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THE INFLUENCE OF ARTIFICIAL INTELLIGENCE ON THE EVOLUTION OF INTERNAL AUDIT METHODOLOGIES WITHIN THE FINANCIAL ENTITY

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Abstract:

This study seeks to determine the impact of artificial intelligence on the transformation of internal audit practices in commercial banks operating in Iraq, while also assessing the feasibility of using MindBridge AI technology and the human and material challenges that might hinder this process.

The research relied on a sample of 152 individuals working in internal audit departments and related departments, using a questionnaire as a primary tool for gathering information, and a descriptive-analytic approach as a research methodology.

The research findings showed that the level of using modern tools and technology by internal audit departments is at an average level, while assessing the feasibility of using MindBridge AI technology is moderate due to a number of barriers, with the most prominent ones being a lack of a special strategic vision, inadequate technological infrastructure, and a need for training. The research also showed that there are human and material challenges that have a significant impact on this process.

The primary recommendation is that artificial intelligence technology be implemented through a gradual approach through pilot projects with a special budget for digital transformation and enhancing cybersecurity, as well as training and a comprehensive data governance framework that might enhance efficiency and quality in internal audits, while also enabling early detection of risks, inaccuracies, and misappropriation of resources.

Keywords: Artificial intelligence; internal auditing; MindBridge Ai; Iraqi commercial banks.

INTRODUCTION:

Over the last two decades, there has been an unprecedented digital transformation globally, resulting in the development of advanced technologies that have significantly redefined financial and regulatory environments. With an increase in data volume, there has been a corresponding increase in the complexity of financial activities, as well as an increase in regulatory requirements. Intelligent technologies have been developed to address challenges that have resulted from these complexities, with an aim of improving the ability to analyze and detect unusual patterns with unprecedented speed and accuracy. There has been an improvement in machine learning, deep learning, and natural language processing, improving the ability to analyze financial data, identifying potential risks, and providing detailed information on activities that are difficult to monitor through traditional methods.

Internal audit practices, on the other hand, have been facing challenges to demonstrate effectiveness within an environment that has been rapidly evolving over the years. The ability to rely on limited sampling and traditional testing methods has become insufficient to provide an adequate level of effectiveness, resulting in audit organizations adopting modern technologies that have been developed to improve their ability to comprehensively analyze and interpret information with unprecedented efficiency. Notable technologies include intelligent systems that have been developed to improve the ability to monitor activities and detect unusual patterns, as demonstrated through MindBridge Ai, which has been successful in improving the efficiency of the auditing process.

Therefore, the fast development of intelligent technologies greatly affects the internal audit process, allowing the transition from the ex post examination-based approach to the more extensive paradigm of comprehensive risk analysis, as well as the quality of the decisions made by the regulatory bodies. Nevertheless, the efficient use of the intelligent technologies depends on the availability of the required human resources, infrastructure, as well as the observance of the ethical standards related to the use of data. Taking into consideration the aforementioned, the present study will explore the effect of artificial intelligence on the transformation of internal audit methodologies, particularly the

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MindBridge Ai, as well as the possible physical and human obstacles that may affect the efficient use of the intelligent technologies at the local level.

Research Problem and Questions:

The landscape for internal auditing is witnessing a significant change with the advancement of intelligent technology, particularly artificial intelligence, in combination with specialized internal auditing software such as MindBridge Ai. This is due to the extensive analysis, risk identification, and ability to process large amounts of data at high speeds, which are hallmarks of these technologies. Nevertheless, a significant number of firms still rely on conventional methods for internal auditing, which could result in inefficiencies in the detection of significant misstatements in the financial statements.

The integration of intelligent technology in the field of internal auditing poses the following research questions:

1. What is the effect of using artificial intelligence technologies, such as the specialized software MindBridge Ai, on the efficiency of internal auditing in Iraqi commercial banks?
2. To what extent do financial and technological factors contribute to the adoption of artificial intelligence in the field of internal auditing in commercial banks?
3. To what extent does the availability of technically qualified personnel, trained in a specific curriculum, contribute to the implementation of artificial intelligence in the field of internal auditing?
4. Is there a statistically significant correlation between the actual level of adoption of artificial intelligence in the field of internal auditing and the effectiveness and efficiency of the internal auditing processes in commercial banks?

RESEARCH OBJECTIVES:

The purpose of this study is to:

1. Evaluate the effects of artificial intelligence technology, for example, MindBridge Ai, on the enhancement of the effectiveness of the internal auditing process in Iraqi commercial banks.
2. Examine the degree to which the availability of both material and human resources assists in the integration of artificial intelligence technology into the internal auditing process.
3. Determine the most significant obstacles to the integration of artificial intelligence technology into the internal auditing process, which are related to both material and human resources.
4. Make appropriate suggestions to the management of the banking sector and the relevant authorities to facilitate the integration of artificial intelligence technology into the internal auditing process.

Significance of the research:

The significance of the present research can be categorized into two main dimensions: scientific and practical, which are elaborated as follows:

Scientific importance:

The scientific significance of this research lies in its contribution to the ever-growing scientific repository of literature regarding the importance of artificial intelligence in improving internal audit practices. It emphasizes MindBridge Ai technology as a pioneering applied model in this field.

In addition, this research fills a gap in our existing knowledge regarding the application of this technology within Arab society, with a special focus on Iraqi commercial banks, where little research has been conducted. Thus, this research enriches the scientific repository by providing a theoretical and practical framework that may serve as a basic reference for future research in this field.

Practical significance:

The significance of the research can be highlighted by referring to the results and recommendations of the research that may be useful to the internal audit departments of Iraqi commercial banks in adopting new technologies like MindBridge Ai. Using such technologies may help improve the efficiency of tasks executed by such departments.

Furthermore, the research may be useful for addressing the issues of big data that often affect the operations of financial institutions. It may be useful for providing auditors with advanced tools that improve the quality of their decisions.

RESEARCH HYPOTHESES:

The study is based on the following hypotheses:

Hypothesis 1: The application of artificial intelligence technologies such as MindBridge Ai has a statistically significant positive impact on the efficiency of the internal audit process of Iraqi commercial banks.

Hypothesis 2: The availability of material and human resources has a statistically significant positive impact on the application of artificial intelligence technologies in the internal auditing process of Iraqi commercial banks.

Hypothesis 3: Material and human resources limitations have a statistically significant negative impact that impedes the application of artificial intelligence technologies in the internal auditing process of Iraqi commercial banks.

Research Limitations:

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- - Spatial scope: The spatial scope is limited to Iraqi commercial banks operating within the territorial boundaries of the Republic of Iraq.
- - Temporal scope: The research is conducted over a period from March to September 2025, which includes research activities conducted over this period.
- - Subject scope: The research is conducted on the use of MindBridge Ai technology with the aim of improving and advancing internal audit practices in Iraqi commercial banks.

Previous studies:

Numerous Arab and international studies have investigated the research variables, including:

Arab studies:

1. A research paper entitled "The Impact of Artificial Intelligence on the Scope of Internal Auditing: A Comparative Study between the Population-Based Approach and the Sample-Based Approach" was conducted by Ahmed Farouk Ali in the year 2025. In this paper, the researcher aims to examine the impact of artificial intelligence on internal auditing, with a specific focus on the possibility of attaining absolute assurance as opposed to the more general concept of reasonable assurance. In achieving this objective, the researcher used a mixed research design that incorporates both quantitative research with an emphasis on the stability and validity assessment, as well as the utilization of qualitative data gathered from interviews with experts in the field. In the end, the researcher found that attaining absolute assurance is not possible, which supports the hybrid model that incorporates artificial intelligence with the expertise of humans.
2. Okasha and Boucheriba (2024), in an examination under the title "The Impact of Artificial Intelligence Technologies on the Internal Audit Function: A Case Study of the Big Four Audit Firms," aim to determine the role of artificial intelligence technologies in the development of the internal audit function. The researchers employed the descriptive-analytical method and the case study method on the Big Four audit firms: KPMG, Deloitte, PwC, and EY. The findings of the researchers show that artificial intelligence technologies have an impact on the development of auditing quality and efficiency. The researchers suggest the training of professional personnel to provide them with the capabilities to effectively utilize the technologies and keep pace with the latest technological developments.
3. A research study was conducted by Farhat et al. in 2024 and was titled "The Role of Artificial Intelligence Applications in Enhancing the Quality of External Auditing." The research study was based on the impact of artificial intelligence applications on the quality of external auditing through a comprehensive literature review and analysis of large-scale corporations. The research findings indicated the positive impact of artificial intelligence applications in increasing the processing speed, accuracy of analysis, ability to detect fraud, and reducing costs, along with the quality of decision-making through precise data. The research study also highlighted the importance of developing the digital skills of auditors and the need to be cautious about the use of artificial intelligence tools due to the risk of data reliability and cybersecurity.
4. The research paper titled "Artificial Intelligence and Its Impact on Audit Quality: An Exploratory Study at the Iraqi Commercial Bank, Najaf Branch" and authored by Al-Ibrahimi, Aoun, and Ghiad (2024) sought to examine the relationship between the application of artificial intelligence applications and audit quality. Using the survey method, the researchers designed and administered a survey among the employees of the Iraqi Commercial Bank – Najaf Branch. The results of the survey showed that the application of artificial intelligence applications in the studied bank was low, which negatively affected the auditing process. The researchers concluded the paper by recommending the application of artificial intelligence to improve audit quality and institutional performance.
5. A study by Ali, Abdullah, & Khattab (2022), titled "The Impact of Activating Artificial Intelligence Technologies on Enhancing Internal Audit Activities – A Field Study," sought to find the link of AI technology with internal auditing activities. Authors used a descriptive research method by sending a questionnaire to 100 participants, out of which 66 responded. Findings of the research pointed toward the positive influence of AI technology on internal auditing activities, which increased with the involvement of artificial intelligence tools through higher speed, accuracy, and completeness of the analysis. Authors of the study emphasized the necessity of increasing the incorporation of AI technology, specifically to engage in remote auditing practices.
6. Al-Otaibi (2015) The researcher carried out an investigation whose title was "The Impact of Business Intelligence Applications on Controlling Internal Audit Quality in Kuwaiti Industrial Companies." The aim of the study was to evaluate the impact of business intelligence applications on the control of internal audit quality in Kuwaiti industrial firms. The researcher used a descriptive-analytic study model, where a questionnaire was designed using two main dimensions, namely business intelligence applications and internal audit quality control. The study targeted a population of 350 employees, out of which a sample of 172 individuals was selected. The study concluded that business intelligence was utilized on an average, while the level of internal audit quality was also average. However, the study established that there was a statistically significant impact of business intelligence applications on the improvement of internal audit

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quality control. The study recommended an expansion of knowledge management and decision support through the integration of artificial intelligence applications.

Foreign studies:

1. Pérez-Calderón et al. (2025) carried out an empirical research study titled "The Impact of Artificial Intelligence on Auditing: An Evaluation from the Profession in Jordan," which focuses on the perceptions of the auditing profession working in the free zones and the development zones of Jordan regarding the effectiveness of artificial intelligence to improve the efficiency of the auditing process. To conduct the research, the authors used a survey method among 336 auditors, and the results were analyzed through SmartPLS. The findings of the study show that artificial intelligence is very effective in improving the efficiency of the auditing process, as well as communicating with the clients. However, there are a few drawbacks to the implementation of artificial intelligence, such as the lack of proper technology, the issue of privacy, and the need to adhere to ethical standards.
2. Ghazi et al. (2025) carried out a study with the title "Artificial Intelligence and Its Impact on Internal Auditing: An Exploratory Study of Opinions from a Sample of Auditors at the University of Mosul" with the objective of assessing the impact of artificial intelligence applications on the time required for internal audit work and the efficiency of evidence-gathering procedures. The research adopted a descriptive, analytical, and inductive approach, and a questionnaire was prepared and sent to 52 internal auditors at the University of Mosul, with 51 responses received. The research findings revealed that artificial intelligence significantly reduces the time required for internal audit work while increasing the accuracy of evidence-gathering procedures. The researchers recommend that auditors should be provided with training to enhance their digital skills to cope with technological advancements in the field of internal auditing.
3. In their extensive systematic review of literature on the integration of artificial intelligence (AI) in internal auditing, Wassie & Lakatos (2024) identify research gaps as well as the limitations in the current frameworks for the adoption of this technology. The research results suggest that AI plays an important role in reducing manual work processes while delivering value-added audit services. However, the global adoption rate of AI in internal auditing is remarkably low. The researchers have developed a new framework, "CACS," based on the concepts of commitment, accessibility, capability, and skill development that can be used to facilitate the assimilation of AI in internal auditing. The research also emphasizes that for the effective adoption of this technology, regulatory policies must be developed along with training for auditors.
4. The research paper "The Impact of Artificial Intelligence on Information Audit Usage: Evidence from Developing Countries" by Almaqtari et al. (2024) examines the factors that determine the adoption of information auditing in Egypt and Jordan, with special reference to artificial intelligence. The research used a non-probability sampling method in which 443 participants were surveyed. The research findings showed that internal factors and expected benefits positively influence the intention to use information auditing. Moreover, advancements in artificial intelligence, as represented by cloud computing and data mining, have a significant impact on the enhancement of expected benefits as well as the relationship between intention to use and actual use. The research paper concludes that artificial intelligence is an essential factor in the enhancement of the effectiveness of information auditing in developing countries.
5. In a research conducted by Musa (2024), titled "Detecting the Effect of Artificial Intelligence on Internal Audit Performance: An Empirical Study in Saudi Arabia," the aim of the research was to assess the impact of different types of artificial intelligence systems, such as assistive, augmented, and autonomous systems, on internal audit performance in the context of the Saudi environment. The research was conducted by distributing a questionnaire to 150 internal auditors in Riyadh, and the results were analyzed using SmartPLS. The results of the research indicated a positive impact of artificial intelligence systems on internal audit performance. The results also indicated that the impact of augmented systems was the highest, while the impact of autonomous systems was moderate, and the impact of assistive systems was the lowest. The author of the research recommended that the research be conducted with a higher number of samples in the future, considering the national and cultural contexts of different countries. The author also emphasized the importance of gradual implementation of artificial intelligence systems in internal audit performance to increase efficiency and reduce human errors.
6. A research study was carried out by Adelakun (2022) titled The Impact of AI on Internal Auditing: Transforming Practices and Ensuring Compliance. The research study discusses the impact of artificial intelligence in enabling a qualitative transformation in internal auditing practices, with special reference to efficiency, accuracy, and risk management. The research study reveals that artificial intelligence is capable of enabling auditors to process large data sets with efficiency and accuracy, which is beyond the capabilities of conventional methodologies that rely on sampling methods. The research study reveals that artificial intelligence enables auditors to identify fraudulent practices and discrepancies in operations in real time. The research study reveals that artificial intelligence tools are critical in ensuring that internal auditing practices comply with regulatory requirements. The research study reveals that artificial intelligence tools also face challenges in relation to data integrity and transparency.

Commentary on Previous Studies:

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Scientific studies from the Arab and global spheres agree on a general conclusion: the implementation of smart technology results in an increase in the efficiency and quality of auditing, as long as the facilitating conditions are met from the regulatory, technical, and human aspects. Scientific studies on artificial intelligence from the perspective of the auditing domain (Ali, 2025; Okasha & Boucheriba, 2024; Farhat et al., 2024; Pérez-Calderón et al., 2025; Ghazi et al., 2025; Musaa, 2024; Adelakun, 2022) agree on the following: the implementation of AI results in an increase in the speed and accuracy of auditing, as well as the detection of anomalies and fraudulent activities.

With regard to the field of banks and emerging markets, empirical results suggest that the internal auditing function's development and autonomy, accompanied by strong support from the bank's senior management, have a positive relationship with organizational performance, as well as regulatory compliance (Hazaea et al., 2024; Al-Fatlawi, 2018). At the same time, some significant differences have been recorded in terms of scope, field, and methodological approach. Some studies have focused on the field of external auditing or the quality of financial reporting (Nashwan, 2024; Mohamed, 2022; Farahat et al., 2024), while others have examined internal auditing from different aspects, including risk management, regulatory compliance (Abdullah, 2021; Mohsen, 2016), the improvement of accounting information systems through regulatory compliance as an intermediary variable (Al Zobi & Jarah, 2023), or the impact of different paradigms of artificial intelligence systems, i.e., assistive, augmented, or autonomous, on internal auditing efficiency (Musaa, 2024). At the same time, some empirical results have been recorded in the Arab banking system, excluding the Iraqi banking system, while a field study offers an indicator of the use of artificial intelligence tools in the Iraqi banking system, recording their weak presence in the commercial banking field, which negatively influences efficiency (Al-Ibrahimi, Aoun, & Ghayad, 2024).

Methodologically speaking, survey studies have primarily relied on questionnaires and statistical methods (SPSS and Smart PLS) to test effect and mediation relationships, while systematic reviews have introduced a conceptual framework to address institutional empowerment (CACS Framework by Wassie & Lakatos, 2024). Conversely, the utilization of tools that rely on risk detection algorithms (e.g., MindBridge Ai) is still in its infancy in Arabic-speaking and even more in Iraqi literature; however, the majority of existing literature does not make use of these tools.

The focus is on the "overall impact of artificial intelligence" without an in-depth examination of its components and their implications on the entire internal audit process. When addressing existing gaps in knowledge, there is a need to formulate guidelines that are context-specific to the Iraqi banking industry, keeping in mind limitations in terms of infrastructure, data availability and quality, human resources readiness, and the current legislation.

While there are clear indications of unique benefits accruing from cloud computing, data mining, and intent and actual usage (Almaqtari et al., 2024), the experience in Iraq suggests a low adoption rate with a corresponding impact on operational efficiencies (Al-Ibrahimi, Aoun, & Ghayad, 2024). The question of how "absolute certainty" might be achieved through a comprehensive analysis of societies remains unresolved, with clear indications pointing towards a hybrid approach that leverages both algorithmic capabilities and professional auditors (Ali, 2025).

In this context, this research addresses clear gaps in both knowledge and practice by:

(1) focusing on a context involving Iraqi commercial banks, which has not been adequately explored;

(2) examining a specific tool, namely MindBridge Ai, in terms of its applicability and reliability in supporting the internal audit cycle, including its impact on speed, accuracy, and fraud detection; and

(3) examining key adoption determinants, including infrastructure, data, competencies, and governance, and their relationship to audit quality.

Therefore, this research makes a contribution to the body of knowledge related to the influence of artificial intelligence by moving beyond a conceptual discussion towards a more practical examination with a view to implementation in the context of Iraqi commercial banks, while recognizing its unique regulatory and operational environment.

Second: Theoretical Framework:

1- A theoretical introduction to artificial intelligence and MindBridge Ai technology

- The concept of artificial intelligence:

With the arrival of the Internet and advancements in electronic and information technologies during the early 2000s, societies began to transform to meet the needs of such advancements. Knowledge is considered to have gained significant importance due to global realignments and advancements in technologies related to the Fourth Industrial Revolution, resulting in a reality that is significantly different from that of previous industrial revolutions. This Fourth Industrial Revolution is marked by its intensity, complexity, and scope, and is deeply rooted in a technological phenomenon of the contemporary world termed digital transformation, defined as "the comprehensive integration of digital technologies into the fundamental infrastructures of enterprises, organizations, and government bodies, resulting in an innovative convergence."

The convergence of various technologies such as the Internet, cloud computing, big data analytics, and artificial intelligence creates an ecosystem that allows for the mutual benefits of different technologies such that each technology

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benefits from and contributes to the advancements of other technologies. This reality offers unprecedented opportunities and challenges to professionals and societies as a whole.

- Definition of artificial intelligence:

The definition of artificial intelligence is multifaceted as it has various interpretative dimensions. Khawald (2012: 170) asserts that artificial intelligence refers to concentrated efforts to create computerized information systems with the ability to perform and reason like humans, such as the ability to learn a foreign language, accomplish intricate tasks, and employ visual perception to carry out physical activities, as well as the ability to store and employ human experiences and knowledge as part of the decision-making process.

Al-Ghamdi (2020) defines artificial intelligence as the application of software, devices, machines, or systems with the ability to mimic human intelligence while executing particular activities, such as the implementation of instant messaging software or robots. Al-Sharif (2022) defines artificial intelligence as a branch of computer science focused on the implementation of intelligent machines, which are an integral part of technology used to encourage the involvement of humans in crucial and creative thought processes to enable machines to carry out activities such as evaluation, critique, and the delivery of various perspectives with high efficiency.

From the above discussion, it can be noted that artificial intelligence represents a form of simulation and imitation, as humans have developed a machine that, though it does not comprehend and perceive, has intelligent capabilities that permit it to interact with the environment through intelligent means, dependent on the requirements set. MindBridge Ai represents one of the most renowned applications of artificial intelligence developed specifically for the financial and regulatory auditing sector. The intelligent analysis platform utilizes an integration of machine learning technologies, advanced statistical algorithms, and traditional business rules to meticulously and accurately evaluate financial data and corporate transactions. The uniqueness of this technology lies in its ability to scrutinize all of the data set, as opposed to traditional approaches that rely on sampling, thus providing an even more thorough analysis with an increased probability of identifying potential errors and anomalies that may have gone unnoticed through traditional approaches.

- The Significance of Artificial Intelligence

Artificial intelligence has a central role in the current advancements, as highlighted by Al-Juhani (2019: 6), due to its various characteristics and consequences. One of the most prominent aspects of the importance of AI is that it has the capability to facilitate the communication process between humans and machines through the use of natural languages as opposed to programming languages. This has made the use of technology accessible to a wider segment of the population. Moreover, AI plays a vital role in the improvement of critical areas such as the field of medicine, law, education, and security. AI has been particularly beneficial in the diagnosis of illnesses and the recommendation of treatment plans, the provision of legal and professional advice, the improvement of the learning process, and the improvement of security and military operations. Moreover, the attributes of autonomy, accuracy, and impartiality of intelligent systems allow them to operate with a lower rate of errors and external influences while making decisions of significant importance in various areas of operation. Moreover, the role of intelligent machines in the alleviation of the workload of the population by performing difficult tasks and participating in rescue operations during emergencies has allowed people to focus their attention on tasks of significant importance.

In the context of commercial banks, AI has a significant role in the improvement of the process of internal audits of the financial activities of the banks. The incorporation of AI has the advantage of facilitating the precise and rapid analysis of large amounts of data while detecting any abnormal and fraudulent activities within the financial system, thus making AI a significant factor in the improvement of transparency and the enhancement of the trust of the stakeholders in the financial system. AI has been improving its role as a significant factor in the improvement of the quality of the internal auditing process of the banks in the context of the rapidly changing digital environment.

MindBridge Ai offers a service that is referred to as Financial Risk Intelligence. The platform identifies irregularities and anomalies in accounting practices and evaluates the level of risk that is linked to each process. Additionally, the platform allows auditors to carry out immediate analyses through interactive dashboards. The process facilitates decision-making, enhances the efficiency of the audit process, and ensures that it is accurate and reliable. Another advantage that can be attributed to the use of this technology is that it allows auditors to obtain an unambiguous explanation of the outcomes that are produced by the algorithms. The feature is very useful to auditors who would like to identify the causes of high risks and relate them to appropriate accounting practices. The efficiency of MindBridge Ai has already been demonstrated through its adoption by various international entities that aim to enhance audit quality, compliance, and efficiency in oversight practices. The technology is considered to be one of the major tools of digital transformation in the field of internal audit.

- Characteristics of artificial intelligence

Shaban (2021) explores a variety of aspects that highlight the importance of artificial intelligence, such as the ability to deal with complex and ambiguous problems and the potential to apply knowledge in a pragmatic way. Moreover, the utilization of past experiences, especially in the context of the education system, is also facilitated by artificial

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intelligence. Additionally, the ability to learn from mistakes and effectively adapt to different contexts, as well as efficiently handle complex problems, also play a crucial role in the importance of artificial intelligence.
According to Al-Obaidi (2015: 46), some of the additional aspects of artificial intelligence can be summarized as follows:
- Ability to symbolize knowledge
- Adoption of an optimistic and experimental methodology
- Management of incomplete information
- Learning capabilities
- Ability to emulate the approaches of humans in solving problems
- Proficiency in processing hypotheses in an accurate and rapid way
- Ability to deliver a consistent level of guidance
- The creation of intelligent systems requires the representation of a large amount of knowledge, with the aim of emulating the human cognition and approaches, in a way that the reliance on human specialists is eliminated

The importance of artificial intelligence in the context of internal auditing:
The importance of artificial intelligence in the context of internal auditing is increasing, especially since artificial intelligence can be utilized to leverage past experiences and apply them in new contexts of auditing. This results in the development of the critical, analytical, and logical thinking of auditors. Moreover, the utilization of artificial intelligence in the context of internal auditing can be related to the creation of new and innovative tools for the analysis of financial and regulatory information, which can be used to enhance the quality of internal auditing in commercial banking institutions.

2- A theoretical introduction to internal auditing:

- The concept of internal auditing:

Internal auditing is defined as a function that is independent and objective in nature, providing assurance and advisory services to enhance organizational value and improve operational efficiencies. The field of internal auditing uses a systematic approach to improve the effectiveness of the organization's approach to risk management, control, and governance. The approach is characterized by a steadfast commitment to independence and objectivity, a risk-based planning process, and direct reporting to the audit committee or the board of directors.
In light of the professional framework established by the Institute of Internal Auditors, the scope of internal auditing is broad and includes a wide variety of activities. These activities include the review of the company's financial and operational controls, compliance, information systems auditing, and continuous monitoring. The activities are collectively aimed at promoting transparency and the quality of information for decision-making purposes, reducing waste, and addressing risks. The scope of internal auditing is also applicable to the banking sector, where the focus is not limited to the review of the company's financial position.
In the banking sector, the function of internal auditing is pivotal in enhancing the company's financial performance, preventing fraud, and promoting accountability by reviewing the company's internal control environment. This is particularly critical in the banking sector, which is a complex environment that requires rigorous compliance with governance and regulatory requirements. The banking sector also requires the integration of technology and the application of advanced data analytics. The application of internal auditing in the banking sector is supported by the empirical literature, which indicates that the effectiveness of the internal auditing function and the complexity of the internal auditing controls are positively related to the company's financial performance and the reduction of the company's exposure to fraudulent activities. This is a critical function that acts as the third line of defense and is able to add significant value to the company.

The significance of internal auditing

Internal auditing plays an important role as a third line of defense in corporate governance, providing independent and objective assurances on the adequacy of internal controls, effectiveness of risk management, and robustness of compliance activities, all of which culminate in increased confidence levels with regard to reporting and decision-making, as well as reducing wastage and fraud simultaneously. Consistent with the internal audit professional practice framework developed by the Institute of Internal Auditors, it can be noted that the importance of internal auditing lies with its risk-based approach, reporting relationships with the audit committee or board of directors, and wide scope of internal audit activities, all of which culminate in improving information quality and overall organizational performance, particularly with regard to the banking sector where internal audit plays an important role as a driver of corporate governance, transparency, and sustainable performance, considering the complexities of banking products and regulatory requirements, including Basel requirements and anti-money laundering activities (Al-Fatlawi, 2018).
Empirical research carried out in the environment of banking institutions and emerging markets suggests that there is a positive correlation between the level of internal audit sophistication and the quality of both financial and operational performance. The major aspects of internal audit, including independence, endorsement by senior management, and engagement with governance committees, directly relate to better performance indicators and lower occurrences of

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fraud. Additionally, internal auditing is seen to be playing a vital role in improving the quality of accounting information systems through evaluation and encouragement of regulatory compliance, as seen in more accurate reports and better-managed risks. These aspects have become even more vital in the age of digital transformation and data growth in banking institutions (Hazaea et al., 2024).

3- A theoretical introduction to the use of artificial intelligence applications in accounting and internal auditing:

However, recent research in the field has shown that the incorporation of artificial intelligence in accounting and auditing has led to a major shift in the way operations are conducted. This has made it possible for auditors to audit comprehensive financial information rather than using sampling techniques. This has made the results of the audit more accurate. It also improves the quality of audit work through the speeding up of tasks, the accuracy of results, and the early detection of fraud through machine learning techniques.

MindBridge Ai technology has come to play a pivotal role as a primary intelligent technology that is significantly contributing to a remarkable change in internal audit practices. The technology works by using machine learning algorithms and statistical analysis techniques to identify discrepancies in financial information, with the capability to analyze all financial transactions as opposed to a sample, thereby increasing the probability of discovering concealed errors and risks. The MindBridge Ai technology presents a new concept referred to as Financial Risk Intelligence, an analytical tool that enables auditors to analyze risk levels based on the characteristics of a given financial transaction, with interactive dashboards providing auditors with instant information about risk-prone areas identified by the technology. The technology also differentiates itself from others by providing an explanation for the analysis conducted by the technology, thereby avoiding the "black box" issue that is commonly experienced with artificial intelligence technology.

The technology not only alerts auditors about potential risks but also explains the reason for increased risk levels, thereby providing auditors with a tool for decision-making based on transparent information. The technology has, therefore, helped institutions that have adopted it identify potential fraud, enhance the evaluation of internal controls, and reduce time spent on routine work, thereby becoming a cornerstone for digital transformation in financial and banking auditing practices.

Despite the aforementioned advantages of the application of artificial intelligence, there are a number of impediments that affect the efficiency of the application of artificial intelligence in the Arab region and specific banks. The impediments include the lack of technological infrastructure, the lack of skilled personnel who are knowledgeable in the management of intelligent systems, the reliability of the used data in the system, the issue of cybersecurity, and the issue of transparency and the application of the system, which affect the efficiency of the internal audit process (Wassie & Lakatos, 2024).

Third: Practical Framework

Research Community and Sample

The study population targets employees in internal audit and accounting units/dimensions of Iraqi commercial bank units. The study also targets employees in dimensions of related functions, including risk management and financial management. Because of limitations in surveying the entire population, a convenient sample of employees from various Iraqi commercial bank units was selected. The sample size was determined using Stephen Thampstone's formula, as shown in Table 1. A total of 175 questionnaires were distributed to respondents, with 164 completed responses recorded. For analysis purposes, 152 were used while 12 were excluded due to response inaccuracies. A random method was used to select individuals in the research sample.

Stephen Thompson's equation

N = N*P (1-P) [[N-1*(q2 /Z2)] + P(1-P)]	N
Population size	N
For the standard degree corresponding to the significance level (95.0) and equal to (1.96)	Z
Error ratio equal to 0.05	Q
probability of the characteristic occurring and neutrality is 0.050	P

Table (1) shows the size of the population and sample according to the above equation.

Paragraphs	Population size	Sample size
Total	215	152

Statistical methods employed

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For the purpose of data analysis, the methods of descriptive statistics, which involve the arithmetic mean, standard deviation, frequency distribution, and percentage, were applied by making use of the SPSS software. A standard framework was created to answer the questions, which the respondents followed as a reference while filling in the answers, as shown in Table 2.

Table (2)

Approved answer criteria

Interpretation	**Arithmetic mean value**
Completely disagree	1.00 to 1.80
Disagree	1.81 to 2.60
Neutral	2.61-3.40
Agree	3.41-4.20
Strongly agree	4.21-5.00

Likewise, the questionnaire was based on the Likert five-point scale with weights ranging from 1 to 5. This scale was used to measure the research hypotheses with the help of Google Forms.

Analysis of the Attributes of the Research Sample:

The questionnaire is divided into two major sections. The first section of the questionnaire focuses on obtaining demographic data regarding the research sample, and it contains seven variables as shown in Table 2. The second section of the questionnaire contains items related to the study's independent variables, which were derived from prior research, investigations, and professional literature, and it contains three variables. There are ten items in every variable. The following is an examination of the demographic characteristics of the sample:

Table (3) shows the description of the research sample.

Paragraphs	**Statement**	**Frequency**	**Percentage**
Age	Less than 25	4	%2.6
	35-25	60	%39.5
	46-36	52	%34.2
	46 & More	36	%23.7
	Total	152	%100
Number of years of experience	Less than 5	20	%13.2
	5-10	38	%25
	16-11	37	%24.3
	16& more	57	%37.5
	Total	152	%100
Scientific specialization	Accounting	124	%81.6
	Finance and Banking	14	% 9.2
	Management	10	%6.6
	Others	4	% 2.6
	Total	152	%100
Academic achievement	Diploma	69	%45
	Bachelor	71	%47
	Master	2	%1.3
	Doctorate	1	%0.7
	High school	9	%6
	Total	152	%100

1 – Age:

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From the table, it is clear that the largest age group of employees in the banking sector lies in the range of 25 to 35 years, which constitutes 39.5% of the total number of employees. Conversely, the lowest percentage of employees, which is 2.6%, is that of people less than 25 years old. The age diversity of the employees, as reflected in the table, greatly contributes to the adoption of artificial intelligence in the auditing field, which not only demands professional experience but also the ability to handle modern electronic devices.

2 – Number of years of experience:

The category with the highest percentage of years of experience is that of more than 16 years, accounting for 37.5%. On the other hand, the category with the lowest percentage is that of less than 5 years of experience, accounting for 13.5%. These details give very vital insights to the responses to the questions set in the next section of the questionnaire.

3 – Academic specialization:

Accounting is a domain with the highest number of representatives, comprising 81.6%, while the rest of the specializations comprise only 2.6%. This may be explained by the specific needs of audit departments, which mainly require experts with knowledge in accounting.

4 – Academic achievement:

The highest percentage of qualifications is held by individuals with a bachelor's degree, which accounts for 47% of the sample. On the other hand, the lowest percentage is held by individuals who have a doctorate degree, which accounts for only 0.7% of the sample. This may be attributed to the needs of banking operations, which are mainly based on professional skills.

Analysis of data results and evaluation of research hypotheses

First hypothesis:

There is a statistically significant effect of the adoption of artificial intelligence technologies (e.g., MindBridge Ai) on the effectiveness of internal auditing within Iraqi commercial banks. The first hypothesis was tested using questions 1-10 of Section II of the questionnaire that focused on the effectiveness of internal auditing with regard to the adoption of artificial intelligence technologies, certainties, and uncertainties. Table 4 presents the responses of the participants of the sample.

Table (4)

Design and implementation of an updated and flexible strategy

Sequence	Question	Disagree Completely	Disagree	Neutral	Agree	Strongly agree
		1	2	3	4	5
- 1	The system significantly reduces the time required to perform routine checks such as reconciliation and document verification	1			114	37
		%.7			%75	%37
-2	The system contributes to accelerating the process of identifying high-risk audit areas compared to traditional methods.		4	9	88	51
			%2.6	%5.9	%57,9	%33.6
-3	The system improves the accuracy and efficiency of detecting anomalies and unusual patterns in financial data.			44	71	37
				%28.9	%46.7	%24.3
-4	The system improves the speed and efficiency of preparing audit reports, including automatically generating graphs and recommendations.			22	78	52
				%14.5	%51.3	%34.2
-5	The system facilitates more effective monitoring of the implementation of recommendations and corrective measures.	1	5	17	81	48
		%,7	%3.3	%11.2	%53.3	%31.6
-6	MindBridge AI integrates seamlessly with existing enterprise systems (such as ERP and other accounting systems), enhancing overall operational efficiency.		2	26	76	48
			%1.3	%17,1	%50	%31.6

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-7	The implementation of MindBridge AI leads to a clear increase in the overall productivity and efficiency of the internal audit department.		8	21	87	36
			%5.3	%13.8	%57.2	%23.7
-8	Audit reports prepared with the help of MindBridge AI demonstrate a higher level of professionalism and clarity compared to traditional reports.		4	30	78	40
			%2.6	%19.7	%51.3	%26.3
-9	Impact of the system on the ratio of time allocated to proactive analysis versus time allocated to auditing			14	60	78
				%9.2	%39.5	%51.3
-10	Data privacy and the interpretability of AI outputs reduce the speed and operational efficiency of auditing	1	1	5	70	75
		%.7	%,7	%3.3	%46.1	%493

Table (5)
Analysis of responses from research sample Design and implementation of an updated and flexible strategy

Sequence	Paragraphs	Arithmetic mean	Standard deviation	Test T	Relative importance
1	The use of the system significantly reduces the time required to perform routine checks such as matching and document verification.	4.2237	.50425	29.919	84%
2	The system contributes to accelerating the process of identifying high-risk audit areas compared to traditional methods.	4.2237	.67301	22.417	84%
3	The system improves the accuracy and efficiency of detecting anomalies and unusual patterns in financial data.	3.9539	.73095	16.090	79%
4	The system improves the speed and efficiency of preparing audit reports, including automatically generating graphs and recommendations.	4.1974	.67146	21.985	84%
5	The system facilitates more effective monitoring of the implementation of recommendations and Corrective measures.	4.1184	.78000	17.678	82%
6	MindBridge AI integrates seamlessly with existing enterprise systems (such as ERP and other accounting systems), enhancing overall operational efficiency.	4.1184	.72728	18.960	82%
7	The implementation of MindBridge AI leads to a clear	3.9934	.76770	15.954	80%

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	increase in the overall productivity and efficiency of the internal audit department.				
8	Audit reports prepared with the help of MindBridge AI demonstrate a higher level of professionalism and clarity compared to traditional reports.	4.0132	.75456	16.554	80%
9	Impact of the system on the ratio of time allocated to proactive analysis versus time allocated to auditing	4.4211	.65636	26.692	88%
10	Data privacy and the interpretability of AI outputs reduce the speed and operational efficiency of auditing.	4.4276	.65713	26.785	89%

Table (6)
Result of the first hypothesis test

%	TEST T	Std. Deviation	Mean	N	
89	41.998	34319.	4.4276	152 152	Strategy Valid N (listwise)

Data Presentation:

Table 4 reveals the analysis of the responses given by the research sample to the ten items included in the questionnaire about audit efficiency, while Table 5 indicates the following: The perspective of the respondents regarding item (10) reflects a substantial influence, as "89% of the participants agreed with this statement, which is the highest percentage compared with all other items that measure the level of significance of internal audit efficiency." In addition, the responses provided by the sample are completely consistent, as confirmed by a mean of 4.4276, which falls in the range of 4.21 to 5.00, and a standard deviation of 0.65713, which reflects a complete consistency in responses.

As indicated in Table (5), the lowest arithmetic mean reported is that of item (3), which states that the system improves the precision and effectiveness of identifying anomalies or atypical patterns in financial data. This item reported a high percentage of agreement among the sample participants, which is 79%, along with uniformity in their responses, as indicated by a standard deviation of 0.73095. In relation to the other items that were previously mentioned, the researchers reported that the other questions about the formulation and implementation of a flexible audit strategy in the COVID-19 situation have an impact in relation to the study sample.

The overall mean for all items was 4.4276, showing unanimous agreement among the sample regarding the essential items, with a standard deviation of 0.34319 representing consistency of responses. This translates into 89%. A t-test was carried out to test the null hypothesis that the mean of the population is 3, i.e., the mid-point of the Likert scale. All means were higher than the assumed mean, and the test was statistically significant at 0.01. Table 6 illustrates the results of the test, thus confirming the first research hypothesis.

Second hypothesis:

There is a statistically significant effect of the availability of material and human resources on the adoption and implementation of artificial intelligence methodologies within internal auditing practices in Iraqi commercial banks. The second hypothesis was examined using responses to questions 11–20 under the second section of the questionnaire, which are all directed at establishing the pivotal role of material and human resources in fostering the adoption and application of artificial intelligence technologies in internal auditing processes in Iraqi commercial banks. Table 7 presents the responses of the sampled participants.

Table (7)
Availability of material and human resources to support the adoption and application of artificial intelligence technologies in internal auditing

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T	Question	Disagree Completely	Disagree	Neutral	Agree	Strongly agree
		1	2	3	4	5
1	Availability of a dedicated budget to support artificial intelligence tools in internal auditing		1	9	80	62
			%0.7	%5.9	%52.6	%40.8
2	Availability of adequate technical infrastructure to support artificial intelligence applications in internal auditing.			18	71	63
				%11.8	%46.7	%41.4
3	The Internal Audit Department has employees who are technically and technologically qualified to work with artificial intelligence tools.		4	14	83	51
			%2.6	%9.2	%54.6	%33.6
4	Senior management continuously trains internal audit staff on the use of advanced and modern technologies.			23	67	62
				%15.1	%44.1	%40.8
5	Encourage senior management at the bank to invest in artificial intelligence solutions to improve the quality of internal auditing.		1	13	87	51
			%0.7	%8.6	%57.2	%33.6
6	Auditors are incentivized and rewarded when they use digital tools in their work.		1	21	85	45
			%0.7	%13.8	%55,9	%29.6
7	The availability of qualified human resources contributes to accelerating the adoption of artificial intelligence technologies in internal auditing.		1	9	98	44
			%0.7	%5.9	%64.5	%28.9
8	The lack of human resources is one of the obstacles to the application of artificial intelligence in internal auditing.		4	45	59	44
			%2.6	%29.6	%38.8	%28.9
9	Financial resources contribute to improving the effectiveness of AI implementation in internal auditing.		13	15	80	44
			%8.6	%9.9	%52.6	%28.9
10	Lack of financial resources is an obstacle to adopting AI technologies in internal auditing.		4	28	83	37
			%2.6	%.18.4	%54.6	%24.3

Table (8)
Analysis There are material and human obstacles with a statistically significant negative impact that hinder Iraqi commercial banks from benefiting from artificial intelligence

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technologies in developing internal audit methods.

Table (9) Results of the second hypothesis test

T	Paragraphs	Test T	Standard deviation	Arithmetic mean	Ratio
1	Availability of a dedicated budget to support artificial intelligence tools in internal auditing	26.593	.61916	4.3355	87%
2	Availability of adequate technical infrastructure to support artificial intelligence applications in internal auditing.	23.868	.66947	4.2961	86%
3	The Internal Audit Department has employees who are technically and professionally qualified to work with artificial intelligence tools.	20.767	.70695	4.1908	84%
4	Senior management continuously trains internal audit staff on the use of advanced and modern technologies.	21.983	.70473	4.2566	85%
5	Encourage senior management at the bank to invest in artificial intelligence solutions to improve the quality of internal auditing.	24.298	.62759	4.2368	85%
6	Auditors are motivated and rewarded when they use digital tools in their work.	20.307	.69100	4.1382	83%
7	The availability of qualified human resources contributes to accelerating the adoption of artificial intelligence technologies in internal auditing.	26.120	.57449	4.2171	84%
8	The lack of human skills is one of the obstacles to the application of artificial intelligence in internal auditing.	12.447	.90579	3.9145	78%
9	Financial resources contribute to improving the effectiveness of artificial intelligence in internal auditing	14.667	.85715	4.0197	80%
10	Lack of financial resources is an obstacle to the adoption of artificial intelligence technologies in internal auditing.	16.945	.73238	4.0066	80%

Descriptive Statistics

	N	Mean	Std. Deviation	Test T	%
Techniques Valid N (listwise)	152 152	4.1612	.41830	34.224	83

Data Presentation:

The successful implementation of artificial intelligence (AI) applications by internal auditing depends on the presence of adequate technical infrastructure. The Internal Audit Department staff have the technical competencies as well as the required professional qualifications to effectively engage with AI applications. Senior management plays an active role in the training of internal auditing staff regarding the use of advanced technologies. There is an expectation that senior management in the bank will commit to AI solutions to improve internal auditing practices. There is an observed

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high level of motivation among auditors, who are rewarded when incorporating technology into their auditing processes. The presence of adequate human resources plays a significant role in facilitating the quick implementation of AI technologies in internal auditing, while the absence of human resources acts as an impediment to the effective implementation of AI. On the other hand, financial resources play an essential role in improving the efficiency of AI applications in internal auditing, while their absence acts as an impediment to the implementation of AI technologies in internal auditing.

Table 7 shows an analysis of the responses of the research sample to the ten questions in the questionnaire regarding the application of advanced technology and techniques in managing the COVID-19 pandemic.

The results are provided in Table 8, which indicates that the feedback provided by the respondents on the 11th item was found to have significant importance, given the highest percentage of 87%, which is related to the importance of using advanced technology and techniques in the context of the COVID-19 pandemic. In addition, the results of the research sample revealed unanimous agreement, given the mean score of 4.3355, which falls in the range of 4.21-5.00. This result is also supported by the standard deviation of 0.66947. As demonstrated in Table 7, the lowest mean score of 3.9145 was observed for the 18th item, which relates to the possibility of consulting specialists or experts by interviewing them without the need to implement the entire process. The significance ratio of 79% was observed for this item, which also demonstrated homogeneity in the responses provided by the participants, given the standard deviation of 0.90579.

With regard to the remaining items that have been discussed in the aforementioned sections, the researchers have stated that the questions related to the significance of the application of advanced technology and methodologies under the COVID-19 conditions have a perceived influence on the study sample. The overall mean for the items was 4.1612, which indicates that the participants have a consensus on the key questions and have provided uniform responses. The standard deviation for the items is 418309, which is related to a prevalence of 83%. A t-test was carried out for the items under the null hypothesis that the mean is equal to 3, which is the midpoint of the Likert scale. The observed means for the items were higher than the hypothetical mean, which indicates that the results are statistically significant at the 0.01 level. The results are illustrated in Table 9, which leads to the acceptance of the second research hypothesis.

Third hypothesis:

There are both material and human barriers that have a statistically significant adverse effect, which impede the leverage of artificial intelligence technology by Iraqi commercial banks to enhance their internal audits. The second hypothesis was tested by using inquiries 21-30 in the second section of the questionnaire, which focus on the material and human barriers that impede the leverage of artificial intelligence technology. Table 10 illustrates the responses to the questionnaire from the sample respondents.

Table (10)
There are material and human obstacles with a statistically significant negative impact that hinder Iraqi commercial banks from benefiting from artificial intelligence technologies in developing internal audit methods.

T	Question	Disagree Completely	Disagree	Neutral	Agree	Strongly agree
		1	2	3	4	5
1	The absence of clear strategies to improve human resource efficiency limits the benefits of MindBridge Ai.		1	13	87	51
			%.7	%8.6	%57.2	%33.6
2	The lack of new skills development among auditors hinders the adoption of MindBridge Ai.			8	75	69
				%5.3	%49.3	%54.4
3	Poor coordination and cooperation between audit units and other departments limits the success of MindBridge Ai implementation.				81	71
					%53.3	%46.7
4	Weak long-term administrative commitment is a barrier to the sustainable use of MindBridge Ai.			11	66	75
				%7.2	%43.4	%49.3
5	The lack of continuous monitoring of technical developments weakens the chances of success for MindBridge Ai.			6	86	60
				%3,9	%56.6	%39.5

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6	The lack of integration between financial support and human rehabilitation poses a challenge to banks' readiness to adopt MindBridge Ai.		4	18	72	58
			%2.6	%11.8	%47.4	%38.2
7	Weak commitment to integrity and accountability among some employees limits the effectiveness of MindBridge Ai.		2	21	97	32
			%1.3	%13.8	%63.8	%21.1
8	The lack of qualified human resources is one of the main obstacles to the successful implementation of MindBridge Ai.		2	15	80	55
			%1.3	%9.9	%52.6	%36.2
9	Limited financial and administrative support from bank management hinders the adoption of MindBridge Ai.		4	22	93	33
			2.6%	%14.5	%61.2	%21.7
10	Weak investment in cybersecurity and protection poses a challenge to the use of MindBridge Ai.		4	13	89	46
			2.6	8.6	%58.6	%30,3

Table (11)
Analysis There are material and human obstacles with a statistically significant negative impact that hinder Iraqi commercial banks from benefiting from artificial intelligence technologies in developing internal audit methods.

T	Paragraphs	Test T	Standard deviation	Arithmetic mean	Ratio
1	The absence of clear strategies to increase human resource efficiency limits the benefits of MindBridge Ai.	24.298	.62759	4.2368	85%
2	The lack of new skills development among auditors hinders the adoption of MindBridge Ai.	29.294	.58976	4.4013	88%
3	Weak coordination and cooperation between audit units and other departments limits the success of MindBridge Ai implementation.	36.134	.50057	4.4671	89%
4	Weak long-term administrative commitment is an obstacle to the sustainable use of MindBridge Ai.	28.016	.62536	4.4211	88%
5	The lack of continuous monitoring of technical developments weakens the chances of success for MindBridge Ai.	30.008	.55681	4.3553	87%
6	The lack of integration between financial support and human rehabilitation poses a challenge to banks' readiness to adopt MindBridge Ai.	19.861	.75144	4.2105	84%
7	Weak commitment to integrity and accountability among some employees limits the effectiveness of MindBridge Ai.	20.345	.63391	4.0461	81%
8	The lack of qualified human resources is one of The main obstacles to the successful implementation of MindBridge Ai.	22.481	.67830	4.2368	85%
9	Limited financial and administrative support from bank management hinders the adoption of MindBridge Ai.	15.778	.77628	3.9934	80%
10	Weak investment in cybersecurity and protection poses a challenge to the use of MindBridge Ai.	20.953	.68517	4.1645	83%

Table (12)
Results of the third hypothesis test

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	N	Mean	Std. Deviation	Test T	%
Criteria	152	4.2533	.40590	38.067	85%
Valid N (listwise)	152				

Data Presentation:

Table 10 shows the analysis of the research sample's responses to the ten items in the questionnaire. The results of the analysis show that both the material and human barriers have a statistically significant negative impact, affecting the ability of Iraqi commercial banks to take advantage of the benefits of artificial intelligence technologies in developing their internal audit methodologies, as depicted in Table 11. Notably, the results of the analysis show that the responses to item 23 were the most influential in the analysis, with 89% of the respondents in agreement, the highest percentage compared to all the items regarding the lack of coordination and collaboration between the audit units and the other departments, hence affecting the ability of the banks to effectively take advantage of the benefits of MindBridge AI. Moreover, the research sample was in complete agreement regarding the analysis results, as depicted by the fact that the arithmetic mean was 4.4671 with a standard deviation of 0.50057.

Table 11 indicates that the lowest arithmetic mean, which is 3.9934, relates to Question 29. This question relates to limited financial and administrative support by bank management and its hindering of the adoption of MindBridge Ai. This led to a significance ratio of 80%. This figure contributed to uniformity of responses, as shown by a standard deviation of 0.77628. In relation to other responses discussed previously, the researchers assert that other questions relating to material and human barriers also negatively impact Iraqi commercial banks' ability to utilize artificial intelligence technologies to improve their internal audit functions, from the perspective of the study sample.

The mean of the responses for all the items was 4.2533. This shows that there is consensus among the participants on the key items. In addition, the responses are consistent, as demonstrated by the standard deviation of 0.40590, which translates to 85%. A one-sample t-test was carried out to test the null hypothesis that the sample mean is equal to 3. The results demonstrated that the sample means for all the items were greater than the hypothetical mean. The t-test was significant at the 0.01 level. This is demonstrated in table 12, which supports the acceptance of the third research hypothesis.

CONCLUSIONS:

The results show that the level of access to modern tools and technologies available in internal audit units is at a moderate level, which forms the basis of possible development; however, it is not enough to enable the full potential of artificial intelligence technologies.

2) The deployment of MindBridge Ai still seems to be hindered by some obstacles, which are generally described as a lack of digital training, financial investment, as well as a strategic vision in some departments.

3) The results revealed that human and material challenges exist to a moderate degree. The lack of qualified personnel was identified as one of the major challenges in addition to insufficient financial resources allocated to cybersecurity and system development.

4) The current status of internal auditing in Iraqi banks reveals that there is an urgent need to increase the integration of artificial intelligence technologies. MindBridge Ai has the potential to increase efficiency in operations, improve quality in outputs, and detect potential risks and fraud in institutions provided that the environment is adequately prepared.

5) The lack of technical and administrative competencies reveals that there is a need to align technological investment with human capacity development rather than simply relying on acquiring technology without addressing challenges in implementation.

RECOMMENDATIONS:

- Based on these findings, the following recommendations are proposed:

- Improve technical infrastructure through updates in databases, creation of digital technologies, and dedication of autonomous investments in cybersecurity to create a secure and appropriate environment for artificial intelligence technologies.

- Improve human capacity through implementation of specialized training and qualification programs in artificial intelligence technologies for internal auditors, along with a skills matrix related to internal certification and accreditation levels.

- Dedicate sustainable financial budgets for digital transformation in auditing, including acquiring digital technologies, technical subscriptions, training, and acquiring advanced expertise in analysis and data.

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- Create a strategic vision and institutional roadmap for gradual adoption of technologies such as MindBridge Ai, starting with pilot projects and gradually expanding based on empirical performance indicators and outcomes.
- Improve organizational integration and data governance through policies mandating coordination between audit units, information technologies, and risk management units, while creating data quality standards and a data governance framework with a focus on transparency and compliance.
- Implement a change management and incentive program with auditor incentives tied to actual usage metrics of digital technologies, along with change ambassadors in audit units to mitigate change resistance and enhance organizational acceptance.

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