of performance during the implementation of the audit process and consistency of practices between different members of the audit team, and providing some assurance for the application of agreed methods documented by expert systems.

7- The ability of expert systems to perform complex tasks due to the fact that it contains the knowledge of multiple experts in the field of auditing, which qualifies it to carry out them at a level superior to human expertise in the same field.

B. Advantages of expert audit systems

Some researchers have pointed to some of the advantages of using expert systems in the audit process, which are as follows: (Abu Zayed, 2017, 35:38)

1. Expert systems raise the performance of auditors, but at the same time they are not a substitute for them in the decision-making process.

2- Expert systems are a means of training and qualifying auditors by benefiting from the expertise and guidance of expert auditors in supporting the performance of junior

auditors, thus forming generations with the ability to accomplish tasks and work efficiently and effectively.

3. The use of expert systems improves the efficiency of the audit process. Such as helping to develop an audit task plan and program, reducing audit costs, as well as shortening effort and time, and providing timely results.

4. Expert systems provide expertise and experience rarely obtained in offices and companies and thus help non-expert auditors to achieve results similar to those achieved by experts in the same field.

5- It improves the efficiency of decisions taken by external auditors and increases their effectiveness.

6- Shortening the time and effort for junior auditors who need to improve their decision-making abilities.

7. The possibility of using expert systems as a consulting and training tool at the same time. These systems can act as an advisor to external auditors, experts, and as a trainer to junior auditors.

8- It represents a documentary reference for auditors and thus provides the companies that use it with the best expertise that can be obtained.

C. Characteristics of expert systems in the audit process:

The distinctive characteristics of expert systems in the auditing profession are:

1- Expert systems are concerned with unstructured or atypical tasks that cannot clearly formulate a problem at the perception or planning stage, and therefore require relying heavily on the personal discretion of the auditor to choose the best alternative among the available alternatives. (Jamil and Osman, 2015, 210: 235)

2- Solving problems in the absence of important information, due to the fact that sometimes having to make decisions in the absence of important information, as well as the inaccuracy of the available information. Reasons for this include the high cost of obtaining accurate information and lack of time. Therefore, artificial intelligence

technology enables to deal with such situations and make important calculations and comparisons in the presence of some missing information.

3- Dealing with complex and puzzling matters where a person is exposed to difficult and puzzling situations, which challenge the available capabilities and possibilities, and requires the development of computer programs to help in such situations in complex detailed planning and study. (Khadash, 2018, 1:30)

4- A means of collecting, acquiring and purifying knowledge by obtaining it from human, material and other sources.

4.2.1 Digital Audit

In the field of auditing, the term (Auditing Quality) appeared, which refers to the characteristic of the professional opinion of the external auditor when auditing financial statements, within the limits of the practical and economic constraints of the audit environment. Therefore, satisfying these needs is a goal of quality and the main guide for the development and improvement of the professional opinion of the external auditor whenever practical and economic constraints allow. Making the fulfillment of the wishes of users of financial statements a measure of the degree of audit quality makes the auditing profession surround their needs and work to review professional standards on an ongoing basis to ensure that those needs are met, which contributes as a result to bridging the gap between what the profession offers and the expectations of users of financial statements, and thus increasing community satisfaction with the profession (Hassanein and Qutb, 2003: 395).

In light of the above, the researcher dealt with this as follows:

1.4.2.1 The concept of audit quality

The concept of audit quality is a relatively recent and important and renewable topic, and its importance increases when the auditor expresses a professional opinion contrary to the reality of the financial statements and leads to serious and misleading results for decision makers. In this regard, three trends can be distinguished (Ahmed, 2017, 16).

The first trend: is the financial trend or direction adopted by professional organizations related to auditing, as the quality of auditing for these organizations

depends on the extent to which the auditors adhere to the professional standards issued by these organizations.

The second trend: is to focus on the work team, as the audit process is carried out by a team of professionals consisting generally of the partner who is responsible for the process, then a manager who undertakes planning, and a chief auditor who supervises the assistants in carrying out the work and collecting evidence. The quality of the audit process is reflected in the extent of commitment to the plans and programs set.

The third trend: It focuses on the results of the audit process, as the quality of the audit is that the auditor discovers errors and gaps in the client's accounting system and reduces the risk of errors in the financial statements to the lowest possible degree in the light of the agreed fees, that is, the greater the probability of discovering material errors, the greater the quality of the audit and vice versa, as classified (Simmunic & Stein) 1987 audit quality in terms of time dimension into two types (long, 2012: 35).

• Pre-audit quality: This type of quality is determined when contracting with the client and is defined as: The possibility that the auditor's report will reveal material errors and irregularities in the financial statements.

• Dimensional quality of auditing: This type of quality is determined when the auditor submits his professional opinion as the possibility that the financial statements are free of errors and material irregularities other than those that have been reported, and this depends mainly on the auditor's independence and ability to withstand the pressures he faces at work, and others believe that the quality of the audit is related to the following points (Odeh, 2018, 14).

A. The extent to which the auditor is able to detect external errors and irregularities.
B. The degree of confidence provided by the auditor to the users of the financial statements through the accuracy of the information provided and the absence of any material distortions and errors.

C. Reduce the risk of detection to the extent that the acceptable audit risk level is extremely low.

D. The extent to which the external auditor adheres to professional standards. E. The external audit service contains all the qualities and characteristics expected by all parties of the audit environment.

Audit quality has received many definitions. It has been defined as "the methods used to ensure that an auditor performs his professional responsibilities" (Arinzolobeck, 2005: 44), and defined as "the possibility that the auditor will detect a breach in the client's accounting system and report on this breach" (De Angelo, 1981). Willingham & Jacobson have suggested that the best way to define audit quality is by linking it to audit risk, and therefore when the chartered accountant reduces the risk of discovery. To the extent that the Acceptable Audit Risk level is as low as possible (Abu Hein, 2015, 47).

(Anbar, 2015, 20: 21) defined audit quality as "the means and procedures adopted by the audit office to ensure that various professional responsibilities as well as the rules and ethics of professional conduct issued by professional organizations and quality control controls are met by minimizing the risk of detection to the greatest possible degree by designing procedures and setting standards to overcome the problems associated with audit processes. (Ahmed, 2011, 40: 45)

From the previous definitions, it is noted that quality depends on two basic conditions: (Abu Hein, 2015, 46):

A. Detecting errors and gaps in the client's accounting system, meaning that the more fraud and material distortions are detected, the greater the quality of the audit and vice versa.

B. Reaching the final opinion of the audit process.

The quality of audit is difficult due to the different nature of audit services from other services and the multiplicity of parties benefiting from this service, although the quality of audit is a basic requirement for all parties and beneficiaries of the audit service for several reasons (Al-Taweel, 2012: 24).

A. The auditor shall take into account the completion of the audit process with the highest possible quality in order to be able to give the highest possible accuracy to his report.

B. The company under audit needs to give language to its financial statements so it needs the audit process to be done with the highest possible quality.

C. Professional organizations believe that the quality of audit performance ensures that the audit profession fulfills its responsibilities towards all beneficiaries.

D. Due to the intensity of competition between audit firms, the vision of both auditors and clients is directed to the quality of the audit process by which the auditor is distinguished from other competitors (practitioners).

From the foregoing, it is clear that in order to achieve quality in the audit process, the work should be performed at a high level, efficiently and effectively in accordance with professional standards of auditing and ethical requirements, which achieves for the beneficiary parties the objectives of the implementation of the audit mission.

2.4.2.1 Disadvantages envisaged in case of failure to achieve audit quality

The auditor faces two main types of challenges and risks, which are represented by the following (Tamimi and Al-Saadi, 2014: 99).

1. Risks related to audit firms or firms.

2- Low reputation of audit offices or companies.

3- Low revenues that can be obtained by audit offices or firms.

4- The possibility of exposure of audit offices or companies to legal liability.
5. The possibility of losing the independence of audit offices or companies from the audited entity.

6- Risks associated with users of financial statements, including risks or losses faced by the beneficiaries of the financial statements due to making decisions based on low-quality reports.

3.4.2.1 Importance and objectives of audit quality:

a. The importance of audit quality

The term **"audit quality"** refers to "the set of policies and procedures designed to achieve quality control in offices that perform audit services for historical financial information and other assurances, related services and procedures necessary to achieve and follow up compliance with these policies" (Juma, 2019, 31), and the importance of quality control can be identified through the following (Baaja, 2016, 29).

1- Compliance with auditing standards.
2- Work to narrow the expectation gap.
3- Attention to working papers and their confidentiality.
4- Encourage teamwork.
5- Contracting with auditors with ability and efficiency.
6- Attention to the discovery of distortions and fraud in the financial statements and reduce practical errors.
7- Establishing confidence in the auditing profession and giving credibility to the financial statements.

2. Audit Quality Objectives

The audit bodies seek to achieve the following objectives (Al-Dhalai, 2020, 22):
1- Emphasizing the commitment of the offices to the recognized auditing standards.
2- Compliance of audit bodies with local laws, contracts with clients and professional standards set by the office to organize its work.
3- Seeking to help the profession to maintain its reputation.
4- Developing the efficiency of practical practice.
5- Availability of guidelines for the procedures that the auditor should adhere to in the audit task.

International Standard on Auditing No. 220 indicated that audit firms should implement quality control applications and methods in accordance with international auditing standards or appropriate national standards or practices, as they are developed at **two levels:** (Mujahid, 2011, 220: 250).

The first level: the level of the audit office.

The second level: the level of each audit separately.

With regard to individual audits, audit firms should choose methods and procedures for quality control that are commensurate with the nature of individual audits, and the auditor and his assistants (who have supervisory responsibilities) must take into account the skills of the assistants and their ability to perform the work entrusted to them when deciding on the appropriate scope of guidance, supervision and auditing for each of them.

4.4.2.1 Auditor's responsibility and procedures to ensure the quality of the audit under the auditing standards

Due to the importance of the auditing profession, especially in giving more credibility to accounting data, serious thinking has begun to be given to the availability of written rules and principles of practice for this profession that can be referred to and resorted to its rules and principles of practice if necessary, and some industrialized countries have succeeded in developing auditing rules, the judiciary and the courts, in addition to representing the guide for scholars and teachers of auditing (Mahmoud, 2002: 12).

In the accounting and auditing profession, these standards take deep dimensions that have become the general philosophical framework of any accounting system and the source of judgments in it, which determines its paths, directs its provisions and governs its procedures, aims to ensure the quality of work in it, as well as that auditing standards contain the basic principles, procedures and related guidelines, which are applied after adapting them when auditing financial statements (Al-Alusi, 2003: 88).

Auditing standards have been defined as "the patterns that an auditor should follow in the performance of his mission and that are logically inferred from the assumptions and concepts that support them" (Thomas and Henske, 1986: 52), and as "general guidelines to assist the external auditor in carrying out his responsibilities when auditing historical financial statements, and includes professional quality considerations such as competence, impartiality and reporting requirements" (Al-Qurashi, 2011: 24).

In general, the auditing standards aim to determine how the audit profession is practiced, and it is a measure of the level of professional performance required of the independent auditor, and it can be said that the standards are the model that is used to judge the quality of the work carried out by the auditor, and the audit standards determine the responsibility that the auditor bears as a result of his examination, as well as that the standards have two basic functions (Jarbou, 2009: 37).

1- It is a tool of communication, explanation and clarification of the audit process and its communication to all parties.

2- It is a means of judging the professional performance of the auditor after carrying out the audit.

The researchers argue that the audit criteria can be viewed from **two important perspectives** (Youssef, 2009, 63).

First: Standards of practical guidelines, as auditing standards are a guide for practitioners through the implementation of the auditor procedures to be followed by the practitioners, because the work of the auditor based on the standards gives the profession confidence and sobriety and gains the confidence of the multiple parties that use the summary of his work because it depends on personal judgment and the adoption of standards will lead to reducing the disparity in personal judgment.

Second: Standards for the quality scale of the work of auditors, as it represents an integrated set of standards used to judge the quality of the performance of the control factor that has been accomplished by the auditors and the standards are generally a measure of professional diligence when performing the tasks of the audit process. As for the criteria for preparing the report, it is considered as a measure of the quality of the audit process, so it is necessary to pay attention to them because they represent a measure of the necessary professional diligence when performing the tasks of the audit process, especially at the present time due to developments in the world of economy and business.

Al-Khasawneh believes that the use of electronic auditing contributes to achieving the dimensions of audit quality (Al-Khasawneh, 2015: 7):

1- Electronic auditing and achieving cost advantage: The use of electronic auditing contributes to reducing the cost of audit services and increasing the profitability of audit devices through the use of audit software in auditing financial statements, thus completing audit services quickly and completing more than one service for more than one institution, and reducing the time required for planning. It can be used to plan and quantify choices through experience and AI systems. To achieve this, the auditor must be at a high level of scientific and practical qualification in the field of using electronic audit programs and the use of software in planning audit tasks and using devices with specifications and competencies that contribute to achieving its goal. International Statement 1009 noted that the use of information technology techniques improves the efficiency and effectiveness of audit procedures.

2- Electronic audit and quality achievement: The use of electronic auditing in the implementation of financial operations contributes to the completion of audit tasks efficiently and effectively. One of the factors affecting the quality of audit is the time and effort spent in implementing audit services. The use of audit software in the implementation of audit tasks contributes to reducing the time and effort required to carry out audit tasks. To achieve this advantage, workers must be highly qualified scientifically and practically using electronic techniques and their uses in electronic auditing. In order to achieve quality in auditing, audit tasks must be accomplished objectively, as the use of electronic technologies by qualified auditors contributes to achieving objectivity in the auditing process, evaluating financial statements and evaluating evidence, and electronic technologies help to achieve independence and impartiality in auditing financial statements and detecting material errors and distortions in the financial statements.

3- Electronic audit and market share: The use of electronic auditing in providing financial statements contributes to providing the service quickly and accurately, especially in an environment where business organizations compete in the use of information technology. The use of information technology also contributes to encouraging business organizations to liaise with the audit office to perform audit tasks.

4- Electronic audit and excellence: Information technology in the current era is a competitive advantage for business organizations, as all business organizations seek to benefit from it in providing their services and producing their goods to distinguish themselves from others with their services and goods. Audit bodies are part of these organizations that can benefit from electronic audit techniques, quality service delivery and communication between the audited partners and the audit office.

5- Electronic audit and creativity: Creativity in the use of electronic auditing makes the auditor design the necessary programs to audit accounts or develop existing systems to suit the existing accounting systems, and creativity also comes in the use and development of artificial intelligence programs and expert systems programs.

5/4/2/1 Digital auditing and its role in supporting audit strategies

We define the audit strategy as the plan developed by the auditor to complete the audit process within a specific period, the auditor distributes the work among the auditors according to the designed audit program that reflects the objectives of the audit in the form of practical procedures that can be tracked and supervised. The process contributes to the following (Al-Khasawneh, 2014: 5).

1- Documentary audit strategy depends on documentary auditing, as the auditor audits documents and records, then financial statements, and can start vice versa, and this method enables the auditor to issue his opinion on the fairness of disclosure in the financial statements, and digital audit helps in implementing the tasks of the documentary audit strategy through the use of parallel simulation programs, general audit programs and special audit programs.

2- Systems Entrance, which is used as a result of the large size of companies and projects, which reflected the inability of management to control the assets and funds of major companies in a direct way, and this is what led to the delegation of powers and the emergence of an administrative pyramid based on an organizational method in which business and objectives are divided through equality between the duties and responsibilities required, and digital auditing helps in implementing the tasks of the systems entrance strategy through special programs and public audit programs.

3- The essential entrance and causes failure and financial insolvency resulting from the increase in cases of fraud and manipulation and harsh criticism of the auditor and accusing them of negligence due to the sufficiency of the division of the internal control system and this entrance focused on conducting a comprehensive audit and not only relying on the control system of the company and helps electronic audit in the implementation of strategic tasks essential entrance through diversity in electronic programs from parallel and optional simulation and public and private audit programs for auditing.

4- The professional entrance is carried out in accordance with the recognized auditing standards.

Based on the above, digital auditing helps in implementing the tasks of the professional entrance strategy through the use of information technology in planning audit tasks, implementing audit tasks and issuing the report.

6.4.2.1 Audit Risk

Audit risk means that the auditor gives an inappropriate opinion on grossly misrepresented financial statements. In order to express his opinion on the financial statements, the auditor shall design procedures to assist him in providing reasonable satisfaction that the financial statements have been prepared correctly in all material respects. However, it should be taken into account the possibility of material errors that may not be detected due to the nature of the choices and the inertia in the audit procedures or the procedures of the internal control system. When there are any indications to this effect, it is imperative that procedures be expanded to corroborate or deny such evidence.

Risks are also defined by the International Federation of Accountants (IFAC) in International Auditing Standard No. (400), labeled with risk assessment and internal control, as the risk of misinformation that occurs in an account balance or group of transactions that may be physical on its own or when combined with erroneous transactions in other balances or groups, which can only be prevented, detected and corrected by the accounting system or internal control system in a timely manner (Al-Hajami, 2015, 198).

a. Components of audit risk:

There are three types of audit risks:

1) Inherent Risks: It is the ability of a particular balance, account or group of transactions to be materially wrong, individually or when they are with wrong transactions in account balances or in other groups with the assumption that there are no relevant internal controls.

To assess the risks inherent in the auditor, the auditor uses his professional abilities to assess many factors: the honesty of management, the experience and knowledge of management, the nature of the entity's business such as the likelihood that the entity's products or services are of outdated technology and the complexity of the capital structure, and the calculation of financial statements that are likely to be subject to distortion, such as the nature of accounts that require adjustments or involve a high degree of guesswork.

The inherent risks are one of the most important risks that must be accurately assessed as they fundamentally affect the efficiency and effectiveness of the audit process, as the efficiency of the audit process is affected if it is determined too high, and this requires greater effort from the auditor. (Odeh 2011, 25)

There are many factors that affect the inherent risk (source, 2013, 32)

1. Seasonality of activity
2. The size of the entity and the size of its activity
3. The nature of the entity's operations and the size of the elements
4. The nature of possible errors
5. The industry to which the client belongs
6. The financial position of the entity and the operational pressures it is exposed to and regulatory pressures
7. Management and Board Turnover
8. Date of modification of errors for a specific account
9. Use Grades
10. Rate of change of procedures and systems

11. Susceptibility to fraud and theft
12. Extent of difficulty in determining amounts and values in accounting records

2) Audit Risk: Such as the occurrence of material errors in the accounts without the possibility of preventing or detecting them in a timely manner through the accounting system and internal control systems, that is, they indicate the failure of the internal control system to prevent, detect, correct or detect errors shortly after their occurrence through the automatic application of the system.

After the auditor understands the client's internal audit system, he begins to assess the audit risks. The stronger, more effective and reliable the internal audit system becomes, the auditor assesses control risk at a low value. If the auditor evaluates the audit risk at a high value, this means that the auditor will not rely on the internal audit system to reduce audit risks, and therefore will carry out extensive tests and procedures due to the low value of the discovery risk. If the value of audit risk is low, the auditor relies heavily on the quality of the internal audit system to reduce the value of audit risk, and will therefore perform fewer tests and procedures. (Al-Khatib, 2012, 24)

3) Detection Risk: These are the risks that the material audit procedures performed by the auditor to detect false information in the balance of an account or group of transactions that can be material alone or when combined with false information in account balances.

These are risks resulting from data errors that cannot be detected by the auditor or significant errors that were not corrected during internal audits or when performing detailed procedures that are present in the balance of an account or group of operations. (Akbar, 2015, 232-233)

In another division of audit risk types, Warren divides the ultimate risk of the audit into two types of risk: Karsou, 2008, 139-140.

First: the possibility of a material error in the financial statements; This risk is outside the direct judgment of the auditor, which means the possibility of obtaining full assurance that the financial statements are free of errors, and there are three

main determinants of this type: -

A- Integrity of the management of the entity.

B- The strength of the internal audit system of the entity

C. Economic situation of the entity under audit

Second: the possibility of failure to discover a material error; this type falls within the scope of direct audit of the auditor, and there are two main determinants of this type of risk:

A- Risk Sampling

B- Risk Nonsampling

The risk of inspection is the possibility of the auditor failing to discover a material error because the audit is carried out only for a part of the community under audit, and thus the possibility of failure to discover some errors remains as long as the community is not examined 100%, while the risk of non-inspection is that the auditor fails to discover a material error due to problems resulting from the interpretation or compilation of test results.

Colbert believes that the first type of Warren's ultimate audit risk is to some extent an expression of inherent risk and regulatory risk, while the second type expresses discovery risk.

Two other authors classified the components of the final risk of the audit into two types:

A- Alpha risk represents the risks resulting from the rejection of the financial statements, although they do not include a material error.

B- Beta Risk represents the risk of accepting financial statements and involves a material error.

The first error is considered as an efficiency error, as it results in incorrect rejection, and the consequent auditor doing other additional tests, and expanding the examination, as this additional effort will result in the auditor reaching the correct results, but at a greater cost, which affects the efficiency of the audit.

A type II error is called an effectiveness error where incorrect acceptance results in affecting the effectiveness of the audit process.

There is no doubt that the error of the second type is more serious in the audit than the error of the first type, as the second type is related to the effectiveness and purpose of the audit.

B. Audit Risk Model

The audit risk model provides a link between the audit procedures and the opinion to be issued by the external auditor. This model is used for planning purposes to decide the amount of evidentiary evidence that must be collected to complete the audit task. The model mathematically explains the relationship between the risk of issuing an unqualified opinion on financial statements that contain a material misstatement or error. Depending on the model, the distortion that must be discovered can be determined in order to determine the extent of testing required to reduce the risk of a material distortion of the financial statements to a certain level, noting that applying the model requires the use of personal judgment by the external auditor in evaluating the types of existing risk. According to American Standard No.(47), the final risk assessment model for auditing is determined by the following equation:

AR = IR * RC * RD

AR = Risk of Audit
IR = Inherent Risk
RC = Risk of Control
RD = Risk of Discovery (Quraishi, 2011, 94)

The value of planned detection risk depends on other factors in the model. The planned discovery risk value changes only when one of the other three factors changes. The planned discovery risk value determines the amount of evidence and the amount of tests the auditor plans to collect, with the detection risk value inversely proportional to the volume of evidence and the amount of tests. If the value of planned discovery risks decreases, the auditor is required to increase the amount of evidence and tests.

The value of the planned discovery risk is determined by applying the following equation:

Planned Detection Risk = Acceptable Audit Risk/(Control Risk×Inherent Risk) (Al-Khatib, 2012, 29)

It should be noted that the lower the inherent risk and the risk of control, the greater the risk of discovery that the auditor can accept, which means an inverse relationship between them. There is no doubt that because the inherent risk and the control risk are doubly integrated into the audit risk model, the effect of a given change in control risk at the appropriate level of detection risk depends on the level of inherent risk - that is, the higher the level of inherent risk, the more important the percentage of change given in the risk of control. For example, if the inherent risk is fixed at 30% and the control risk rises from 50% to 90%, the combined or combined risk will rise from 0.15 to 0.27. On the other hand, the inherent risk doubles to 60%, and the size of the increase in the combined risk will also double, rising from 0.27 to 0.54 (Al-Quraishi, 2011, 95).

Audit standards do not require the use of the audit risk model literally, but its application in fact depends on the personal judgment and professional judgment of the auditor, and in order to use this model in assessing audit risks for the purposes of planning the audit process, this requires the auditor to:

1) Setting the planned level of audit risk.

2) Assessment of natural risk and audit risk.

3) Based on the assessed level of natural risk and risk of audit, the planned core tests or risk of detection are adjusted to reach the desired level of audit risk (Al-Washli, 2008, 89).

7.4.2.1 The role of digital auditing in reducing audit risk

Digital auditing is one of the modern methods in the field of auditing that aims to use modern technology and software to analyze data and carry out audits more accurately and effectively. It has an important role in reducing audit risks as follows:

1. Improve data accuracy: Digital auditing enables the use of powerful graphical analysis tools to examine large data sets faster and more accurately, reducing the likelihood of errors or manipulation of data.

2. Improve risk identification: Digital audit techniques can comprehensively analyze data to identify unusual or suspected trends and patterns, helping to identify potential risks that could affect the validity of financial statements.

3. Improve process efficiency: By relying on digital audit systems, audits can be carried out faster and more efficiently, reducing the risk of human error and increasing the quality of results.

4. Increased focus on exceptions: Digital audit tools can identify unusual exceptions or points more effectively, enabling auditors to direct their attention and efforts towards areas that need extensive audit.

5. Enhance transparency and trust: Through the use of digital auditing, the level of transparency and trust in audits can be increased, as auditors can better document and track processes and share results more clearly with stakeholders.

The researcher believes that digital auditing contributes to reducing audit risks by improving the accuracy and effectiveness of audits and increasing confidence in the quality of financial statements and associated reports.

Chapter One Summary

Artificial intelligence technologies have made a great revolution in all fields because of their many characteristics that lead to accuracy and high speed, as well as lead to innovation and reduce human effort. There are many types of artificial intelligence used in business, including expert systems and others. Audit agencies and companies have been interested in using artificial intelligence techniques in carrying out audit tasks and carrying out inspections and audits because of their impact on the efficiency and effectiveness of the auditor, the quality of the audit process and the improvement of audit work.

Digital auditing is based on the use of digital data and computational technologies to analyze financial statements and business processes. Using expert systems, rules

and specialized audit knowledge are applied, making it easier to identify exceptions and provide guidance accurately and quickly.

These developments contribute to improving the quality of audit by increasing the accuracy of inferences and data analysis. It also helps strengthen audit strategies by improving guidance and identifying areas that need more attention.

Using digital auditing and expert systems, potential risks can be identified more and early, helping to take appropriate preventive action. It also contributes to increasing the transparency of audits and reducing the chances of error.

Chapter Two

Applied study

Chapter Two

Applied Study

1/2 Introduction:

This research aims to identify modern scientific methods and innovation in regulatory work in light of modern technological developments and digital transformation, and the impact of this on the efficiency and effectiveness of auditing and the quality of audit reports, by testing a set of hypotheses that dealt with one of the modern scientific methods that the auditor can rely on in accordance with professional standards when carrying out control tasks and the extent of readiness for innovation in auditing, namely digital auditing using expert systems as one of the artificial intelligence techniques and so on. It has a positive impact on maximizing the value of audit outputs, which is reflected in the quality of the report, supporting its strategy and reducing audit risks. In addition to characterizing the primary data through a questionnaire relied on by the researcher, by applying to the Libyan Audit Bureau.

2/2 The Libyan Audit Bureau:

It is the Supreme Audit Institution in Libya, an independent and impartial professional body, with legal personality and independent financial liability. The LAB reports directly to the legislative authority and is a member of professional organizations such as the International Organization of Supreme Audit Institutions and the African and Arab Organization of Supreme Audit Institutions.

The LAB aims to achieve effective control over public funds and verify their proper use and disposal, through examining and auditing accounts and evaluating the performance of all entities subject to its audit.

Other objectives of the LAB include:

1. Verifying the suitability of manual and electronic internal control systems, and the integrity of financial transactions, accounting entries and financial reports in accordance with applicable legislation.

2. Statement of deficiencies in applicable laws, rules and regulations.

3. Disclosure of financial irregularities in the entities subject to its audit.

4. Evaluate the performance of the entities subject to its audit and verify the use of resources in an economical, efficient and effective manner.

5. Enhancing transparency and strengthening its principles in state institutions and providing specialized financial and accounting advice.

In line with international standards, the law has assigned to the Bureau the competence of systemic supervision, performance control and preventive or preventive control. The Bureau exercises systemic control in both its financial and legal aspects by examining and reviewing the accounts, financial statements and other technical operations of the entities subject to its audit, and ensuring the application of laws, decisions and financial regulations related to the unit subject to control or audit. In addition to other precautionary competencies to preserve public funds, including: Implementing audit controls that ensure the collection of public revenues and discovering any shortcomings or laxity in their collection or that prevent any violations or violations from occurring when disbursing; Preventing the disposal of the accounts of entities subject to its audit if it is proven to him that there are actions that have caused harm to public funds, and he may place them under examination and accompanying review until the causes disappear and the damage is removed. And other audit tasks.

The Libyan Audit Bureau also exercises the competence of performance auditing by examining and evaluating the performance of the entities subject to its audit to show their efficiency and effectiveness in carrying out their activities and to ensure that their programmes and projects are scientifically and economically managed and that they achieve the objectives set for them and that those bodies have used their financial resources in the activities and tasks entrusted to them with the highest degree of efficiency.

The law stipulates the need to take into account the observations and recommendations of the Bureau in correcting the imbalances and deficiencies in the

management of public funds. In the event that the observation revealed from the examination and review work rises to a case of mismanagement or negligence resulting in waste of public funds, financial irregularities or criminal offences, files shall be prepared and referred to the competent authorities to complete the investigation procedures.

3.2 Statistical methods used in the study:

To achieve the objectives of the study, the researcher relied on some descriptive statistical methods, and some inferential statistical methods.

1.3.2 Descriptive statistical methods:

Some descriptive metrics were relied upon to describe the research data as follows:

1- Arithmetic mean:

It is an indicator to determine the relative importance of each element of the question, and the relative weights that were allocated to the responses of the sample items to the survey questions using the following mathematical equation:

$$\bar{X} = \frac{\sum_{i=1}^{n} x}{n}$$

$\bar{x}$: arithmetic mean of relative weights.
∑_(i=1)^n▒x : sum of the relative weights determined by the responses.
n : sample size.

Standard deviation

It is a measure of dispersion and is used as an indicator to determine the deviations of values from their arithmetic mean. It is calculated by the square root of the mean squares of values from their arithmetic mean. It is useful for measuring dispersion or homogeneity between opinions. Homogeneity of opinions increases when standard deviation decreases, while dispersion of opinions increases when standard deviation increases, calculated as follows:

σ=√((∑_(i=1)^n▒〖(x-x̄)^2 〗)/n)

where (σ) indicates the standard deviation

2.3.2 Inferential statistical methods

T test:

It is a test used to know the moral difference of the arithmetic mean calculated for the sample, in terms of being moral or non-significant, if the level of moral P-Value is less than 0.05, there is a difference or significant differences, but if the value of significance is greater than 0.05, there is no difference or significant differences.

The SPSS 25 program gives the significance value P-Value, where it is compared to the value of the significance 5%, if the value of the significance is less than the value of the significance 5%, the hypothesis that there is a relationship between the two variables and vice versa is accepted.

4.2 Study hypotheses:

Based on the aforementioned objectives, the research is based on the main premise that the use of digital auditing using expert systems as an artificial intelligence technology in the stages of the audit process will support the audit strategy, reduce audit risks and enhance its quality.

To achieve the objective of the research, the following hypotheses were developed:

First hypothesis:

There is a statistically significant relationship between digital auditing using expert systems and supporting the audit strategy in the Libyan Audit Bureau.

Second hypothesis

There is a statistically significant relationship between digital auditing using expert systems and reducing audit risks in the Libyan Audit Bureau.

Third hypothesis:

There is a statistically significant relationship between digital auditing using expert systems and achieving audit quality in the Libyan Audit Bureau.

Fourth hypothesis:

There are challenges in benefiting from digital auditing using the expert systems of the Libyan Audit Bureau.

5.2 Questionnaire List Design:

In light of the data necessary to test the hypotheses of the study, the researcher designed the survey list, which included a set of phrases that measure the relationship between digital auditing using expert systems, supporting the audit strategy, reducing audit risks and achieving its quality in the Libyan Audit Bureau, relying on a set of statements for the hypotheses of the study based on the Likert five-point scale.

6.2 Distribution of the questionnaire list:

The researcher distributed the questionnaire lists to the vocabulary of the random sample consisting of (50) auditors from the employees of the Libyan Audit Bureau, and a survey was conducted according to the size of the sample under study. After the questionnaires were collected, each list received from the respondents was reviewed to ensure their completeness and validity for inclusion in the statistical analysis. The following table illustrates this:

Table 2
Statement of questionnaire lists distributed, received and valid for statistical analysis

statement	Distributed lists	Unreceived lists	Received lists	Excluded lists	Valid lists
Number	50	1	49	0	49
%	100	2	98	0	98

It is clear from the previous table that the response rate reaches (98%), and the lists valid for statistical analysis amounted to (98%) of the total distributed lists of (50) forms.

7/2 Frequency and relative tables:

The researcher used these tables to infer the number and proportions of responses from respondents and put them in a two-column table. The first column represents the occurrences, and the second column represents the percentage of the sample size as shown in the following tables:

Table No. (3)

Shows the number and percentage of respondents in the sample

Demographic variables		Duplicate	Percentage (%)
Fully qualified	Bachelor	42	84
	Postgraduate Diploma	2	4
	Master	4	8
	Doctor	2	4
	Total	50	100
genre	male	30	60
	female	20	40
	Total	50	10
Work Experience	From 5 years and less than 10	2	4
	From 10 years and less than 20	45	90
	20 years and above	3	6
	total	50	100

8.2 Descriptive statistics and "T" testing:

The mean and standard deviations of the independent variable digital audit were found using expert systems and dependent variables (reducing audit risks, enhancing audit quality, audit support strategy, obstacles that limit the use of digital auditing in achieving audit quality and supporting audit strategy), as follows:

-First hypothesis test:

There is a statistically significant relationship between digital auditing using expert systems and supporting the audit strategy in the Libyan Audit Bureau.

To verify the validity of this hypothesis, the arithmetic averages and standard deviations of the views of the study sample were extracted in the paragraphs related to the hypothesis, as in the following table.

Table (4) Arithmetic Averages and Standard Deviations of the views of the Study Sample for the Paragraphs Related to the Hypothesis

M	Paragraphs	Arithmetic average	Standard deviation	Answers to the study sample
1	The availability of scientific qualification among auditors in the aspects and uses of digital auditing using expert systems helps in supporting the documentary audit strategy.	4.866	0.342	Highly
2	The availability of practical qualification for auditors in the aspects and uses of digital auditing using expert systems helps in supporting the documentary audit strategy	4.833	0.375	Highly
3	Digital audit software using expert systems helps support documentary audit strategy	4.833	0.375	Highly
4	The availability of systems technologies that are expert in digital audit programs and their use in the audit process helps in supporting the documentary audit strategy	4.866	0.342	Highly
5	The use of expert systems for digital auditing in the audit process helps support the strategy of the systems entrance to audit	4.866	0.342	Highly

6	The availability of expert systems techniques in audit bodies and their use in the audit process helps in supporting the audit systems entrance strategy	0.833	0.375	Highly
7	The availability of scientific qualification among auditors in the aspects and uses of digital auditing helps in supporting the strategy of the systems audit entrance	4.85	0.36	Highly
8	The availability of practical qualification for auditors in the aspects and uses of digital auditing helps in supporting the strategy of the audit entrance systems	4.85	0.36	Highly
9	The use of digital audit software in the audit process helps support the strategy of the intrinsic approach	4.816	0.39	Highly
10	The availability of electronic devices in audit companies and their use in the audit process helps in supporting the strategy of the essential entrance	4.816	0.39	Highly
11	The availability of scientific qualification among auditors in the aspects and uses of digital auditing helps in supporting the strategy of the entrance to the essence	4.816	0.39	Highly
12	The availability of practical qualification			

	for auditors in the aspects and uses of digital auditing helps in supporting the strategy of the professional approach to auditing	4.866	0.342	Highly
13	The use of digital audit software in the audit process helps support the strategy of the professional approach to auditing	4.866	0.426	Highly
14	The availability of electronic devices in audit companies and their use in the audit process helps in supporting the strategy of the professional approach to auditing	4.833	0.375	Highly
15	The availability of scientific qualification among auditors in the aspects and uses of digital auditing helps in supporting the strategy of the professional approach to auditing	4.78	0.415	Highly
16	The availability of practical qualification for auditors in the aspects and uses of digital auditing helps in supporting the strategy of the professional approach to auditing	4.88	0.342	Highly
	Overall average relationship between digital auditing using expert systems and audit strategy support	4.83	0.370	Highly

The previous table shows the arithmetic averages and standard deviations of the paragraphs related to the third hypothesis. The arithmetic averages ranged between (4.833 - 4.866). The paragraph, which stipulates that the availability of scientific

qualification among auditors in the aspects and uses of digital auditing helps in supporting the documentary audit strategy ranked first with an arithmetic average of 4.866. While the paragraph that states that the practical qualification of auditors in the aspects and uses of digital auditing helps in supporting the documentary audit strategy ranked last with an arithmetic average of 4.83. The arithmetic mean as a whole was 4.83. There was a tendency among the respondents for the hypothesis paragraphs to a high degree in all paragraphs related to the role of digital auditing in achieving and supporting the audit strategy, and the arithmetic mean of the dimension was compared with the standard mark (3) the hypothesis acceptance criterion using the "T" test as shown in the following table.

Table (5): Arithmetic Averages, Standard Deviations and Paragraph "T" Test

Digital auditing using expert systems and supporting the audit strategy in the Audit Bureau	Arithmetic average	Standard deviation	T value	Degrees of freedom	Statistical significance
	4.83	0.370	1.8482	59	0.000

The above table shows that there are statistically significant differences (a < 0.95) between the arithmetic average and the standard mark (3), where the value of "T" was 108.482 and a statistical significance of 0.000, thus the hypothesis is accepted, which states that there is a statistically significant relationship between AI techniques and support for the audit strategy.

-Second hypothesis test

There is a statistically significant relationship between digital auditing using expert systems and reducing audit risk.

To verify the validity of this hypothesis, the arithmetic averages and standard deviations of the views of the study sample were extracted in the paragraphs related to the hypothesis, as in the table below.

Table (6) Arithmetic Averages and Standard Deviations of the Views of the Study Sample for the Paragraphs Related to the Second Hypothesis

M	Paragraphs	Arithmetic average	Standard deviation	Answers to the study sample
17	Digital auditing using expert systems helps reduce audit risk in general	4.843	0.375	High
18	Digital auditing using expert systems contributes to the discovery of material errors	4.843	0.375	High
19	Digital auditing using expert systems assists the auditor in collecting sufficient and appropriate evidence to express his opinion on the financial statements.	4.866	0.342	High
20	Digital auditing using expert systems helps to judge the integrity of control systems	4.866	0.342	High
21	Digital auditing using expert systems helps determine the materiality threshold that ensures the detection of material errors	4.866	0.342	High
22	Digital auditing using expert systems contributes to complex analytical procedures that ensure more accurate results.	4.843	0.375	High
23	Digital auditing using expert systems contributes to assessing the internal control system and identifying strengths and weaknesses.	4.833	0.342	High
24	Digital auditing using expert systems contributes to determining the appropriate timing of the audit process based on control risks.	4.866	0.342	High
	Overall average of the relationship between digital auditing using expert systems and reducing audit risk	4.84	0.360	High

Table 3 shows the arithmetic average and standard deviations of the paragraphs related to the hypothesis. The arithmetic averages ranged between (4.833-4.866). The paragraphs stating that digital auditing using expert systems contributes to determining the appropriate timing of the audit process based on control risks,

determining the threshold of materiality, collecting sufficient and appropriate evidence, and judging the integrity of audit systems in the first place with an arithmetic average of (4.866). The paragraph, which states that digital auditing using expert systems contributes to evaluating the internal control system and identifying strengths and weaknesses, ranked last with an arithmetic average of (4.833). The arithmetic average as a whole was (4.84). The orientation of the responses of the study sample indicates that the use of digital auditing as one of the artificial intelligence techniques contributes to a high degree in reducing the risks of auditing.

Table (7): Arithmetic Averages, Standard Deviations and Paragraph "T" Test

The relationship between digital auditing using expert systems and reducing audit risk	Arithmetic average	Standard deviation	T value	Degrees of freedom	Statistical significance
	4.84	0.360	1.432 2	59	0.000

The above table shows that there are statistically significant differences (a < 0.95) between the arithmetic average and the standard mark (3), where the value of "T" was 104.322 and a statistical significance of 0.000, thus the hypothesis is accepted, which states that there is a statistically significant relationship between digital auditing using expert systems and reducing audit risks in the Audit Bureau.

-Third Hypothesis Test

There is a statistically significant relationship between digital auditing using expert systems and achieving quality in audit services.

To verify the validity of this hypothesis, the arithmetic average and standard deviations of the views of the study sample were extracted in the paragraphs related to the hypothesis, as in the table below.

Table (8) Arithmetic average and Standard Deviations of the Views of the Study Sample for the Paragraphs Related to the Third Hypothesis

	Paragraphs	Arithmetic average	Standard deviation	Answers to the study sample
25	The scientific qualification of the auditor using digital auditing helps in achieving the quality of audit services	4.843	0.375	High
26	The practical qualification of the auditor using digital auditing helps in achieving the quality of audit services	4.843	0.375	High
27	Using specialized digital audit software that contributes to achieving the quality of audit services	4.866	0.342	High
28	The use of advanced devices and communication networks in auditing contributes to achieving the quality of audit services	4.865	0.342	High
29	Digital auditing using expert systems helps to achieve quality in preserving worksheets	4.833	0.375	High
30	Digital auditing using expert systems contributes to achieving quality in collecting evidence in auditing	4.866	0.342	High
31	Digital auditing using expert systems contributes to the provision of independent audit services	4.835	0.342	High
32	Digital auditing using expert systems contributes to providing audit services objectively	4.866	0.342	High
33	Digital auditing using expert systems contributes to the provision of impartial audit services	4.866	0.375	High
34	Digital auditing using expert systems contributes to increasing coordination and integration between the different stages of the audit process	4.833	0.375	High
35	Digital auditing using expert systems improves the ability of individuals to select high-quality evidence	4.866	0.342	High
The overall average of the relationship between digital auditing using expert systems and achieving the quality of audit services		4.84	0.360	High

The table shows the arithmetic average and standard deviations of the paragraphs related to the hypothesis. The arithmetic average ranged between (4.833-4.866). The paragraph, which stipulates the use of specialized software for digital auditing contributes to achieving the quality of audit services, and that digital auditing using expert systems contributes to providing audit services objectively in the first place and with an arithmetic average of (4.866). The paragraph, which states that digital auditing contributes to achieving quality in keeping working papers, ranked last with an arithmetic average of (4.833). The arithmetic average as a whole was (4.84). The orientation of the answers of the study sample indicates that the use of digital auditing and the availability of the elements of success related to scientific and practical qualification and the use of expert systems as one of the artificial intelligence techniques contribute to a high degree in achieving quality in audit services.

Table (9): Arithmetic average, Standard Deviations and Paragraph "T" Test

The role of digital auditing using expert systems in achieving the quality of audit services	Arithmetic average	Standard deviation	T value	Degrees of freedom	Statistical significance
	4.84	0.360	1.4322	59	0.000

The above table shows that there are statistically significant differences (a < 0.95) between the arithmetic average and the standard score (3), where the value of "T" was 104.322 and a statistical significance of 0.000, thus the hypothesis is accepted, which states that there is a statistically significant relationship between digital auditing using expert systems and the quality of audit services in the Audit Bureau.

-Fourth Hypothesis Test

There are challenges facing the Libyan Audit Bureau in leveraging digital auditing using expert systems.

To verify the validity of this hypothesis, the arithmetic averages and standard deviations of the opinions of the study sample were extracted in the paragraphs related to the hypothesis, and the table below shows this.

Table (10): Arithmetic average and Standard Deviations of the Performance of the Study Sample for the Paragraphs Related to the Fourth Hypothesis.

M	Paragraphs	Arithmetic average	Standard deviation	Answers to the study sample
36	One of the obstacles to the use of expert systems in digital auditing is the cost of physical audit software	4.78	0.415	High
37	One of the obstacles to the use of expert systems in digital auditing is the lack of scientific qualification with artificial audit techniques	4.82	0.375	High
38	One of the obstacles to the use of digital auditing is the lack of practical qualification with artificial audit techniques	4.8	0.403	High
39	One of the obstacles to the use of expert systems in digital auditing is the need to develop artificial intelligence programs according to the development of accounting information systems in the audited bodies.	4.84	0.360	High
40	One of the obstacles to the use of expert systems in digital auditing is the need to develop artificial intelligence programs according to the nature of accounting information systems in the audited	0.482	0.390	High

	entities unless there is a unified accounting information system			
41	There is no clear definition of the organization of digital audits according to auditing standards	4.83	0.375	High
42	One of the obstacles to the use of expert systems in digital auditing is that there is no authority of proof with regard to digital audit evidence.	4.79	0.375	High
43	One of the obstacles to the use of expert systems in digital auditing is the problem of the time period of retention of electronic evidence for a short period	4.85	0.360	High
44	One of the obstacles to the use of expert systems in digital auditing is that some entities still apply manual and electronic systems	4.80	0.403	High
45	Auditor's lack of confidence in AI-related systems and reliance on simple software in the audit process	4.85	0.360	High
46	Lack of sufficient experience in using expert systems in digital auditing	4.77	0.415	High

	Overall average of challenges in benefiting from the use of digital auditing using expert systems	4.81	0.389	High

The table of arithmetic average and standard deviations of the paragraphs related to the fourth hypothesis shows that the arithmetic average ranged between (4.77-4.85). The paragraph that states the auditor's lack of confidence in systems related to

artificial intelligence came in first place with an arithmetic average of 4.85, while the paragraph that states that one of the obstacles to the use of digital auditing is the lack of sufficient experience in using expert systems in digital auditing ranked last with an arithmetic average of 4.77. The arithmetic average as a whole was 4.81. The responses of the study sample indicate that there are obstacles that limit the use of electronic auditing in the audit process. The arithmetic average of the dimension was compared with the standard mark (3) of the hypothesis acceptance criterion using the "T" test as shown in the following table.

Table (11): Arithmetic average, Standard Deviations and "T" Test

For the challenges facing benefiting from the use of digital auditing using expert systems	Arithmetic average	Standard deviation	T value	Degrees of freedom	Statistical significance
	3.54	1.174	96.102	59	0.000

It is clear from the above table that there are statistically significant differences (a < 0.95) between the arithmetic average and the standard score (3), where the value of "T" was 96.102 and a statistical significance of 0.000, thus the hypothesis is accepted, which states that there are obstacles that limit the benefit of the use of expert systems in digital auditing in achieving competitiveness advantages and audit strategy.

From the previous presentation, statistical analysis and hypothesis testing, it was found that the four hypotheses were fulfilled, which indicate that digital auditing using expert systems supports the audit strategy and reduces the risks of the audit and thus achieves its quality.

Chapter Two Summary

In this chapter, the researcher dealt with the applied study and explained the hypotheses that he dealt with by testing and analysis and the methodology he followed to test and analyze these hypotheses.

The researcher reached the fulfillment of the four hypotheses that he addressed, which supported the existence of the impact or role of digital auditing using expert systems as one of the artificial intelligence techniques in supporting the audit strategy and reducing its risks, and thus achieving the quality of auditing despite the presence of some challenges facing the benefit of digital auditing using expert systems.

Chapter Three
Findings and Recommendations

Chapter Three

Findings and Recommendations

In this part, the researcher deals with findings and recommendations, so this part is divided into the following:

1/3: Findings.

2/3: Recommendations.

1/3 Findings

In light of the data analysis findings of the applied study carried out by the researcher, the findings can be presented as follows:

1- There is a statistically significant relationship between digital auditing using expert systems as an artificial intelligence technique and supporting the audit strategy.

2- There is a statistically significant relationship between digital auditing using expert systems as an artificial intelligence technique and reducing audit risks.

3- There is a statistically significant relationship between digital auditing using expert systems as one of the artificial intelligence techniques and achieving audit quality.

4- There are many challenges facing the use of digital auditing using expert systems.

5- The progress in the use of information and communication technology in business organizations in a large way has imposed on audit bodies and companies a new reality that requires the auditor to keep pace with this development and move towards benefiting from information and communication technology in providing audit services.

6- One of the obstacles to the use of electronic programs in auditing is the cost of purchasing, developing and developing electronic software, which requires that the auditor have scientific knowledge in the most important software and applications, and this may increase the cost of audit services as public programs may contribute to the completion of some audit tasks.

7- In light of the presence of large amounts of data stored in databases and data stores, the need to develop powerful tools for analyzing data and extracting information and knowledge from them has increased, hence the so-called artificial intelligence emerged as a technology used to extract knowledge from huge amounts of data, classify it, analyze it and benefit from it in achieving the quality of auditing, increasing the efficiency and effectiveness of the auditor and strengthening his professional opinion.

8- Expert systems are artificial intelligence techniques, and they contain many advantages that make it of a special nature.

9- Artificial intelligence techniques have an effective and important role in the field of finance and accounting, as they have the ability to classify and predict, and they are more used in the areas of bankruptcy prediction, going concern, financial distress, in addition to corporate performance prediction, credit risk estimation, and management fraud detection. Thus, they are important tools that help the audit increase the efficiency and effectiveness of the audit process.

10- It turns out that artificial intelligence techniques are used by many professional organizations, which supports the researcher's opinion on the importance of relying on it in developing the review process.

11- Accounting and auditing companies and bodies conduct training courses on the use of modern auditing methods, especially the use of artificial intelligence techniques, and the use of specialized and expert academic and professional expertise, in order to qualify and develop the capabilities of external auditors in them.

12- Those in charge of the accounting and auditing profession in Libya have adopted the preparation of the infrastructure for electronic professional services, such as continuous auditing and emphasizing trust in companies' websites and real-time accounting systems.

13- Among the characteristics of artificial intelligence techniques are the ability to deal with difficult problems, automatic detection of unknown patterns, dealing with a large volume of data, relatively high cost, the discovery of important unexpected information hidden in accounting transactions, the ability to learn.

2/3 Recommendations

In light of the researcher's findings of statistical analysis, and the review of studies, references and research, the researcher provides a set of recommendations summarized as follows:

1- The need to enhance the auditors' awareness of the importance of using digital auditing in providing audit services and its role in achieving the quality of the audit process for audit companies in the information technology environment.

2- The need to enhance the auditors' awareness of the importance of information technology in supporting audit strategies in the information technology environment.

3- The need to develop the professional performance of the auditor in the areas of benefiting from digital auditing in planning the audit process, collecting audit evidence and preparing the audit report through holding training courses.

4- Encouraging auditors to enroll in specialized training courses in the field of information technology and artificial intelligence and use them in auditing.

5- Completing specialized studies in the field of using artificial intelligence techniques in various financial and accounting fields, such as studying credit risks and combating money laundering.

6- Studying the techniques of artificial intelligence separately in detail and the role of each of them in developing the professional field of accounting.

7- Working to increase the professional competence of the auditor through continuous development and training on modern methods and their various applications.

8- Supreme Audit Institutions should update their audit legislation and policies to keep pace with technological developments and ensure their compatibility with the use of expert systems.

9- SAIs should invest in developing the necessary infrastructure to support the use of digital auditing, including cloud computing and cybersecurity technologies.

10- SAIs should strengthen cooperation and partnerships with the private sector, academia and international institutions to exchange knowledge and experiences in the use of digital auditing.

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Annexes

Modern Scientific Methods and Innovation in Audit Work

The Fourteenth Scientific Competition
Arab Organization of Supreme Audit Institutions

(ARBOSAI)

Prepared by:
Abu Bakr Abdullah Alakrum
Libyan Audit Bureau
State of Libya
2024

This questionnaire represents one of the important aspects of the research, and aims to study modern scientific methods and innovation in the supervisory work, please kindly answer the questions posed and provide the researcher with your valuable opinions by placing a sign (√) on the answer that you deem appropriate, as the researcher hopes that your answers will enrich and raise the scientific research level of this research.

Thanks for your cooperation....

Researcher
Abu Bakr Al , Akroum

First: General Information:

Please **tick** the appropriate answer

1- Name: ..... (optional)

2- Academic Qualification:

[ ] Bachelor
[ ] Postgraduate Diploma
[ ] Master's / Professional Certificates
[ ] PhD

3- Type:

[ ] Male

[ ] Female

4- Work Experience:

[ ] From 5 years and less than 10

[ ] From 10 years and under 20

[ ] More than 20

<u>Second: Study hypotheses:</u>

	There is a statistically significant relationship between digital auditing using expert systems and supporting the audit strategy in the Libyan Audit Bureau	Strongly agree	I agree	neutral	Disagree	Strongly disagree
		5	4	3	2	1
1	The availability of scientific qualification among auditors in					

	the aspects and uses of digital auditing using expert systems helps in supporting the documentary audit strategy.					
2	The availability of practical qualification for auditors in the aspects and uses of digital auditing using expert systems helps in supporting the documentary audit strategy					
3	Digital audit software using expert systems helps support documentary audit strategy					
4	The availability of systems technologies that are expert in digital audit programs and their use in the audit process helps in supporting the documentary audit strategy					
5	The use of expert systems for digital auditing in the audit process helps support the strategy of the systems entrance to audit					
6	The availability of expert systems technologies in audit bodies and their use in the					

	audit process helps in supporting the audit systems entrance strategy					
7	The availability of scientific qualification among auditors in the aspects and uses of digital auditing helps in supporting the strategy of the systems audit entrance					
8	The availability of practical qualification for auditors in the aspects and uses of digital auditing helps in supporting the strategy of the audit entrance systems					
9	The use of digital audit software in the audit process helps support the strategy of the intrinsic approach					
10	The availability of electronic devices in audit companies and their use in the audit process helps in supporting the strategy of the essential entrance					
11	The availability of scientific qualification among auditors in the aspects and uses of digital auditing helps in supporting the					

	strategy of the entrance to the essence					
12	The availability of practical qualification for auditors in the aspects and uses of digital auditing helps in supporting the strategy of the professional approach to auditing					
13	The use of digital audit software in the audit process helps support the strategy of the professional approach to auditing					
14	The availability of electronic devices in audit companies and their use in the audit process helps in supporting the strategy of the professional approach to auditing					
15	The availability of scientific qualification among auditors in the aspects and uses of digital auditing helps in supporting the strategy of the professional approach to auditing					
16	The availability of practical qualification for					

	auditors in the aspects and uses of digital auditing helps in supporting the strategy of the professional approach to auditing					

	There is a statistically significant relationship between digital auditing using expert systems and reducing audit risk	Strongly agree	I agree	neutral	Disagree	Strongly disagree
		5	4	3	2	1
17	Digital auditing using expert systems helps reduce audit risk in general					
18	Digital auditing using expert systems contributes to the discovery of material errors					
19	Digital auditing using expert systems assists the auditor in collecting sufficient and appropriate evidence to express his opinion on the financial statements.					
20	Digital auditing using expert systems helps in judging the integrity of control systems					
21	Digital auditing using expert systems helps determine the materiality threshold that ensures the detection of material errors					

22	Digital auditing using expert systems contributes to complex analytical procedures that ensure more accurate results.					
23	Digital auditing using expert systems contributes to assessing the internal control system and identifying strengths and weaknesses.					
24	Digital auditing using expert systems contributes to determining the appropriate timing of the audit process based on control risks.					

	There is a statistically significant relationship between digital auditing using expert systems and achieving quality in audit services	Strongly agree	I agree	Neutral	Disagree	Strongly disagree
		5	4	3	2	1
25	The scientific qualification of the auditor using digital auditing helps in achieving the quality of audit services					

26	The practical qualification of the auditor using digital auditing helps in achieving the quality of audit services					
27	Using specialized digital audit software that contributes to achieving the quality of audit services					
28	The use of advanced devices and communication networks in auditing contributes to achieving the quality of audit services					
29	Digital auditing using expert systems helps to achieve quality in preserving worksheets					
30	Digital auditing using expert systems contributes to achieving quality in collecting evidence in auditing					
31	Digital auditing using expert systems contributes to the provision of independent audit services					
32	Digital auditing using expert systems contributes to providing audit services objectively					
33	Digital auditing using expert systems contributes to the provision of impartial audit services					

34	Digital auditing using expert systems contributes to increasing coordination and integration between the different stages of the audit process					
35	Digital auditing using expert systems improves the ability of individuals to select high-quality evidence					

	There are challenges in benefiting from digital auditing using the expert systems of the Libyan State Audit Bureau.	Strongly agree	I agree	neutral	Disagree	Strongly disagree
		5	4	3	2	1
36	One of the obstacles to the use of expert systems in digital auditing is the cost of physical audit software					
37	One of the obstacles to the use of expert systems in digital auditing is the lack of scientific qualification with artificial audit techniques					
38	One of the obstacles to the use of digital auditing is the lack					

	of practical qualification with artificial audit techniques					
39	One of the obstacles to the use of expert systems in digital auditing is the need to develop artificial intelligence programs according to the development of accounting information systems in the audited bodies.					
40	One of the obstacles to the use of expert systems in digital auditing is the need to develop artificial intelligence programs according to the nature of accounting information systems in the audited entities unless there is a unified accounting information system					
41	There is no clear definition of the organization of digital audits according to auditing standards					
42	One of the obstacles to the use of expert systems in digital auditing is that there is no authority of proof with regard to digital audit evidence.					
43	One of the obstacles to the use of expert					

	systems in digital auditing is the problem of the time period of retention of electronic evidence for a short period					
44	One of the obstacles to the use of expert systems in digital auditing is that some entities still apply manual and electronic systems					
45	Auditor's lack of confidence in AI-related systems and reliance on simple software in the audit process					
46	Lack of sufficient experience in using expert systems in digital auditing					