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**The Impact of Applying Artificial Intelligence Techniques on  
Operational Efficiency in Saudi Banks**

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### Abstract

This study aims to explore the impact of applying artificial intelligence (AI) techniques on operational efficiency in Saudi banks. It seeks to determine the current state of AI application, examine its effect on mitigating banking risks, and identify obstacles that hinder its implementation in banks. A descriptive-analytical methodology was adopted, collecting data through a questionnaire distributed to a simple random sample of private-sector employees in Saudi Arabia. The sample size consisted of 350 respondents.

The findings indicate a statistically significant relationship between the application of AI techniques and improved operational efficiency in Saudi banks. AI technologies were found to enhance decision-making processes, reduce operational costs, and improve customer service efficiency. However, challenges include the high initial costs, lack of specialized skills, and resistance to technological change among employees. Recommendations include investing in AI training for bank staff, ensuring continuous updates to AI systems, and addressing technical and financial constraints to facilitate a smoother adoption process within the banking sector.

**Keywords:** artificial intelligence, operational efficiency, banking sector, Saudi Arabia, risk mitigation.



تهدف هذه الدراسة إلى استكشاف أثر تطبيق تقنيات الذكاء الاصطناعي على الكفاءة التشغيلية في البنوك السعودية. وتسعى إلى تحديد الوضع الحالي لتطبيق الذكاء الاصطناعي، ودراسة تأثيره على التخفيف من المخاطر المصرفية، وتحديد العقبات التي تعوق تطبيقه في البنوك. وتم اعتماد المنهج الوصفي التحليلي، وجمع البيانات من خلال استبيان تم توزيعه على عينة عشوائية بسيطة من موظفي القطاع الخاص في المملكة العربية السعودية. وتألّف حجم العينة من ٣٥٠ مستجيباً. وتشير النتائج إلى وجود علاقة ذات دلالة إحصائية بين تطبيق تقنيات الذكاء الاصطناعي وتحسين الكفاءة التشغيلية في البنوك السعودية. وقد وجد أن تقنيات الذكاء الاصطناعي تعمل على تعزيز عمليات اتخاذ القرار، وخفض التكاليف التشغيلية، وتحسين كفاءة خدمة العملاء. ومع ذلك، تشمل التحديات التكاليف الأولية المرتفعة، ونقص المهارات المتخصصة، ومقاومة التغيير التكنولوجي بين الموظفين. وتشمل التوصيات الاستثمار في تدريب الذكاء الاصطناعي لموظفي البنوك، وضمان التحديات المستمرة لأنظمة الذكاء الاصطناعي، ومعالجة القيود الفنية والمالية لتسهيل عملية تبني أكثر سلاسة داخل القطاع المصرفي.

**الكلمات المفتاحية:** الذكاء الاصطناعي، الكفاءة التشغيلية، القطاع المصرفي، المملكة العربية

السعودية، التخفيف من المخاطر.



## **Chapter One: The general framework of the study**

### **Introduction:**

This study examines the impact of artificial intelligence on banking institutions, focusing on how these modern technologies can help overcome challenges such as money laundering, fraud, and cheating. The study will examine if there is a significant relationship between AI application and mitigating banking risks, using a questionnaire distributed to employees and managers of Saudi banks.

### **1.1 The Study Problem:**

The problem of the study revolves around contributing to the impact of applying artificial intelligence techniques to financial institutions. Based on this, the problem of the study can be formulated as follows: “What is the effect of applying artificial intelligence techniques in Saudi banks?” From this main question, emerge the following sub-questions:

1. What is the current state of applying artificial intelligence techniques to banks?
2. What is the effect of using artificial intelligence techniques in different areas?
3. What are the obstacles to using artificial intelligence techniques in banks?

### **1.2 The Study Importance:**

The scientific importance of the study stems from its theoretical background related to applying artificial intelligence techniques in commercial banks and its results, which may help improve the use of artificial intelligence in financial institutions from all scientific aspects.



In terms of practical importance, applying artificial intelligence technologies helps enhance reliable information in local financial and banking operations and link them globally.

### **1.3 The Study Objectives:**

**The study mainly aims to clarify the following:**

1. Recognize the current state of applying artificial intelligence techniques to Saudi banks.
2. Clarify the impact of using artificial intelligence techniques on reducing banking risks.
3. Highlight the main obstacles hindering the application of artificial intelligence techniques in Saudi commercial banks.

### **1.4 The Study Questions:**

Based on what is mentioned in the objectives and the importance of the study, and in view of the importance of the topic, the following question arises before us:

**What artificial intelligence techniques exist in financial institutions in Saudi Arabia? What is the impact of applying it?**

**From this question, the following sub-questions emerge:**

1. What is the current state of applying artificial intelligence techniques to Saudi banks in light of Vision 2030?
2. What is the impact of using artificial intelligence techniques to mitigate banking risks?
3. What are the obstacles to using artificial intelligence techniques in commercial banks?



### **1.5 The Study Hypothesis:**

**The main hypothesis is that artificial intelligence can perform most banking operations in a way that mimics human work.**

In light of the problem of the study and in line with its objectives and importance, and through this hypothesis, we aim to test the following hypotheses:

1. The first hypothesis is that there is no statistically significant relationship between the use of artificial intelligence techniques in commercial banks and mitigating banking risks.
2. The second hypothesis is that there is no statistically significant relationship between the application of artificial intelligence techniques in commercial banks and keeping pace with global financial and banking developments.

### **Data Collection Sources**

- Secondary sources: These include data and information found in books and references, university theses, working papers, magazines, periodicals, scientific conferences and workshops, in addition to published and unpublished reports that addressed the topic in various relevant institutions.
- Primary sources: The study relied on the questionnaire as the main tool in collecting data from its sources, which was designed specifically for this purpose on Google Forms and sending its link to the research community.

### **1.6 Study tools:**

The research tool is defined as "the means by which the data collection process is carried out in order to answer its questions, and researchers will rely on the questionnaire to collect data, which is defined as "a specific formula of paragraphs and questions aimed at collecting data from research individuals"



**It consisted of two main sections:**

- **The first section:** It is the part related to the demographic variables of the study sample individuals, represented by: gender, age, academic qualification, and job level.
- **Section two:** The second section included the paragraphs and dimensions that measure the independent and dependent variables of the study.

### **1.7 Previous Studies:**

#### **1. (Biswas & others, 2020) Study:**

The study suggests that AI technologies can improve cost reduction, human decision-making, revenue, error rates, resource utilization, and uncover new opportunities. These technologies can lead to higher profits, personalization at scale, differentiated channel experiences, and rapid innovation cycles. However, banks without AI implementation face risks due to rising customer expectations and the increased adoption of digital banking services. The most widely used AI technologies include robotic process automation, virtual assistants, and machine learning techniques. Big tech companies may exploit these advantages to deepen their presence in financial services.

#### **2. (Sabharwal, 2014) Study:**

This research that the researcher studied refers to Indian banks, and only new private sector banks are using AI technological applications. The researcher mentioned that these banks are using AI applications for trivial matters like facilitating automatic checkbook reordering, employee performance appraisal, credit assessment, and portfolio analysis.

#### **3. (Reham M. Diab, 2022) Study:**

The researcher explained the contribution of artificial intelligence technologies in the field of banking, including: managing credit card accounts, combating money



laundering, and chat robots that serve the customer; fraud detection; review and evaluation of loan applications submitted to banks; financial planning; faster customer service; stronger data protection; and other contributions made by artificial intelligence.

- **The concept of artificial intelligence (AI):**

Artificial intelligence (AI) has gained significant attention in the financial and banking sectors, as it enhances performance, continuity, and technology adoption. AI is a branch of computer science that simulates human behavior through specific algorithms, making appropriate decisions based on data. It is used in various fields, including machine learning, robotics, data analysis, and machine translation. AI plays a crucial role in banking by analyzing financial data, identifying patterns, detecting fraud, improving customer experience, and improving credit processes. It also provides personalized banking services, enhancing efficiency and security in banking operations. The field continues to develop and advance, making AI an exciting and exciting field to explore.

- **Saudi Data and AI Authority (SDAIA):**

The Saudi Data and AI Authority (SDAIA) was established in 2019 to govern data and artificial intelligence in Saudi Arabia. It is the national reference for regulation, development, and dealing in these sectors. SDAIA aims to achieve Vision 2030 by defining strategic direction, providing data-related capabilities, and continuously enhancing them through innovation.

- **Artificial intelligence techniques used in banks include:**

1. Machine learning: intelligent models trained on financial data and the banking behavior of customers to make informed decisions and analyze financial models and trends.





2. Natural Language Processing: Natural language processing applications are used to understand and analyze financial texts and communicate with customers intelligently and effectively.
3. Voice Recognition: Voice recognition techniques are used to convert spoken speech from customers into written texts for analysis and interaction.
4. Talking robots: Talking robots are used to interact with customers, provide banking services, and answer inquiries intelligently and efficiently.

These are some of the techniques used in artificial intelligence in banks. Artificial intelligence helps improve efficiency and the customer experience in banking.

### **1.8 The Study Tools:**

The study population consists of bank managers and employees in Saudi Arabia. To complete this study, questionnaires will be distributed to study the impact of applying artificial intelligence techniques to Saudi banks. The questionnaire will consist of three main axes:

1. The first axis is identifying the current state of applying artificial intelligence techniques in Saudi banks.
2. The second axis is evaluating the impact of using artificial intelligence techniques in mitigating banking risks.
3. The third axis is identifying the main obstacles to the use of artificial intelligence technologies in commercial banks.

### **1.9 The Study Boundaries:**

- Objective boundaries: The study is limited to the reality of applying artificial intelligence techniques in commercial banks and their impact on mitigating banking risks.



- Geographical boundaries: financial and banking departments in Saudi banks and their branches in the Kingdom, where the questionnaire is likely to be distributed during the period from August to December 2024.

## **Chapter Two: Theoretical Framework**

### **The first topic: artificial intelligence**

#### **2.1.1 Artificial Intelligence**

The information technology revolution has led to the emergence of smart systems using knowledge bases, such as artificial intelligence. AI helps understand human intelligence by simulating intelligent human behavior and processing operations electronically. This topic explores the development of artificial intelligence, its importance, objectives, characteristics, types, components, methods, and applications. It also discusses its application in the banking sector, its requirements, and the advantages and disadvantages of applying AI in banking.

#### **2.1.2 The emergence and development of artificial intelligence:**

Artificial intelligence is a product of philosophy, mathematics, and psychology, originating from the Arab scholar Al-Khwarizmi. It was first proposed in 1956 by John McCarthy at the University of Dartmouth. It includes individuals, procedures, physical parts, software, data, and knowledge required for computer systems and equipment. The first appearance of AI systems was in 1973, related to speech recognition. The development stages include general problem-solving methods, knowledge-based systems, and comprehensive information environments. The field has evolved from a knowledge-based system to a comprehensive information environment.



### **2.1.3 The concept of artificial intelligence**

Artificial intelligence has gained significant attention in Jordanian commercial banks since the early nineties, as it has become a crucial component in their activity and competitiveness. Researchers agree that artificial intelligence is a field of study that focuses on creating computers and programs capable of intelligent human behavior. It is defined as the ability of devices to perform actions and activities expected from the human brain, such as knowing, acquiring it, judging, understanding relationships, and producing original ideas. Artificial intelligence is a branch of information systems that studies the development of intelligent algorithms and technologies for computers and robots to perform tasks or solve problems. It is embodied in the simulation language between human behavior and computer systems, with the goal of reaching the intellectual leadership of computer systems used by banks and organizations aiming for local and global entrepreneurship.

### **2.1.4 The importance of artificial intelligence**

There is no doubt that artificial intelligence has become an important role in human life, as technology has entered various fields of life and knowledge, and it is doing a lot of work with high accuracy and speed, and carrying out many dangerous activities and work that are difficult for humans to do, and some aspects of the importance of artificial intelligence can be referred to, as follows:

1. Artificial intelligence contributes to preserving human experience and knowledge accumulated over the years and transferring them to smart machines.
2. Man is able to use human language in dealing with machines instead of complex programming languages in computers, which makes the use of machines accessible to everyone, even people with special needs, after dealing with advanced software and machines was the preserve of specialists and experts.



3. Artificial intelligence is concerned with diagnosing diseases and prescribing medications, legal and professional consultations, interactive education, security and military fields.
4. Artificial intelligence contributes to decision-making, as these systems enjoy independence, accuracy and objectivity and therefore their decisions are far from error, bias, racism, prejudices, or even external or personal interventions.
5. Smart machines relieve humans of many risks and psychological pressures, and make them focus on other more important things.

From another point of view, the importance of artificial intelligence for any company that uses it is embodied in the following:

1. A comparative and similar approach to the human method of complex problem solving.
2. It deals with hypotheses synchronously, with high accuracy and speed.
3. It works to find specialized solutions to each problem.
4. He works at a constant scientific and advisory level that does not change.
5. Processes data that does not contain numbers (symbols) through logical analysis and comparison operations.
6. It plays in provoking new ideas that lead to innovation, development and immortalization of human experience.
7. Reduce reliance on human experts, save expenses and reduce human effort.

### **2.1.5 Types of artificial intelligence**

Expert systems are information programs designed to stimulate human logic and solve problems. They are based on the value of information programs and the field of knowledge engineering, which aims for effectiveness. Expert systems are subsystems of artificial intelligence that depend on a knowledge base and subset of programs to make sound decisions.



The knowledge base is a subsystem of expert systems, containing specialized knowledge derived from human experience. The system uses techniques to absorb and derive this knowledge, encrypting it in a program and storing it in the knowledge base. The system then self-introduces new solutions into the working memory, benefiting the decision-maker.

The inference mechanism works with new and old facts in the working memory to derive and extract new information, similar to human thinking in problem-solving. The system also has an interpretation facility that interprets proposals, results, or solutions. This allows the system to provide explanations for the decision-maker, ensuring they understand the reasons and justifications behind the system's recommendations. The environmental interface of the beneficiary is the interface with the final beneficiary, where interaction occurs through natural language and is based on meeting the needs and requirements of the beneficiary.

Characteristics of expert systems: Expert systems contain several characteristics, as follows:

- Expert systems separate knowledge from control, allowing for the absorption and storage of accumulated experience from human experts. They focus on field expertise, using symbols to represent diverse patterns of knowledge. Experts extract rules through their practical experience, using the exploratory research method to solve complex problems. Programming focuses on problem data, while knowledge engineering involves organizing and teaching specialized knowledge to reach a deep understanding of the problem. This approach is essential for expert systems to be effective and efficient. The key characteristics of expert systems include separation of knowledge from control, assimilation of expert knowledge, focus on field expertise, and the use of exploratory perception.



## **The second topic: neural networks**

Artificial neural networks, also known as industrial networks or relational approaches, are an ancient artificial intelligence technique that aims to mimic the human brain's workings. These networks, arranged in levels, function through learning and communication, and can be considered a thinking model. They process large amounts of unrelated information to solve special problems, resembling the human nervous system. Artificial neural networks acquire knowledge through continuous training and storage, enabling them to reach optimal solutions by analyzing historical data and benefiting from previous experiences. Researchers believe that artificial neural networks can be defined as a process similar to the human brain's neurons, acquiring experiences and knowledge through training and storage.

### **2.2.1 The importance of neural networks:**

There is great importance for neural networks in order for artificial intelligence to be effective and efficient, and the following is the importance of neural networks:

1. The ability of neural networks to derive a new meaning from a large, complex or inaccurate data number.
2. Extract patterns and detect trends that are too complex, to reach results not observed by humans or other computer techniques.
3. Trained neural networks can be described as an expert, in the category of information given to analyze them and then this expert can be used to present new solutions and answer the question "what if".
4. Automatic learning, self-regulation, and timely completion of the process.

### **The motivation for interest in neural networks is the following:**

1. They are simple and highly interconnected, as they effectively represent complex mathematical solutions.

2. They are considered very flexible in design.

**While the researcher believes that, the importance of neural networks lies in the following:**

1. Its ability to learn to model nonlinear and complex relationships, which is very important, because there are many relationships between nonlinear and complex inputs and outputs.
2. The possibility of generalization after learning from the initial inputs and their relationship as we can deduce the invisible relationships between the data, which enables the model to be generalized to the data.
3. It is considered the best model that can be used with data with high volatility and unstable variation, due to its ability to learn hidden relationships in data without imposing any fixed relationships in the data, and this helps in predicting financial time series such as stock prices.

### **2.2.2 Types of neural networks**

**There are several types of neural networks, which are as follows:**

1. **Front-feeding neural networks:** These networks are the most commonly used, as they consist of a group of neurons, called units, where they are arranged in a stratified form in only one direction of movement, i.e. back and forth, and there is no feedback or feedback.

**There are several advantages to front-feed neural networks:**

- The ability to predict and extrapolate any input, where after network training will be able to predict any new inputs, even those outside the training limits.
- It works well for many applications, especially the installation of the time series curve of data, i.e. data that comes at different times and value.



2. **Neural networks with feedback:** These networks work to enter sequential and regular inputs and thus regular outputs are output, by sharing data between time periods, and the use of these networks has led to amazing results in their processing of natural languages and image captions, and neural networks with feedback are divided into two parts: the first is neural networks with direct feedback, where they replicate the output of the neuron to its input, and the second are neural networks with adjacent feedback and they work to connect Neuronal outputs into inputs, in other words, they are networks that replicate millions from output to input, so that they give the best possible results.
3. **Self-connected neural networks:** They work in receiving inputs and then transmitting outputs at the same time, and when processing information, all elements of computational processing based on them at the same time in parallel processing method, that is, they work to receive inputs and output outputs at the same time in order to be similar to the way the human brain works, and some structural examples of neural networks include the following:
  - Two-layer grille with forward feeding.
  - A two-layer network with forward and reverse feeding.
  - A single-layer mesh with side reverse feeding.
  - Multilayer mesh.





## **Chapter Three: Study Methodology and Procedures**

### **Introduction**

This chapter deals with the field study by identifying the study methodology, the study population and sample, the study tool, data collection sources, statistical methods used in the study, and calculating the validity and stability of the study tool.

### **3.1 Research Methodology:**

The research is based on a descriptive and analytical approach, as it focuses on examining the theoretical foundations related to the subject by reviewing the relevant Arab and foreign references. The research also includes the implementation of a field study consisting in distributing questionnaires to different categories of the selected sample.

### **3.2 Population and sample of the study**

The study population was represented in the private sector workers in the Kingdom of Saudi Arabia, the study used the method of simple random samples to collect study data through the study tool represented in the questionnaire form, and the number of members of the study sample reached 350 individuals, who answered the questions of the questionnaire form.

### **3.3 Sources of data and information collection:**

**The study relies on two main sources in collecting data and information as follows:**

☒ **Secondary sources:** Arabic and foreign books and references related to the subject of study, in addition to relying on previous research and studies, periodicals, scientific journals and articles



- ❖ **Primary sources:** The study relies on the questionnaire as the main tool in collecting data from its sources, which was specially designed for this purpose on Google Forms and sending its link to the study community
- ❖ **Statistical methods:**

The research used the statistical program SPSS to analyze the study data using a set of statistical methods as follows:

- Vacornbach coefficient for calculating the level of stability of the study instrument
- Pearson's correlation coefficient to determine the level of internal consistency and the validity of the study tool and to identify the relationship between the study variables
- Ratios and frequencies to describe the characteristics of the study sample
- The arithmetic mean and standard deviation to describe the level of response of the study sample members to the statements of the study tool
- Simple linear regression equation to measure the effect between study variables

### 3.4 Study Tool

The questionnaire was worked on to suit the variables of the study by reviewing previous studies related to the subject of the study, as it consisted of two main sections:

- **The first section:** which is the part related to the demographic variables of the members of the study sample , which are: gender, age, academic qualification, and professional status,
- **Section Two:** The second section included paragraphs and dimensions that measure the independent and dependent study variables. It included statements related to the independent variable (artificial intelligence) and included four dimensions (expert systems - artificial neural networks - smart agents) and included 20 phrases and phrases related to the dependent variable (operational efficiency) in Saudi banks in the Kingdom of Saudi Arabia and included 10 phrases The five-point Likert scale,

consisting of very agree (5), agree (4), neutral (3), disagree (2), and very disagree (1), was used to answer the questions of the study axes.

The study divided the direction of approval of the study sample members on the statements of the study axes into levels by applying the following:

Scale range = highest number in scale (5) – lowest number in scale (1) = 4

Level range = scale range / number of levels (5) = 0.80

**Table (1) Levels of approval of the study sample on the statements of the study tool**

Level	Grade
Very Low	1 – 1.79
Low	1.80 – 2.59
Medium	2.60 – 3.39
High	3.40 – 4.19
Very High	4.20 – 5.00

### 3.5 Believe the study tool

The validity of the questionnaire statements was calculated by determining the level of internal homogeneity by identifying the statistical significance of the Pearson correlation coefficients between the degree of the statement and the total degree of the axis to which the statement belongs, and the results were as follows:

❖ **First Theme: Artificial Intelligence**

**Table (2) Correlation coefficients for the first axis statements**

M	Ferry	Person correlation coefficient	Mr
Expert System			
1	Expert systems are used in both government agencies to improve decision-making.	**0.588	,, , , ,
2	Expert systems provide accurate and reliable information to support management processes.	**0.687	,, , , ,
3	Expert systems help reduce human errors in procedures.	**0.481	,, , , ,
4	Employees are adequately trained in the use of expert systems...	**0.607	,, , , ,
5	Expert systems are an effective tool in improving the quality of services provided to citizens.	**0.646	0.000
Artificial neural networks			
6	Artificial neural networks are used in big data analysis in both government agencies.	**0.778	,, , , ,
7	Artificial neural networks provide accurate predictions about future trends.	**0.590	,, , , ,
8	Neural networks help improve the performance of existing systems.	**0.782	,, , , ,
9	Neural networks are used in the development of innovative solutions to complex problems.	**0.795	,, , , ,
10	Understanding how neural networks work is essential for both government workers.	**0.488	0.000
Smart Agents			

11	Smart agents are used to improve citizens' interaction with government services.	**0.721	٠,٠٠٠
12	Smart agents help ease the burden on employees by automating routine tasks.	**0.730	٠,٠٠٠
13	Using smart proxies is an important step towards improving the user experience.	**0.529	٠,٠٠٠
14	Smart agents contribute to providing quick and efficient responses to queries.	**0.634	٠,٠٠٠
15	Smart agents are periodically updated and developed to meet the needs of users.	**0.671	0.000
Practical applications of artificial intelligence			
16	Artificial intelligence techniques are applied in improving e-government services.	**0.778	٠,٠٠٠
17	AI helps analyze data to enhance decision-making in public policies.	**0.590	٠,٠٠٠
18	Artificial intelligence techniques are used to monitor performance and evaluate the quality of services.	**0.782	٠,٠٠٠
19	Artificial intelligence is an effective tool in achieving the Kingdom's Vision 2030.	**0.795	٠,٠٠٠
20	The practical applications of artificial intelligence provide new opportunities to improve government performance.	**0.488	0.000

**\*\* Statistically significant at 0.01**

It was found that all correlation coefficients for all AI axis statements were statistically significant at a significant level (0.01), which means that AI axis statements have the sincerity of internal consistency and are valid for study purposes.

❖ **Second Theme: Operational Efficiency**

**Table (3) Correlation coefficients for second axis statements**

M	Ferry	Person correlation coefficient	Mr
1	Technology improves the efficiency of both government entities' operations.	**0.694	,, , , ,
2	The efficiency of operational processes is measured periodically to ensure continuous improvement.	**0.709	,, , , ,
3	Updated procedures help boost operational efficiency and save time.	**0.649	,, , , ,
4	Employee skills are enhanced to improve operational efficiency in the workplace.	**0.725	,, , , ,
5	Transparency in processes is an important factor in improving operational efficiency.	**0.652	,, , , ,
6	Collaboration between different departments is essential for operational efficiency.	**0.750	,, , , ,
7	Analysis techniques are used to improve the efficiency of operational processes.	**0.448	,, , , ,
8	Approved procedures enhance the efficiency of operational processes in the provision of services.	**0.649	,, , , ,
9	Feedback from citizens is a catalyst for improving operational efficiency.	**0.630	,, , , ,
10	Technological innovations contribute to raising the level of operational efficiency in the organization.	**0.673	0.000

\*\* Statistically significant at 0.01

It was found that all correlation coefficients for all operational efficiency axis statements were statistically significant at a significant level (0.01), which means that the

operational efficiency axis statements have the sincerity of internal consistency and are valid for study purposes.

### 3.6 Third: Hypothesis test

**Main hypothesis:** There is no statistically significant effect at the level of significance ( $0.05 \geq \alpha$ ) of the impact of artificial intelligence in its dimensions (expert systems - artificial neural networks - smart agents) on operational efficiency in Saudi banks.

**Table (4): Results of the Simple Linear Regression Model of the Impact of Artificial Intelligence on Operational Efficiency in Saudi Banks**

P-VALUE	R	R2	F	T	B
,,000	,,٧٦٩	,,٥٩٢	**٥٥٣,٣٥٠	**٢٣,٥٢٣	0.992

Source: SPSS 23 statistical analysis results

**\*\* Statistically significant at 0.01**

Table (4) shows that there is a statistically significant direct effect of the level of artificial intelligence on operational efficiency in Saudi banks at the level of 0.05, where the value of (Sig F) = 0.000, which is a value less than 0.05, meaning that the calculated F value is greater than the tabular F value, and it turned out that there is a strong positive correlation with statistical significance between artificial intelligence on operational efficiency in Saudi banks at a significant level of 0.05 and it turns out that the independent variable (Artificial intelligence) explains 76.9% of the changes that occur in the dependent variable (operational efficiency) and that the rest of the changes are due to other variables that were not included in the model, and it was found that the more the level of artificial intelligence increased by 1%, the greater the level of operational efficiency by 0.446%, which shows the invalidity of the main hypothesis of the study.



## Chapter Four: Findings, recommendations and proposals

### 4.1 Results of the study

- ✓ The presence of a very high level of expert systems as one of the dimensions of artificial intelligence, where the value of the arithmetic mean was 4.274 with a standard deviation of 0.712
- ✓ The presence of a very high level of artificial neural networks as one of the dimensions of artificial intelligence, where the arithmetic mean value was 4.297 with a standard deviation of 0.675
- ✓ The presence of a very high level of smart agents as one of the dimensions of artificial intelligence, where the arithmetic mean value was 4.340 with a standard deviation of 0.648.
- ✓ The presence of a very high level of practical applications of artificial intelligence as one of the dimensions of artificial intelligence, where the value of the arithmetic mean was 4.297 with a standard deviation of 0.675
- ✓ High level of operational efficiency in the Kingdom of Saudi Arabia where the arithmetic mean value was 4.095 with a standard deviation of 0.775.
- ✓ The existence of a strong positive correlation with statistical significance between artificial intelligence on operational efficiency in Saudi banks at a significant level of 0.05 It turned out that the independent variable (artificial intelligence) explains 76.9% of the changes that occur in the dependent variable (operational efficiency) and that the rest of the changes are due to other variables that were not included in the model and it was found that the more the level of artificial intelligence increased by 1%, the greater the level of operational efficiency by 0.446%, which shows the invalidity of the main hypothesis of the study.
- ✓ The existence of a strong positive correlation of statistical significance between the expert systems on operational efficiency in the Kingdom of Saudi Arabia at a significant level of 0.05 and it turned out that the independent variable (expert systems) explains 55.7% of the changes that occur in the dependent variable (operational



efficiency) and that the rest of the changes are due to other variables that were not included in the model and it was found that the greater the level of expert systems by 1%, the higher the level of operational efficiency in the Kingdom of Saudi Arabia by 0.361%, which shows the invalidity of the first sub-hypothesis of the study.

- ✓ The existence of a strong positive correlation with statistical significance between artificial neural networks on the efficiency of the performance of banks in the Kingdom of Saudi Arabia at a significant level of 0.05 It turned out that the independent variable (artificial neural networks) explains 48.1% of the changes that occur in the dependent variable (the efficiency of the performance of banks) and that the rest of the changes are due to other variables that were not included in the model and it was found that the greater the level of artificial neural networks by 1%, the greater the level of efficiency of the performance of banks in the Kingdom of Saudi Arabia by 0.337%, which shows that The validity of the second sub-hypothesis of the study.
- ✓ The existence of a strong positive correlation with statistical significance between smart agents on the efficiency of the performance of banks in the Kingdom of Saudi Arabia at a significant level of 0.05 and it turned out that the independent variable (smart agents) explains 42.2% of the changes that occur in the dependent variable (the efficiency of bank performance) and that the rest of the changes are due to other variables that were not included in the model and it was found that the more the level of smart agents increased by 1%, the higher the level of efficiency of banks' performance by 0.294%, which shows the invalidity of the third sub-hypothesis of the study.
- ✓ The existence of a strong positive correlation of statistical significance between the practical applications of artificial intelligence on the efficiency of the performance of banks in the Kingdom of Saudi Arabia at a significant level of 0.05 It turned out that the independent variable (practical applications of artificial intelligence) explains 48.1% of the changes that occur in the dependent variable (the efficiency of bank performance) and that the rest of the changes are due to other variables that were not



included in the model and it was found that the higher the level of practical applications of artificial intelligence by 1%, the higher the level of efficiency of the performance of banks in the Kingdom of Saudi Arabia by 0.337% This shows the invalidity of the second sub-hypothesis of the study.

#### 4.2 Recommendations

- ✓ Saudi banks are advised to allocate larger budgets to the development and implementation of artificial intelligence technologies, which contributes to enhancing operational efficiency and improving services provided to customers.
- ✓ Banks should organize specialized training programs for employees to enhance their skills in the use of artificial intelligence technologies, helping them to make the most of them in their daily tasks.
- ✓ It is recommended to develop effective integration strategies between AI technologies and existing systems, to ensure smooth operations and get the most out of these technologies.

#### 4.3 Propositions

- ✓ "Analysis of the impact of artificial intelligence on customer experience in Saudi banks"
- ✓ "The Role of Artificial Intelligence in Enhancing Cybersecurity in the Banking Sector"
- ✓ "Exploring the Challenges Facing the Application of Artificial Intelligence Technologies in Saudi Banks"
- ✓ "The Impact of Artificial Intelligence on Strategic Decision Making in Banking Institutions"

"Evaluating the Effectiveness of Using Smart Agents in Improving Banking Services"



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