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Article

Using Artificial Intelligence Technologies in Banks to Achieve Sustainable Performance
A Survey Study of Employees of a Sample of Iraqi Banks

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Abstract: The research seeks to explain the role of the application of artificial intelligence technologies in enhancing sustainable performance in banks, according to its dimensions (economic, social, and environmental), in light of the rapid technological change and the growing need for more sustainable operating models. The research looks at how AI technologies, such as machine learning, big data analysis, worksheet automation, and social media monitoring, can be harnessed to improve the efficiency of banking operations, reduce costs, reduce environmental impact, and enhance banks' social responsibility.The research relied on the descriptive-analytical approach to reach its goals, as a questionnaire was used that was distributed to a sample of employees of five Iraqi commercial banks, and their number reached (130) employees, analyzed the sample's responses using the statistical program (SPSS.24), the research reached a set of conclusions, the most important of which is that there is a positive, significant and statistical correlation between the use of artificial intelligence technologies and the achievement of sustainable performance, which reflects the importance of investing in these technologies as a strategic tool to achieve the sustainable development goals in banks. The most important recommendations are the need for banks to increase investment in artificial intelligence technologies, integrate them with their strategic policies, and develop their human competencies on a continuous basis to ensure the optimal use of these technologies.

Keywords: Artificial Intelligence, Sustainable Performance, The Three Dimensions of Sustainable Performance.

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1. Introduction

With the advancement of technology and the enormity of data as a result of digital transformation, electronic services, and smart systems, the need has emerged on how to deal with this data and take advantage of artificial intelligence technologies as a technology that simulates human behavior in thinking, solving problems, learning, dealing with complex tasks, and making decisions [1]. The use of these technologies has increased significantly in all fields and industries and has extended to the banking sector, and in light of the economic, environmental and social challenges facing banks, it has become important for banks to adopt an approach towards sustainable performance, which has been more than three decades since its emergence and developed during this period to occupy great importance in industrial and service institutions as well as banks, that is, it includes all fields and departments because of its economic, social and environmental benefits that reflect positively on these institutions [2], [3]. Therefore, understanding the relationship between AI technologies in supporting and achieving this type of performance is important because the application of AI technologies carries with it many variables in the work environment, challenges facing banks, and an understanding of the different needs of customers, and banks that rely on AI technologies should focus on the effectiveness of technologies in enhancing operational efficiency,

environmental compliance, and social contribution to provide access to an integrated and sustainable model [4], [5]. In order to cover the intellectual content and theoretical foundations, this research was divided into four sections, the first section was dedicated to presenting and discussing the research methodology, the second was dedicated to the theoretical aspect of the research, while the third section included the presentation and discussion of the research results, and the research concluded the conclusions and recommendations in the fourth and last section.

2. Materials and Methods

First: Research problem

In recent years, there has been a growing interest in the concept of artificial intelligence, in conjunction with the increasing interest in environmental issues and the role of banks in achieving sustainable development and preserving the environment, and responding to the pressures of stakeholders interested in environmental considerations. There are many factors that encourage banks to apply AI technologies, including: customer interest in providing distinctive and new services, cost reduction, competitive advantage, and commercial motivations, and in order to achieve this permanently and continuously, the bank must apply the philosophy of sustainability that the methodology of applying AI technologies seeks to achieve sustainable performance through its three dimensions (economic, social and environmental). Hence, the research problem revolves around two issues

1. What is the possibility of applying artificial intelligence technologies in the banks of the research sample?
2. Measuring the impact of artificial intelligence technologies on the dimensions of sustainable performance separately.

Second: Research Objectives

The research seeks to achieve a set of goals, the most important of which are:

1. Analyzing the reality of using artificial intelligence applications in Iraqi banks, the research sample.
2. Identify the extent to which artificial intelligence technologies such as (machine learning, visualization technology, worksheet automation) and others contribute to supporting the three dimensions of sustainable performance: economic, social, and environmental.
3. Conducting statistical analysis to indicate the level of application of artificial intelligence in the banks of the research sample and the level of achieving sustainable performance in them.
4. Identifying the challenges facing the application of artificial intelligence technologies in the field of achieving sustainable performance in banks.
5. Providing practical recommendations to decision-makers in banks to enhance the use of artificial intelligence applications in supporting banking sustainability.

Third: importance of research

The research seeks to enrich the scientific literature by linking modern variables, (applications of artificial intelligence and sustainable performance), as two topics of continuous development in the local and global academic environment. Providing an evidence-based analytical insight on how AI technologies can be used to enhance sustainable performance in the banking sector. It also reduces the pressure on banking institutions imposed by accelerated digital transformations by relying on smart tools to achieve efficiency and sustainability at the same time, and enhances the understanding of the relationship between technology and long-term performance, to help banking institutions align their technologies with the Sustainable Development Goals.

Fourth: Research Hypotheses

Based on the research problem and for the purpose of achieving its objectives of exploring the relationship between artificial intelligence technologies and achieving

sustainable performance in its three dimensions (economic, social, and environmental) in the banking sector, the research relied on a main hypothesis that states **(**the existence of a significant correlation and impact relationship between artificial intelligence technologies and achieving sustainable performance in banks) and branches into the following sub-hypotheses:

1. The existence of a significant and statistical correlation and impact between artificial intelligence technologies and achieving the economic dimension of sustainable performance in the banks of the research sample.
2. The existence of a significant and statistically significant correlation and impact relationship between artificial intelligence techniques and achieving the social dimension of sustainable performance in the research sample banks.
3. The existence of a significant correlation and impact relationship between artificial intelligence technologies and achieving the environmental dimension of sustainable performance in the research sample banks.

Fifth: Research Population and Sample

The research community consists of employees of the Iraqi banking sector, who have direct or indirect interaction with artificial intelligence technologies in their work environment. This community was selected due to the importance of the banking sector in adopting modern technologies and its pivotal role in achieving sustainable performance indicators at its economic, social and environmental levels.

As for the research sample, it was deliberately selected represented by (branch managers, assistant managers, officials of the Credit, Audit and Internal Control, Accounts, Treasury, Customer Service and some of their employees) in five Iraqi banks, namely (Ashur International Bank, Investment Bank of Iraqi, Gulf Commercial Bank, International Development Bank for Investment, and Iraqi Middle East Investment Bank), and the sample size reached (130) employees.

Sixth: Statical Methods Used

1. Analysis of the validity and consistency of the research tool:

   The researcher used the stability coefficient (Cronbach's alpha) to measure the consistency of the answers to the paragraphs of each of the questionnaire variables, and the acceptable values exceeding (0.70) were considered as evidence of the reliability of the tool.
2. Descriptive Statistics

   The arithmetic mean and standard deviation were used to analyze the responses of the sample members to the questionnaire paragraphs, with the aim of determining the level of agreement with the paragraphs of each of the research variables.
3. Statistical methods for testing hypotheses

   The simple Pearson correlation coefficient was used to measure the strength and direction of the relationship between the independent variable (artificial intelligence techniques) and the dependent variable (sustainable performance in its three dimensions: economic, social, and environmental). Simple linear regression analysis was used to measure the impact of AI on achieving sustainable performance and to determine the extent to which the independent variable can explain the variance in the dependent variable.

3. Results.

Section Two: Theoretical Aspect of the Research

First: Concepts of Artificial Intelligence

The concept of artificial intelligence has become in circulation and has advanced significantly in its technologies, as its capabilities have increased widely in the current world, which has led to the design of a different set of practical technologies in the banking sector, in addition to other disciplines.

Several definitions of artificial intelligence have been received, including: It is a new technological science that integrates method, technique, theory, as well as the application system by performing computer simulations Shape It is similar to the human way of thinking and extending the scope of human intelligence, and in essence it is a mature intelligent machine that is complete by constantly simulating and discovering human behavior [6]. It is also defined as: science that is concerned with the study of the ideas provided by machines to become capable of responding to stimulation and in accordance with the traditional response of humans such as intention, thinking, and judgment, so that machines have the ability to evaluate, criticize, and choose various opinions for themselves, and thus the result is the ability to produce work with the skill of human beings. He believes that artificial intelligence is a modern technology that contributes to managing tasks in a smarter and more sophisticated way, taking into account the ability to manage the functions for which it was designed. They define artificial intelligence as a machine science that deals with processing data and converting it into information through systems capable of thinking, learning, and acting independently, thus performing complex tasks more accurately and faster than humans [7], [8].

From the above, we find that there is no single agreed description among researchers for the definition of artificial intelligence, because of the multiple ways in which artificial intelligence can promote and support the automation of human activities, work, and learning independently [9]. Here, the researcher can define artificial intelligence as: all computer systems that have the ability to continuously scan their environment, learn from it, and take actions in response to what they sense, in addition to achieving human-defined goals.

It is worth mentioning that the word "technologies" means the practical application of scientific knowledge and practical skills, which includes the design and manufacture of machines and tools that help solve problems and achieve the goal. therefore, Artificial intelligence technologies can be defined as: technologies that mimic human behavior, perform tasks that are traditionally carried out in conjunction with the human factor, and have the ability to learn and develop themselves from experience and based on the information they collect [10]. These technologies are used in solving problems and making decisions and aim to e enhance human ability and not dispense with them, in addition to accomplishing work more efficiently, meaning that the future of technologies depends greatly on how people use them, and these technologies have taken many forms, including:

1. Chatbots, which are used in customer service to understand the customer's problem or inquiry more quickly and provide them with a highly efficient answer
2. Techniques for analyzing critical data and optimizing its scheduling based on a very large set of textual data [11].
3. Automated recommendation engines that provide recommendations to the user according to his usage habits, such as TV shows and social media.

The importance of artificial intelligence technologies:

Many studies have pointed to the importance of these techniques, as follows:

1. Using human language with machines instead of computer programming languages.
2. Employing machines to carry out dangerous and arduous work, detect unknown places, and participate in rescue operations in the event of natural disasters.
3. The use of artificial intelligence technologies in making many decisions and helping in many sensitive areas such as diagnosing diseases, prescribing medications, and legal consultations [12].

What has been mentioned above is the importance of artificial intelligence technologies in general, either the importance of these technologies in the banking sector, which takes several dimensions, including positive and negative, so let's start with the positive and mention them:

1. Cost Reduction

By transforming routine tasks by humans into AI systems, increasing the speed of response, keeping people informed of the latest organizational changes, and saving time by preparing periodic reports. Artificial intelligence technologies enable greater opportunities to achieve cost savings in the banking sector by making customer identification processes faster and easier, and doing employee work through chatbots and voice assistants, as well as preventing and detecting fraud and also improving the anti-money laundering process [13].

2. Improve Performance

AI technologies are driving revenue growth, improving employee efficiency and customer service experience by Targeted emails, as banks use AI technologies to help with many decisions, Especially credit and loan decisions to determine whether a company or individual is creditworthy[14].

3. Regulatory Compliance

Banking is the most regulated sector of the global economy, with governments using their regulatory authority to ensure that a bank's customers do not use it to commit financial crimes such as fraud and money laundering.‹ To prevent fraud and money laundering, monitor money transfers, and support customer privacy. Banking regulatory compliance is costly, so banks are looking for virtual assistants and smart monitors to monitor transactions and customer behaviors, review transactions and record them in various compliance systems [15].

4**.** Communicate outside of the bank’s working hours

The use of artificial intelligence technologies by banks, especially the use of chat assistants, leads to meeting the needs of customers throughout the week and around the clock, so we find that customers have become more satisfied due to these technologies that deal with multiple matters, especially related to banking transactions and services that require human intervention [16].

5. Investment assistance

Many banks Using artificial intelligence technologies to help make investment decisions and support investment banking research, banks for example have used an advisor that helps customers manage their money in a better way and provide Restricted guidelines on the investment decision as well as availability to the client when needed [17].

The negative dimensions of AI technologies in banks are:

1. Weak supervision as a result of automating the bank's full operations
2. Difficulty in making decisive decisions under certain circumstances.
3. Poor human interaction, customers may feel uncomfortable when dealing with intelligent technology systems other than humans.
4. An increase in unemployment rates as a result of artificial intelligence technologies making employees' work faster and more accurate.

In the researcher's opinion, the above negative dimensions can be overcome through:

1. Working on training employees in banks by involving them in courses related to artificial intelligence technologies that enable them to deal with smart systems.
2. Maintaining a balance, i.e. integrating artificial intelligence technologies with the human element [18].
3. Reducing technical and security risks through a team that monitors the decisions of AI technologies and ensures their safety.
4. Adopting artificial intelligence technologies gradually to provide suitable solutions without the need for large investments.

Objectives of Artificial Intelligence Technologies:

1. Enabling access to patterns in the processing of higher mental processes that take place within the human mind.
2. The development of computer programs in order to learn from past experiences to be able to solve problems.

3. The use of computers facilitates the solution of problems and thus helps in the learning and training processes in good ways and at a lower cost.
4. Finding solutions to many tasks.

The Life Cycle of AI Technologies:

AI technologies have a life cycle that consists of four stages:

1. Data Design and Modeling Stage: The design process includes clarifying the general ideas of the system, its objectives, its main hypotheses, and requirements with the possibility of building a prototype, then the process of data collection, processing, and classification is carried out, and finally tests are conducted to ensure its quality, as well as documenting the characteristics of the data that includes (how to create it, where it is used and maintained), while the modeling process means creating or selecting algorithms, testing them, training on them, and interpreting them [19].
2. Confirmation and verification: It includes the implementation and modification of models and the conduct of performance evaluation tests according to various dimensions and considerations.
3. Publishing: The system experience includes verifying its compatibility with existing systems, ensuring compliance with laws, evaluating the user experience and managing organizational change.
4. Operation and Supervision: It involves the operation of the AI system and the continuous evaluation of its recommendations and its intended and unintended effects in light of ethical goals and considerations, and at this stage, problems are diagnosed, modifications are made and if necessary, the system is withdrawn.

(Table 1)

Classification of Artificial Intelligence Technologies in the Banking Sector:

AI technologies can be summarized in the table 1 below:

Table 1. Classification of Artificial Intelligence Technologies in Banks

No.	Technology	Domain	Mechanism
1	Machine learning-based technology	Identify credit risk.	Checking your supervised bank's credit wallet more quickly
2	Visualization Technology	Analyze the main pillars of newly granted mortgages, make comparisons between banks and verify the quality of the data.	Leverage and improve the use of detailed credit-related information contained in the credit database.
3	Network analytics technology	Analyze Suspicious Transaction Reports.	Identify individuals and organizations that exhibit suspicious behaviors and identify common anti-money laundering patterns.
4	Natural Language Processing Technology	Support supervisor evaluations of potential board members and bank executives.	Pre-check for response and document translation.
5	Early Warning Technology	Standardization of many supervision applications, document analysis, predictive model, relationship analysis.	Analyzing bank requests, forecasting risks based on regulatory reporting data.
6	Supervision Technology	Support cyber risk stewardship activities.	Compilation of cyber-related reports.

7	Worksheet Automation Technology	Automate the steps of the control process.	Handling (loan applications, contracts, conformity reports, account opening forms).
8	Board Risk Analysis Technology	Assisting supervisors in their review of the culture and behavior of the board members in banks.	Analyze data related to Curriculum vitae of the members of the Council Meeting Reports Voting Behavior Members' Relations with Each Other Speech and Text Analysis or Speeches
9	Manage document risk margin automation	Analyze texts, summarize documents, and analyze specific topics.	Data collection and analysis Preparing warning and alert reports
10	Big Data	Easier and more efficient access to data	Training employees on the required technical knowledge
11	Social Media Monitoring Technology	Examining the public's feelings towards the bank	Customer reviews about QIB and its services Evaluating Marketing Campaigns

Source: Prepared by the researcher based on

Second: Sustainable Performance

Sustainability simply means Ability to Persistence for a long period of time or persistence for a specific period of time also means the preservation and improvement of resources and processes over a long period of time. Sustainable performance is defined as according to the views of many researchers, including those who define it as: the ability of the bank to create value for the relevant parties and the extent to which it is able to achieve balance between the various economic, environmental and social fields or dimensions . It agrees with this definition when it defines sustainable performance as a concept that obliges banks to fulfill their responsibilities related to the environment and society, in addition to achieving their goals, i.e., economic, environmental and social performance together [20]. He explained that sustainable performance is a concept that combines economic, social and environmental dimensions that not only have an impact on the environment but can also have long-term economic benefits and give the bank a competitive advantage.

The researcher can define sustainable performance as the interaction between the bank's performance in its business and social and environmental performance in addition to economic performance, i.e. the ability of the bank to achieve its objectives and increase value for shareholders while taking into account the economic dimensions and social and environmental responsibility in the long term.

Sustainable Performance Objectives:

Sustainable performance has a wide range of goals that can be summarized in the following points:

1. Developing and improving the level of technology used in activities and keeping pace with global developments in modern methods and means by developing the skills of employees towards modern innovative methods and technology.
2. Improve long-term social benefits to shareholders while reducing banks' use of materials and minimizing negative impacts on the environment [21].
3. Removing the obstacles and restrictions that lead to the Bank's failure to achieve its objectives by identifying the weaknesses that prevent the Bank from performing its responsibilities properly and thus affecting the objectives set by the management.

4. Enabling the internal control system to continuously monitor to support commitment to performance and follow up on all social and environmental conditions.

Sustainable Performance Requirements:

The goal of sustainable performance in banks is not only to achieve wealth, but also to achieve its duties towards economic, social and environmental activities, so banks must adhere to three conditions, which are:

1. Banks shall solve problems related to environmental and social activities imposed by the State, in addition to carrying out voluntary work to protect the environment and serve the community.
2. Banks must create positive value through their activities that contribute to increasing the economic value of the country through the success of the bank in reducing costs, increasing revenues and competitiveness, increasing profits achieved, and preserving customers and the bank's reputation.
3. The Bank shall provide proof that any administrative activity does not contribute to achieving negative effects on the social, economic or environmental levels.

Dimensions of sustainable performance:

1. Dimension Economic

It is the surplus that the bank achieves as a result of maximizing its results by reducing the level of use of resources, and this dimension is represented in trust, responsiveness to customer needs, flexibility, financing, and quality. This dimension can be assessed using a set of quantitative and qualitative indicators related to economic transactions and focuses on the economic status of the stakeholders.‹ The economic dimension is also related to the effects of the bank on the economic conditions of the stakeholders and its economic systems at the local, national and global levels, and the economic category shows the flow of capital between the various key stakeholders and the economic effects of the bank on society as a whole. To ensure the basic needs and requirements of the individual and to raise the standard of living by maximizing returns, this means that it is essential that the economic unit functions properly, and adopts principles in the areas of occupational safety, employee health, human resources and the environment [22], [23].

2. The social dimension:

Means the success of the bank in achieving pre-defined social goals that contribute to the improvement of an important matter of society or relations with other communities.‹ Banks need to adopt strategies and concepts through which banks integrate voluntary ESG objectives into their business operations [24]. It can be defined, that the performance that can be accurately measured is the exercise of the bank's responsibilities towards its employees‹ it measures the effectiveness of the bank's human resources and the most important indicators are social employment, management-employee relations, health and safety, security and learning, and the reward of a variety of opportunities.

3. Environmental Dimension:

It can also be defined as the impact of commercial activities by providing products of safe goods and services and reporting environmental risks, and environmental performance refers to the environment-related requirements of stakeholders, as there are environment-related interests in front of banks, as companies must satisfy the interests of the groups they are affected by, and environmental performance is defined as The company's effectiveness in meeting and exceeding the expectations of the community regarding concerns related to the natural environment, environmental performance in fuel consumption, toxic emissions and wastes, efficiency in the efficient use of raw materials and risks, environmental impact and effectiveness in achieving environmental efficiency goals, and procedures for compliance with environmental laws, legislations and regulations. The most important environmental indicators are: raw materials, energy, water, and goods and services.

Third Section / Presentation and Discussion of Research Results

1. Questionnaire Analysis

A. Analysis of the Consistency of the Validity of the Questionnaire

For the purpose of analyzing the consistency of the validity of the questionnaire adopted by the research, Cronbach's alpha coefficient was relied on, and it was extracted by the statistical program (SPSS), noting that the acceptable value of this coefficient in academic research is (70%) or more, and it was applied to the research variables in the questionnaire and the results appeared in Table (2) below:

Table 2. Stability coefficient by Cronbach's alpha for the research variables

Variables	Number of questions	Cronbach's alpha coefficient	Resolution
The Possibility of Applying Artificial Intelligence Technologies in Iraqi Banks	8	0.913	Accept
The Role of Artificial Intelligence Technologies in Achieving the Economic Dimension of Sustainable Performance in Iraqi Banks	8	0.897	Accept
The Role of Artificial Intelligence Technologies in Achieving the Social Dimension of Sustainable Performance in Iraqi Banks	8	0.919	Accept
The Role of Artificial Intelligence Technologies in Achieving the Environmental Dimension of Sustainable Performance in Iraqi Banks	8	0.879	Accept

Prepared by: The researcher based on the results of the analysis of the sample's answers using the statistical software (SPSS).

Table (2) shows the value of Cronbach's alpha coefficient for the sample answers and on all questions related to the research variables, which appeared to be greater than the acceptable minimum in academic research, which is (70%), which means that there is a high degree of internal consistency in the questionnaire paragraphs and for all variables, and therefore the research tools are characterized by high stability, and this justifies their adoption in achieving the research objectives and analyzing its results.

B. Descriptive analysis of the sample answers

To reach the research objectives, the statistical descriptive analysis was used to analyze the sample's answers about the research variables using the statistical program (SPSS. 24), and the arithmetic mean, standard deviation, effect level, and rank of the sample answers for each of the paragraphs of the research variables, as well as the total level of the dimension, noting that the effect level was extracted through a scale for the pentagram, which was divided into five levels as shown in the table below, noting that the approved arithmetic mean is (table 3) based on the use of the scale of the five-point Likert scale.

Table 3. Degrees and level of influence of the five-point Likert scale adopted in the research

the five-point Likert scale	1	2	3	4	5
Degrees of Impact	1 – 1.79	1.80 – 2.59	2.60 – 3.39	3.40 – 4.19	4.20 – 5
Level of Impact	Completely ineffective	Simply Impressive	Average Impact	Hugely impressive	Very influential

Source: Prepared by the researcher.

Note that the effect score of the five-point Likert scale in the table above will be compared with the arithmetic mean of the sample answers for each of the paragraphs of the research variables to determine the level of impact, while the ranks are meant to arrange the variable question paragraphs according to their importance in representing the variable based on the sample answers and relying on its arithmetic mean, and the following is the descriptive analysis of the research variables.

1. Descriptive analysis of the sample's answers to the possibility of applying artificial intelligence technologies in Iraqi banks.

Table 4. The arithmetic mean and standard deviation of the applicability of artificial intelligence technologies in Iraqi banks

No.	Details	Arithmetic mean	Standard Deviation	Level	Rank
1	Management of bank has a clear understanding of AI technologies.	3.723	0.862	Hugely impressive	3
2	The Bank's strategic plan includes the concepts of artificial intelligence technologies.	3.569	0.822	Hugely impressive	8
3	Your bank has the human and physical capabilities to implement AI technologies.	3.669	0.976	Hugely impressive	4
4	Enhance the awareness of employees within the bank about the importance of applying artificial intelligence technologies.	3.746	0.874	Hugely impressive	1
5	bank employees have sufficient skills and experience to apply AI technologies.	3.584	0.955	Hugely impressive	7
6	The bank has an information system that uses advanced analytical tools to analyze customer data.	3.662	0.985	Hugely impressive	5
7	Bank employees are engaged in training workshops that encourage the development of their digital skills.	3.745	0.959	Hugely impressive	2
8	Bank management understands the importance of applying AI technologies to achieve a competitive advantage.	3.600	0.964	Hugely impressive	6
	Mean and total standard deviation	3.663	0.775	**Hugely impressive**	

Prepared by: The researcher based on the results of the analysis of the sample's answers using the statistical software (SPSS).

Table (4) shows the answers of the sample about the possibility of applying artificial intelligence technologies in the banks of the research sample, as the arithmetic mean of

their answers and all the paragraphs of the variable, was higher than the value of the approved arithmetic mean, which is (3) and with standard deviations less than one, which means that the employees of the banks in the research sample were in favor of the possibility of applying artificial intelligence technologies in their banks, due to the availability of material and human capabilities in the bank and the availability of a clear vision in the bank's management of the advantages of applying artificial intelligence technologies by including them in the The Bank's strategic plans and the involvement of employees in workshops and courses related to developing their skills in the use of artificial intelligence technologies.

2. Descriptive analysis of the sample responses to the role of artificial intelligence technologies in achieving the economic dimension of sustainable performance in Iraqi banks.

Table 5. The arithmetic means and standard deviation of the role of artificial intelligence technologies in achieving the economic dimension of sustainable performance in Iraqi banks

NO.	Details	Arithmetic mean	Standard Deviation	Level	Rank
1	The bank's plans include a plan to continuously improve the profitability of the bank by reducing operational costs by automating the bank's internal processes.	3.754	0.949	Hugely impressive	8
2	The use of artificial intelligence technologies contributes to the achievement of the economic goals set by the bank as a result of improved resource allocation.	3.769	0.849	Hugely impressive	7
3	The use of AI technologies brings a competitive advantage over other banks operating in the same field.	3.954	0.746	Hugely impressive	2
4	banks works to present a distinctive image of its services and to satisfy and attract new shareholders when using artificial intelligence technologies.	3.900	0.843	Hugely impressive	5
5	The adoption of artificial intelligence technologies helps increase the bank's market share as a result of the development of innovative services that achieve higher economic returns.	3.923	0.850	Hugely impressive	4
6	AI technologies reduce operational costs and reduce time in granting loans and opening accounts.	3.946	0.951	Hugely impressive	3
7	Artificial intelligence technologies help keep pace with market changes by	4.023	0.830	Hugely impressive	1

	providing banking services that are in line with the desires and needs of customers.				
8	The application of AI technologies reduces bank losses by predicting financial risks.	3.854	0.907	Hugely impressive	6
Mean and total standard deviation		3.890	0.657	Hugely impressive	

Prepared by: The researcher based on the results of the analysis of the sample's answers using the statistical software (SPSS).

Table (5) shows the responses of the sample about the role of artificial intelligence technologies in achieving sustainable performance across the economic dimension in the banks of the research sample, and the arithmetic mean of the sample's answers for the paragraphs of all the variables reached higher than the value of the approved mean, which is (3) and with a standard deviation less than the correct one, which means that the employees of the banks in the research sample and their management, believe to a large extent that artificial intelligence technologies help achieve sustainable performance of banks according to the economic dimension, and this is what appeared on the If the highest arithmetic average of the paragraph stating that the application of artificial intelligence in the bank helps to provide distinguished banking services in line with the wishes and needs of its customers, or the lowest arithmetic mean, it was achieved in the paragraph that states that the bank has a plan to reduce operational costs by automating the bank's internal operations.

3. Descriptive analysis of the sample's responses to the role of artificial intelligence technologies in achieving the social dimension of sustainable performance in Iraqi banks.

Table 6. The arithmetic mean and standard deviation of the role of artificial intelligence technologies in achieving the social dimension of sustainable performance in Iraqi banks

NO.	Details	Arithmetic mean	Standard Deviation	Level	Rank
1	AI technologies improve the customer experience by delivering more accurate and fast services.	4.138	0.785	Very influential	1
2	Artificial intelligence technologies help attract the human competencies available in the labor market and direct them to analytical tasks instead of routine tasks.	3.854	0.884	Hugely impressive	8
3	The bank's management works to develop the skills and efficiency of the performance of employees assigned to use artificial intelligence technologies.	3.960	0.945	Hugely impressive	5
4	The use of AI technologies at the bank promotes creativity and innovation and encourages research and development.	3.869	0.827	Hugely impressive	7
5	AI technologies help provide banking services to meet the	3.892	0.790	Hugely impressive	6

	needs of different and diverse customer segments.				
6	AI technologies increase customer satisfaction for round-the-clock banking availability.	3.962	0.839	Hugely impressive	4
7	AI technologies reduce repetitive stress on employees at the bank through automation of routine work.	3.977	0.840	Hugely impressive	3
8	AI technologies enable the exchange of information and the immediate response to customer questions and inquiries.	4.000	0.811	Hugely impressive	2
Mean and total standard deviation		3.927	0.671	Hugely impressive	

Prepared by: The researcher based on the results of the analysis of the sample's answers using the statistical software (SPSS).

In Table (6), the results of the analysis of the sample's answers on the role of artificial intelligence technologies in achieving the social dimension of sustainable performance in the research sample banks, where the arithmetic mean of the sample's answers for the paragraphs of all the variables was greater than (3), which represents the value of the approved mean, and with standard deviations less than the correct one, and this indicates that the research sample believes that artificial intelligence technologies help achieve the goals of the social dimension of sustainable performance, and this is what their answer showed The questions have an economic dimension, and the highest arithmetic average was in the paragraph that states that the application of artificial intelligence in their banks leads to the provision of more accurate and fast services to their customers, or the lowest arithmetic average was achieved for the paragraph that sees that artificial intelligence technologies help banks to attract the human competencies available in the labor market, and this indicates the availability of these competencies in a large way in banks, which gives the management of these banks the ability to exploit them to achieve the bank's goals.

4. Descriptive analysis of the sample's responses to the role of artificial intelligence technologies in achieving the environmental dimension of sustainable performance in Iraqi banks.

Table 7. The arithmetic mean and standard deviation of the role of artificial intelligence technologies in achieving the environmental dimension of sustainable performance in Iraqi banks

NO.	Details	Arithmetic mean	Standard Deviation	Level	Rank
1	AI technologies are contributing to reducing reliance on paper through digital transactions and automation.	4.277	0.726	Very influential	1
2	Banks attaches great importance to reducing energy consumption and improving operational efficiency when applying AI technologies.	3.885	0.841	Hugely impressive	2
3	One of the priorities of using AI technologies at the Bank	3.585	1.077	Hugely impressive	7

	is to take the necessary measures to preserve and protect the environment.				
4	Artificial intelligence technologies contribute to the selection of the best and least environmentally impactful alternative among the available alternatives.	3.785	0.972	Hugely impressive	5
5	bank finances green green projects such as renewable and solar energy projects based on artificial intelligence technologies.	3.485	1.122	Hugely impressive	8
6	Artificial intelligence technologies are promoting the development of environmentally friendly banking services.	3.623	0.990	Hugely impressive	6
7	Artificial intelligence technologies support the bank's drive to achieve environmental sustainability as part of the bank's corporate social responsibility.	3.815	0.870	Hugely impressive	4
8	AI technologies can assess the environmental impact of bank's investment and financing projects.	3.862	0.878	Hugely impressive	3
Mean and total standard deviation		3.789	0.719	Hugely impressive	

Prepared by: The researcher based on the results of the analysis of the sample's answers using the statistical software (SPSS).

Table (7) shows the arithmetic mean and standard deviation of the sample's answers about artificial intelligence technologies and its role in achieving sustainable performance through the environmental dimension in the banks of the research sample, and the arithmetic mean of the sample's answers appeared for all paragraphs of the environmental variable, greater than (3), which is the value of the mean adopted in the research, or its deviations were less than the correct one, and this shows that the research sample is unanimous that artificial intelligence technologies contribute significantly to achieving sustainable performance across the dimension The first paragraph that states that the application of artificial intelligence technologies helps banks reduce operational costs by automating banking transactions and converting them from paper to digital on the highest arithmetic average, while the paragraph that states that the banks in the research sample finance environmentally friendly projects through artificial intelligence technologies, and this indicates that banks rely on other methods to finance environmentally friendly projects such as (renewable energy projects, solar cells) and others.

5. Testing research hypotheses

A. Testing the first sub-hypothesis, which states that there is a significant and statistically significant correlation and impact relationship between artificial intelligence and the economic dimension of sustainable performance. The correlation, simple regression, and (T) and (F) test were used to find the relationship between them

by the statistical program (SPSS), and the results of the test appeared in the following table 8:

Table 8. Statistical Analysis for second sub-hypothesis

R	R2	calculated t	Sig significance level	F calculated	Significance level	Degree of impact "β"	Accept or reject
0.776	0.602	8.353	0.000	193.996	0.000	0.659	Accept

Prepared: researcher based on statistical analysis using statistical program (SPSS).

The statistical analysis showed that there is a significant correlation and effect between the use of artificial intelligence technologies in the research sample banks and the achievement of the economic dimension of sustainable performance in them, through the value of the correlation coefficient (R) which reached (0.776), or the interpretation coefficient (**R2**), which explains the degree of impact of the independent variable (artificial intelligence technologies) on the dependent variable is sustainable performance represented by the economic dimension, where the value of (**R2**) reached (0.602)), meaning that the independent variable (artificial intelligence technologies) was able to explain (0.602) of the total variances of the dependent variable (the economic dimension of sustainable performance), and that (0.398) of the variances are due to other factors that affect the achievement of the economic dimension of sustainable performance in the banks in the research sample, or the degree of the dependent variable being affected by the independent variable, *as shown by the value of β*), which reached a value of (0.659).), which indicates that the amount of increase in investment in the value of artificial intelligence technologies by one, leads to an increase in the value of the economic dimension of sustainable performance by (0.659), while the significance of the relationship between the two variables was shown by the value of (**SIG**), where it reached (0.000), which is less than the value of the level of significance adopted in the research, which means the acceptance of the first sub-hypothesis of the research.

B. Testing the second sub-hypothesis

Table 9. Statistical Analysis for second sub-hypothesis

R	R2	calculated t	Sig significance level	F calculated	Significance level	Degree of impact "β"	Accept or reject
0.764	0.584	8.127	0.000	179.556	0.000	0.562	Accept

Prepared: researcher based on statistical analysis using statistical program (SPSS).

Table (9) showed that there is a significant and statistically significant correlation between the use of artificial intelligence techniques in the banks of the research sample and the achievement of the social dimension of sustainable performance in them, through the value of the correlation coefficient (R), which reached (0.764), while the significance of the relationship between the two variables was shown by the value of (Sig), which reached (0.000), which is lower than the value of the level of significance adopted in the research, and the coefficient of interpretation reached (R2).), which explains the degree of impact of the independent variable (artificial intelligence technologies) on the dependent variable is sustainable performance, represented by the social dimension, by (0.584), meaning that the independent variable (artificial intelligence technologies) was able to explain (0.584) of the total variances of the dependent variable (the social dimension of sustainable performance), and that (0.416)The research sample was not taken into account, either the

degree of the dependent variable being affected by the independent variable, as it was shown by a value *of* β), which reached a value of (0.562), which indicates that the amount of investment in the value of artificial intelligence applications by one by one leads to an increase in the value of the social dimension of sustainable performance by (0.562).), and as a result, the second sub-hypothesis of the research is accepted.

C. Testing the third sub-hypothesis

Table 10. Statistical Analysis for third sub-hypothesis

R	R2	calculated t	Sig significance level	F calculated	Significance level	Degree of impact "β"	Accept or reject
0.678	**0.459**	**6.574**	**0.000**	**108.714**	**0.000**	**0.629**	**Accept**

Prepared: researcher based on statistical analysis using statistical program (SPSS).

Table (10) shows the results of testing the third sub- hypothesis of the research, where the results showed that there is a significant and statistical correlation between the use of artificial intelligence technologies and the achievement of the environmental dimension of sustainable performance in the banks of the research sample, through the value of the correlation coefficient (R) which reached (0.678), or the significance of the relationship between them was shown by the value of (Sig), which reached (0.000), which is less than the value of the level of significance approved in the research, which is (0.5)), and the coefficient of interpretation **(R2**), which explains the degree of impact of the independent variable (artificial intelligence technologies) on the dependent variable of sustainable performance, represented by the environmental dimension, reached (0.459), meaning that the independent variable (artificial intelligence technologies) was able to explain (0.459) of the total variances of the dependent variable (the environmental dimension of sustainable performance), and that (0.541)The research sample was not taken into account, either the degree of the dependent variable being affected by the independent variable, as it was shown by the value of β), which reached a value of (0.629), which indicates that the amount of investment in the value of artificial intelligence technologies by one by banks, leads to an increase in the value of achieving the environmental dimension of sustainable performance by (0.629).), and as a result, the third sub-hypothesis of the research is accepted.

4. Conclusion

1. The statistical analysis showed that there is a positive and significant relationship between the applications of artificial intelligence and the achievement of sustainable performance in the banks of the research sample, which confirms that investment in artificial intelligence technologies contributes to improving sustainable performance through its economic, social and environmental dimensions.
2. The analysis showed that the economic dimension of sustainable performance was the most affected by the applications of artificial intelligence in banks, due to its use in improving the efficiency of banking operations, reducing operational costs, and strengthening the competitive position of banks.
3. The results showed that the applications of artificial intelligence contributed to improving the quality of service provided to the bank customers in the research sample, and thus it is hoped that it will lead to an increase in their satisfaction, in addition to providing a more dynamic work environment for bank employees. This contributes to achieving the social dimension of sustainable performance.
4. The results indicated that the use of artificial intelligence applications in banks indirectly helps in improving environmental performance by reducing dependence on paper, and improving energy consumption in operational

processes, which is in line with achieving the environmental dimension of sustainable performance in them.

5. Overall, the results of the analysis showed that the adoption of artificial intelligence in banks is not only a technical option for banks, but also a strategic direction that enhances their long-term sustainability.

Recommendations

1. The need for banks to increase investment in the applications of artificial intelligence technologies in their fields, including machine learning, big data analysis, and smart robots, to ensure the best sustainable performance for them.
2. Urging the management of banks to integrate artificial intelligence technologies into their strategic policies, to ensure that they are aligned with sustainability goals.
3. Increasing investment in developing its human competencies that are able to deal with artificial intelligence technologies through training and continuous development, to ensure the optimal use of these technologies.
4. Working to enhance digital infrastructures to ensure the integration of smart systems, increase the efficiency of treatments, and respond to social and environmental risks and challenges.
5. Adhering to the instructions of the regulatory and banking authorities supporting the use of artificial intelligence technologies in banks while ensuring compliance with the Sustainable Development Goals.
6. Focusing future studies on comparing banks that rely on artificial intelligence and those that do not, to identify the fundamental differences in sustainable performance and determine the best among practices.

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