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The Applications of Artificial Intelligence in Improving the Financial Performance of Economic Institutions: A Case Study of Al Baraka Bank of Algeria

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Abstract

This study aims to analyze the impact of artificial intelligence applications on the financial performance of economic institutions, with a focus on its role in enhancing financial analysis, risk management, and operational efficiency. Utilizing a descriptive analytical approach and a case study of Al Baraka Bank Algeria, the results demonstrated a positive correlation between the adoption of artificial intelligence technologies and the achievement of sustainable financial performance. This impact was reflected in reduced operational costs, increased transaction speed, and enhanced capacity for effective risk management. The study concluded that artificial intelligence constitutes a strategic driver for transforming financial management and strengthening the competitive capability of institutions. In an era characterized by rapid technological transformations, artificial intelligence has emerged as a driving force reshaping the foundations of the global economy and institutional structures. Artificial intelligence is no longer merely a concept confined to science fiction; it has become a tangible reality permeating various aspects of our daily lives, from the simplest applications on our smartphones to the most complex industrial and financial operations. Thus, the ability of machines to simulate human intelligence through learning, reasoning, and decision-making has opened unprecedented horizons for enhancing efficiency, improving productivity, and creating innovative business models.

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Introduction

At the heart of this transformation, economic institutions face a dual challenge: either to adapt to this technological wave and invest in their capabilities to achieve a competitive advantage, or to ignore it and risk marginalization and decline. Financial

performance, which reflects the health of the institution and its ability to achieve its objectives, is among the most affected aspects by this revolution. Through its various applications, artificial intelligence provides powerful tools to enhance the accuracy of financial analysis, forecast future trends, automate processes, and manage risks with an efficiency previously unattainable.

The relationship between the adoption of artificial intelligence applications and the improvement of financial performance is not merely a simple causal link but rather a complex integrative relationship. Investment in these technologies requires substantial financial resources; however, it promises tangible returns manifested in reducing operational costs, increasing revenues, and enhancing the ability to make informed strategic decisions. This interaction between technology and financial performance raises fundamental questions about the capacity of institutions, particularly in developing economic contexts, to capitalize on these opportunities and confront their associated challenges.

Firstly: The Problematic Issue:

In the context of the global trend towards digitization, economic institutions face an inevitable necessity to integrate modern technologies into their operations to maintain their competitive capacity. Artificial intelligence emerges as a strategic tool that can effect a qualitative leap in the efficiency of financial management. Accordingly, the primary problem of this study revolves around the following question:

To what extent do artificial intelligence applications contribute to the improvement of the financial performance of economic institutions?

Sub-questions:

To address the main issue, we pose the following subsidiary questions:

- What are the fundamental theoretical concepts associated with artificial intelligence and financial performance?
- How do artificial intelligence applications, such as machine learning and data analytics, affect the accuracy of financial analysis and performance forecasting?
- What is the role of artificial intelligence in enhancing the efficiency of financial risk management and internal controls within organizations?
- What is the current state of artificial intelligence application in Algerian financial institutions, and what is its actual impact on their financial performance indicators?

Third: Hypotheses:

Based on the problem statement and the questions raised, we start from the following hypotheses:

Main Hypothesis: There is a positive and statistically significant correlation between the adoption of artificial intelligence applications and the improvement of financial performance indicators (profitability, efficiency, risk management) in economic institutions.

Sub-hypothesis 1: The use of artificial intelligence applications contributes to enhancing the accuracy of financial analysis and forecasting, thereby leading to more efficient financial decision-making.

Sub-hypothesis 2: The application of artificial intelligence in risk management leads to a reduction in cases of financial fraud and an improvement in the quality of credit portfolios, which positively reflects on the stability of financial performance.

Fourth: Significance of the Study:

This study derives its significance from several aspects:

Scientific significance: Contributes to enriching the theoretical literature in the fields of financial management and technology by examining the relationship between two contemporary variables (artificial intelligence and financial performance) within an economic context that has not been sufficiently studied.

Practical significance: It provides decision-makers and financial managers in economic institutions with a clear vision of the practical benefits of adopting artificial intelligence applications, and assists them in directing their technological investments to achieve the best possible financial performance.

Fifth: The Methodology Employed:

To address the study's issues and test its hypotheses, the descriptive analytical method will be employed, which involves describing the phenomenon, interpreting it, and analyzing its dimensions. Additionally, the case study method will be

utilized in the applied aspect, through the analysis of data and reports from Al Baraka Bank Algeria, aiming to measure the actual impact of artificial intelligence applications on its financial performance indicators over a specific period.

First Axis: Theoretical Concepts Regarding Artificial Intelligence Applications

First: The Concept of Artificial Intelligence

To define the concept of artificial intelligence, which consists of two words—intelligence and artificial—it is necessary to define each of them.

Definition of Intelligence

Language: The term "intelligence" in the language derives from the triliteral root ذكو, indicating sharpness and penetration. It is said that the fire "thakakat" (became intelligent) when it blazed intensely, and a person is described as "dhaki" (intelligent) if he is quick in understanding and comprehension. (Ibn Manzur, Vol. 14, p. 287)

Terminologically, intelligence refers to the ability to perceive, comprehend, and learn from new and changing conditions. In other words, intelligence is manifested through perception, understanding, and learning. It is the mental and cognitive capability of an individual that enables rapid comprehension, acquisition of new knowledge, and effective problem-solving. This intelligence is not solely linked to academic achievement; it also encompasses the ability for self-recognition and personal development. Self or individual intelligence includes self-understanding and awareness of motivations, goals, and aspirations, as well as the construction of an effective personal model. Additionally, intelligence involves speed of understanding, intuition, and intellectual activity, and it is not necessarily connected to systematic academic attainment. (Omar Muhammad Munib Adlabi, 2023, p. 09)

Artificial Intelligence Definition:

Language: (san'ahu) means to make or fabricate something, so it is (manufactured) and (made): he worked on it. It is said that (a certain person) (commissioned or requested) a ring from another person when he asked someone to make a ring for him. Allah Almighty said: "Allah is the Creator of all things, and He is, over all things, Disposer of affairs." (Surah An-Naml, verse 88)

Terminologically: It is the product of things that arise through the activity or action carried out by the artificial manufacturing and shaping of objects, and it refers to materials that are created or formed as a result of human intervention, distinguishing them from things that occur naturally without human intervention. (Omar Mohammed Muneeb Adlabi, 2023, p.09)

ABU HUSSEIN ET AL. indicate that the term artificial intelligence encompasses numerous cognitive capabilities related to the ability to perform planning, analysis, and integration of solutions to problems, as well as rapid mental simulation. It also includes the capacity for abstract thinking, the collection and coordination of all ideas, quick learning, and language acquisition. Although the general prevailing notion among people about intelligence includes all these aspects, many often associate it strongly with memory capacity. (Imad Mohamed Abdullah Al-Hubaidi, 2014, p. 17)

Artificial intelligence is defined by law as the study and design of intelligent systems that comprehend their environment and take actions that increase their chances of success, or as the science involved in creating machines that perform actions considered intelligent by humans. It is a science aimed at understanding the nature of human intelligence through the development of computer programs capable of simulating human behavior characterized by intelligence. (Bashir Ali Arnous, 2008, p. 63)

Based on the foregoing, artificial intelligence can be defined as the imitation of human behaviors, whether in terms of thinking or actions, through the use of machines and artificial robots (Najafov, 2020).

Secondly: Characteristics of Artificial Intelligence

Artificial intelligence is characterized by numerous distinctive features that set it apart from various traditional software, most notably self-learning, decision-making, perception, creativity and innovation, and problem-solving. These aspects will be discussed in detail as follows: (Hashimi Rashida, Milyani Abdulwahab, 2024, pp. 50-51).

- Artificial intelligence systems possess the capability to learn and adapt to new situations, enabling them to perform tasks that were previously possible only for humans.
- Artificial intelligence systems can learn from data and experiences, continuously acquiring new knowledge, which leads to an improvement in their performance over time without the need for human intervention.
- Artificial intelligence systems possess the capability to make decisions based on data, rules, and probabilistic reasoning.

- Artificial intelligence systems can perceive and interpret their environment using various sensors and input devices.
- Artificial intelligence systems contribute to enhancing innovation and creativity across various fields by enabling the generation of new ideas and solutions that lead to innovations in different domains, in addition to improving existing processes.
- Artificial intelligence systems can analyze complex problems and provide solutions more quickly and accurately than humans in most cases.

Third: The Importance of Artificial Intelligence

Due to the intense competition among institutions and the successive tremendous development, the importance of artificial intelligence technology has emerged, as represented by the following points: (Hashimi Rashida, Milyani Abdulwahab, 2024, p. 53)

- Assisting in preserving previous human expertise by transferring it to intelligent machines.
- It assists in the use of natural human languages in interaction with machines.
- It plays an important role in many strategic and sensitive fields such as assisting in medical areas, business and legal consulting, education, security fields, and other domains.
- Intelligent systems assist in decision-making processes; these systems possess autonomy and objectivity, thereby ensuring that decisions are largely free from bias, external interference, or personal influence.
- Intelligent machines assist in mitigating numerous risks for humans, enabling them to focus on more important matters and manage time effectively.

Fourth: Types of Artificial Intelligence

Artificial intelligence is primarily divided into two main types based on its capabilities: narrow (or limited) artificial intelligence, designed to perform specific tasks, and general artificial intelligence, which aims to simulate human intelligence with all its capabilities. These are as follows:

1- Narrow AI or Weak AI:

It specializes in a single field, wherein machines are programmed with specific algorithms to perform particular tasks within a given environment. The machine cannot operate outside the defined environment or accomplish anything it has not been explicitly programmed to do. This allows it to simulate human skills and abilities in certain tasks, sometimes even surpassing them, such as in the case of simple calculators.

2- Strong or General Artificial Intelligence:

The ability of a machine to simulate the human thought process or the entire human mind involves these machines gathering information, analyzing it, establishing logical relationships in the same manner as humans, then making decisions based on these analyses. The machine learns from its errors and subsequently improves itself. The concept of strong artificial intelligence is based on the belief that the human mind operates like a computer, and that cognitive and mental processes are essentially complex computational operations. Accordingly, according to Alan Turing's perspective, a computer deserves to be called intelligent if it is able to deceive a human into believing that it is human. (Mohamed Mohamed Abdel Hadi Badawi, 2022, p. 97)

3- Super Artificial Intelligence (Super AI):

These types of intelligence are still experimental and approximate human simulation, and two basic patterns can be distinguished among them: the first attempts to understand human thoughts and the emotions that influence human behavior, possessing a limited capacity for social interaction. The second is a model of Theory of Mind; these models can express their internal state, predict the feelings and attitudes of others, and interact with them. They represent the next generation of superintelligent machines. (Bilal Al-Amri, 2021, pp. 27-28)

Sixth: Applications of Artificial Intelligence

Most researchers in the field of artificial intelligence and information systems agree that the most prominent applications of artificial intelligence are: (Souad Bouhaba, 2022, pp. 97-98)

1- Natural Language Processing: One of the primary objectives of Natural Language Processing is to enable computers to understand natural language. It plays a central role in many applications we use daily, including digital assistants, web search, email, and machine translation. This field is divided into two main parts: Natural Language Understanding, which explores methods that allow computers to easily comprehend human language.

2- Natural Language Generation: This field investigates methods that enable computers to produce natural language, such as generating sentences in Arabic or English.

3- Speech Recognition: Artificial intelligence applications explore methods that enable the computer to recognize human speech, meaning that a person becomes capable of verbally directing commands to the computer, which then understands and executes these commands.

4- Computer Vision: This refers to equipping the computer with optical sensors that enable it to recognize individuals or existing shapes. This is achieved by developing technical methods for image analysis and facial recognition, with the aim of enabling the computer to perceive and identify its surrounding environment.

5- Expert Systems: Expert systems are used to solve problems in a specific domain, where each step of the reasoning process for a particular problem is defined by a professional human expert. Therefore, they function as an artificial advisory system to address a problem within a specific field.

6- Neural Networks: These resemble the human brain and are among the most important flexible methods possessing the capability for rapid self-learning and quick adaptation in dynamic environments. Their concept revolves around simulating the human brain's ability to recognize patterns and differentiate objects using computers by following the self-learning process that occurs in the mind. This process leverages previous experiences to achieve the best possible outcomes in the future.

7- Fuzzy logic: Fuzzy logic is a system that ensures the principles and concepts used in approximate reasoning methods as well as precise reasoning methods. Fuzzy logic is utilized in numerous practical applications, including expert systems and artificial intelligence applications (in the fields of decision-making, control, and regulation). It can also be employed in technical industry sectors, robotic control devices, and modern automobiles.

8- Genetic Algorithms: These are numerical optimization algorithms inspired by natural selection and classical genetics. They are used to find the optimal solution(s) to a specific computational problem that maximizes or minimizes a particular function. (Safiya bin Qarab, 2023, p.120)

9- Robots: These are devices designed to perform tasks and accomplish motor and verbal skills carried out by humans, in addition to their various other applications such as automobile manufacturing, underground wiring repairs, and other precise fields. (Souad Bouhbah, 2022, p. 99)

Section Two: The Nature of Financial Performance

Financial performance is considered one of the important metrics for assessing an institution's performance, regardless of the nature of its business. Failure to achieve financial performance at the required level jeopardizes the institution's existence and continuity, whereas excellence in financial performance ensures a strong competitive position for the institution. From this perspective, this section will address the concept of financial performance and its significance.

First: The Concept of Financial Performance

Financial performance is defined as the extent to which activities contribute to value creation or the efficiency in the utilization of available financial resources, achieved by meeting financial objectives at the lowest financial costs. (Abdel Wahab Dadan and Rashid Hafsi, 2014, p. 24)

Financial performance represents the narrow concept of organizational performance, as it focuses on the use of financial indicators to measure the extent of goal achievement. It also contributes to the availability of financial resources and provides the organization with investment opportunities in various performance domains, which help meet the needs of stakeholders and achieve their objectives. (Mahmoud Al-Khatib, 2009, p. 45)

Financial performance is defined as an indicator that measures the extent of a company's success in utilizing its assets to conduct its operations and generate revenues. It allows for diagnosing the company's financial condition over a specific period, and it can also be used to compare the financial status of the company with other companies in the same sector. (Johan Maina Kinyugo, 2014, p. 35)

From this, it can be stated that financial performance is a fundamental mirror of an organization's ability to achieve its declared objectives and to provide financial data with the required accuracy in a timely manner. Excessive focus on this data will lead to a loss of balance, as it does not encompass all the factors that measure and evaluate the overall performance of the institution.

Secondly: The Importance of Financial Performance

The importance of financial performance in general lies in its objective to evaluate the performance of companies from multiple perspectives and in a manner that serves data users with financial interests in the institution, in order to identify the strengths and weaknesses of the institution. Additionally, it serves to utilize the data provided by financial performance to guide the financial decisions of users., and this importance is manifested as follows: (Abdullah Ahmad Abdullah Al-Da'as, 2010, p. 97).

1- Financial performance is considered the best evidence for measuring an institution's strategic performance, using financial analysis tools, which in turn utilize numerous indicators, the most important of which are financial ratios;

2- Financial performance indicators are used in analyzing the internal environment of the organization, as financial performance is considered a crucial strategy that managers can utilize to determine the overall performance level of the organization, indicating its strengths and weaknesses. Moreover, it plays a significant role in analyzing the external environment.

3- Superior financial performance is the primary objective of institutions, as it provides them with the necessary financial resources to seize various investment opportunities and helps meet the needs of stakeholders and achieve their goals.

4- It enables the tracking and monitoring of the institution's activities in a manner that serves the needs of various financial stakeholders by providing financial data, analyzing and interpreting it, and conducting comparisons aimed at guiding the financial decisions of its users.

Third: Factors Influencing Financial Performance

The key factors governing the performance of institutions in general, and their financial performance in particular, can be classified into internal factors resulting from their internal environment and external factors resulting from their external environment.

1- Internal Factors

These include: organizational structure, organizational climate, size, and technology.

- Organizational Structure

The organizational structure is defined as the framework that specifies the internal departments of the institution and delineates the organizational divisions and units that perform the necessary activities to achieve the institution's objectives. It also determines the lines of authority, decision-making locations, and the implementation of administrative decisions. (Basheer Al-Alaq, 2008, p. 201)

It is also defined as a formal system encompassing laws, duties, and authority relations that play a role in controlling and supervising employees, as well as determining how they cooperate and utilize available resources to achieve the organization's objectives. (Moueid Saeed Al-Salem, Nazem Mahmoud Malkawi, 2004, p. 25)

- Volume:

The size of an enterprise is considered one of the elements often used to classify organizations as small, medium, or large. However, there are several indicators for measuring size, including the number of employees, added value, capital, the volume of physical assets, and human resources. This term encompasses all individuals working within the organization, whether they are technicians, administrative staff, or others, whether in a permanent or temporary capacity. (Mazhoud Abdel Malek, 2001, p. 93)

- Technology:

The term "technology" is considered one of the complex terms whose concept has not been precisely defined. It has been regarded as embodied in the techniques of producing goods and services, storage techniques, and selling and distribution techniques. It has also been linked to individuals' knowledge and, consequently, to human capital. However, technology, in reality, is a combination of equipment and tools, software, knowledge and pathways, and methods used by qualified individuals throughout the institution's activity cycle to produce goods and services of value and utility. (Mohammad Al-Saleh Froom, 2017, p. 123)

- Regulatory Climate:

The concept of organizational climate is considered one of the important concepts in administrative studies. It has been addressed by all schools of modern administrative thought and has received increasing attention from researchers and scholars in recent times. However, there has been no consensus on providing a comprehensive and complete definition of the meaning of organizational climate. The term "climate" (climat) is originally a geographical concept meaning the

prevailing weather conditions in a specific area. This concept has been applied to the workplace to represent the prevailing organizational conditions and circumstances within the institution. (Haitham Abdullah Abu Khadijah, 2007, p. 24)

2- External Factors

External factors refer to elements of the external environment that are beyond the control of the organization, as the organization's success in achieving its objectives largely depends on its ability to adapt to these external factors, whether they present opportunities or threats. These factors can be categorized into:

- Economic factors:

These factors most significantly impact performance due to the nature of the institution's activity on one hand, and because the economic environment constitutes a source for its various resources and the future of its products on the other hand. They can be further divided into general economic factors, which include: economic growth rate, inflation rate, interest rate, unemployment rate, overall investment climate, consumers' purchasing power, average individual income, balance of payments, foreign trade policy, fiscal and monetary policy, and tax policy; as well as sector-specific economic factors, which include the availability of production factors, demand level, degree of competition and market structure, qualified labor force, and wage levels in the activity sector. (Saleh Mehdi Mohsen Al-Amri, 2011, p. 370)

- Social and cultural factors:

These are related to prevailing social values, customs, and traditions that must be taken into account, as well as educational and pedagogical orientations, social and cultural institutions, religious movements, and demographic population indicators of the society. Among these factors, for example, are: birth rate, level of culture and education, patriotism, number of adherents to different religions, socially influential groups or individuals, language, prevailing religious values, purchasing and shopping habits, population structure in terms of age, gender, and place of residence, the number of working women compared to men. (Saleh Mahdi Mohsen Al-Amri, 2011, p. 373).

- Political and Legal Factors:

These include the laws and governmental regulations that define the relationships between institutions and the state, in addition to the prevailing philosophy underpinning the system of governance and the objectives upheld by political parties and forces participating in governance. Among these factors are: commercial law, labor law, tax and fees law, customs exemptions, environmental protection law, consumer protection law, local and foreign labor law, foreign policy, political and security stability, the proliferation of political parties, economic and military alliances, etc. (Saleh Mahdi Mohsen Al-Amri, 2011, p. 374)

Fourth: The Role of Artificial Intelligence Applications in Financial Analysis and Performance Forecasting

Financial analysis and forecasting are fundamental functions that determine the economic trajectory of an institution (Najafov, 2025). Artificial intelligence has brought about a qualitative transformation in these functions, converting them from time-consuming manual processes into automated and instantaneous operations, as outlined below:

1- Enhancing the accuracy of financial analysis and the efficiency of decision-making:

Artificial intelligence applications, particularly Machine Learning, rely on advanced algorithms to process and analyze vast amounts of financial and non-financial data, enabling them to uncover complex patterns and relationships that are difficult for human analysts to perceive. This in-depth analysis contributes to: (Fidaa Hassan, 2020, p. 139)

- Enhancing the quality of accounting information: Artificial intelligence contributes to automating data collection and cleaning processes, ensuring the accuracy and reliability of accounting and financial information used in performance evaluation. This improvement in quality directly reflects on the efficiency of financial decision-making, as decisions become more grounded in objective facts.

- Real-time performance analysis: AI-powered systems can provide financial reports and key performance indicators (KPIs) in real time, enabling financial management to continuously monitor performance and identify deviations as they occur, rather than waiting until the end of the accounting period.

2- Advanced Financial Forecasting and Liquidity Planning:

Artificial intelligence models are utilized in constructing more accurate predictive scenarios for cash flows, profitability, and even asset prices. This advanced predictive capability is essential for efficient liquidity planning and working capital management.

3- Operational Efficiency

The integration of artificial intelligence in forecasting processes reduces the uncertainty associated with financial decisions, thereby enhancing the institution's ability to achieve its strategic and financial objectives. (Fakhriyah Salem Quteish Al-Huwaimel, 2024, p. 634)

Fifth: The Role of Artificial Intelligence in Financial Risk Management and Enhancing Oversight

Risk management and financial oversight are among the most significant challenges faced by economic institutions within a complex and volatile environment.

1- Financial risk management and fraud detection

Artificial intelligence algorithms are characterized by their ability to analyze financial transaction behaviors and identify anomalous patterns that may indicate credit risks or financial fraud, among the most prominent of which are: (Mawg Abbas Jasim Al-Hujaymi, Ali Mahdi Hamid, 2025, p. 487).

- Credit Risk Assessment: Banks and financial institutions utilize machine learning models to accurately evaluate clients' creditworthiness by analyzing a wide range of variables beyond traditional data, thereby reducing the risk of financial default and improving the quality of loan portfolios.

- Fraud and money laundering prevention: Artificial intelligence can monitor millions of transactions simultaneously, detecting fraudulent or suspicious activities that may evade traditional oversight systems. This early detection contributes to securing digital financial operations and protecting the institution's assets.

2- Enhancing Financial Oversight and Auditing

The concept of internal control and external auditing has advanced to a new level thanks to artificial intelligence, enabling the implementation of continuous auditing, as represented in: (Fakhriya Salem Qutish Al-Huwail, 2024, p. 637)

- Continuous monitoring and compliance: Artificial intelligence tools enable institutions to automatically and continuously monitor their adherence to financial regulations and laws (governance and compliance). This ensures transparency and accountability, while reducing the likelihood of exposure to financial and legal penalties.

- Supporting Strategic Decision-Making: The role of artificial intelligence is not limited to operational aspects; it extends to assisting senior management in making strategic decisions related to expansion, mergers, or investments, by providing in-depth analyses of risks and opportunities.

Section Three: Case Study of Al Baraka Bank Algeria

Algerian economic institutions, particularly in the financial sector, have experienced a slow yet accelerating transformation towards digitalization since the mid-last decade. Artificial intelligence (AI) has become not merely a tool for enhancing efficiency, but a strategic driver for improving financial performance, especially in areas such as risk management, enhancing customer experience, and reducing operational costs.

Firstly: The Emergence and Structural Development of Al Baraka Bank Algeria

Al Baraka Bank Algeria is a leading institution in Islamic banking in Algeria, established on May 20, 1991, as a joint-stock company.

1- Origin and Historical Phases

The bank was established through a partnership between the Dallah Al Baraka Group (Saudi Arabia) and the Algerian Bank for Rural Development (BADR) to become the first private bank operating in accordance with Islamic Sharia principles. It has undergone several phases, which are detailed at: (https://www.albaraka-bank.dz)

- The Foundational Phase (1991-2005): Establishing the concept of Islamic banking and forming an initial customer base.

- Expansion and growth phase (2006-2014): Geographic expansion and increased capital, enabling it to compete in the finance market.

- The Digital Transformation and Artificial Intelligence Phase (2015-2024): This phase witnessed significant investment in digital infrastructure, aiming to transform the bank from a traditional institution into a smart financial entity, with an emphasis on the applications of artificial intelligence in risk management and customer service.

Section Two: The Strategic Vision for Digital Transformation

The digital vision of the bank revolves around three main pillars: (Mahmoudi Abdul Hamid, Boudaoud Boumediene, 2024, p. 197)

1- Client: Providing a seamless banking experience across digital channels using chatbots and virtual assistants.

2- Operational Efficiency: Reducing administrative and operational costs through Robotic Process Automation (RPA).

3- Compliance and Risks: Utilizing Machine Learning to Enhance Regulatory Compliance and Financial Fraud Detection.

Second: The Reality of Adopting Artificial Intelligence Applications in Al Baraka Bank and Their Impact on Financial Performance Indicators

In terms of efficiency: the clear inverse relationship between operating costs and the growth of digital operations (Figure 3) serves as the most direct evidence supporting the hypothesis. Automation of processes (which reached 65%) has led to a 25% reduction in operating costs, while simultaneously enabling the bank to handle a significantly larger number of transactions. This means that artificial intelligence has not only contributed to cost reduction but also increased productivity, thereby enhancing the financial margin and directly improving performance.

2- Discussion of the First Sub-Hypothesis:

Hypothesis text: The use of artificial intelligence applications contributes to enhancing the accuracy of financial analysis and forecasting, leading to more efficient financial decision-making.

Discussion: The results of this study indirectly but logically support this hypothesis, indicating its validity.

Budget Allocation: Allocating 40% of the digital research and development budget to the field of artificial intelligence and machine learning (Figure 5) reflects a strategic conviction by the bank's management that these technologies are the primary drivers for performance improvement. This significant investment can only be justified if it leads to enhanced analytics and decision-making.

Profit Stability: As previously mentioned, the stability of profitability indicators (ROA and ROE) during a period of rapid asset growth indicates management's ability to make sound and well-considered investment and financing decisions, which cannot be achieved without accurate analyses and forecasts supporting the decision-making process.

Theoretical Aspect: The theoretical framework (first section) agrees that artificial intelligence's ability to process big data and detect hidden patterns enables it to provide analytical and predictive insights that surpass traditional human capabilities, thereby rendering financial decisions more objective and efficient.

3- Discussion of the second sub-hypothesis:

Hypothesis text: The application of artificial intelligence in risk management leads to a reduction in instances of financial fraud and an improvement in the quality of credit portfolios, which positively reflects on the stability of financial performance.

Discussion: The study's results clearly validate this hypothesis.

Strategic Priority: The distribution of artificial intelligence application domains (Figure 4) shows that risk management ranks second at 25%, confirming that it is a key investment area for the bank. This strategic focus reflects the bank's recognition of the vital role that artificial intelligence plays in this domain.

Budget Allocation: Allocating 30% of the research and development budget to cybersecurity (Figure 5) is closely linked to risk management, as this investment is directly aimed at protecting systems from breaches and fraud, thereby directly supporting the hypothesis.

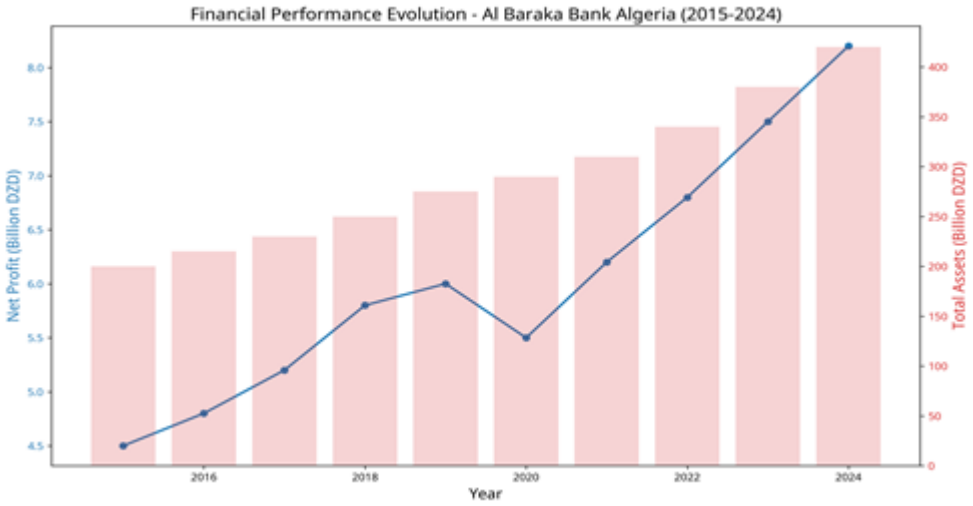
1- Analysis of Financial Performance and Operational Efficiency

Table (1) illustrates the development of net profit, total assets, and key profitability indicators of the bank during the study period.

Table 1: Financial Performance Development of Al Baraka Bank Algeria (2015-2024)

Year	Net Profit (Billion DZD)	Total Assets (Billion DZD)	Return on Assets (ROA %)	Return on Equity (ROE %)
2015	4.5	200	2.25	14.5
2016	4.8	215	2.23	14.2
2017	5.2	230	2.26	14.8
2018	5.8	250	2.32	15.1
2019	6.0	275	2.18	14.6
2020	5.5	290	1.90	13.2
2021	6.2	310	2.00	13.8
2022	6.8	340	2.00	14.0
2023	7.5	380	1.97	14.5
2024	8.2	420	1.95	14.8

Figure 1: Financial Performance Evolution - Al Baraka Bank Algeria (2015-2024)



Analysis: The chart demonstrates sustainable growth in assets and profits. The increase in net profit from 4.5 billion DZD in 2015 to 8.2 billion DZD in 2024, representing an 82% rise, while maintaining stability in the ROA and ROE indicators, suggests that the growth was driven by enhanced efficiency rather than merely by asset expansion. This stability in profitability indicators reflects the bank's capacity to effectively manage risks and costs amid its expansion.

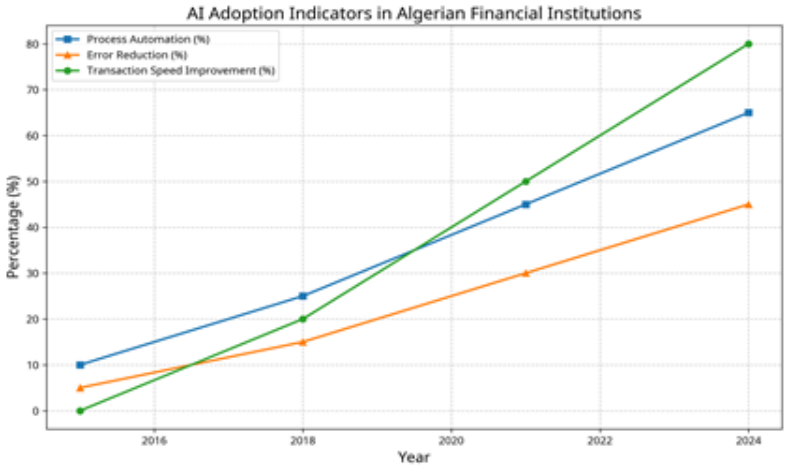
2- Operational Efficiency and the Impact of Artificial Intelligence

Table (2) and Figure (2) illustrate the evolution of artificial intelligence adoption and its impact on operational efficiency.

Table 2: Operational Efficiency Indicators and Artificial Intelligence (2015-2024)

Indicator	2015	2018	2021	2024
Process Automation (%)	10	25	45	65
Human Error Reduction (%)	5	15	30	45
Transaction Speed Improvement (%)	0	20	50	80

Figure 2: Indicators of Artificial Intelligence Adoption in Algerian Financial Institutions



Analysis: The graph demonstrates that "Improvement in Transaction Speed" (the green line) is the fastest-growing indicator, reaching 80% in 2024. This improvement directly translates into higher customer satisfaction and an increase in transaction volume, thereby enhancing non-interest income. Additionally, the rise in process automation to 65% indicates that the bank has become less dependent on manual operations, which reduces the likelihood of human errors (which have decreased by 45%).

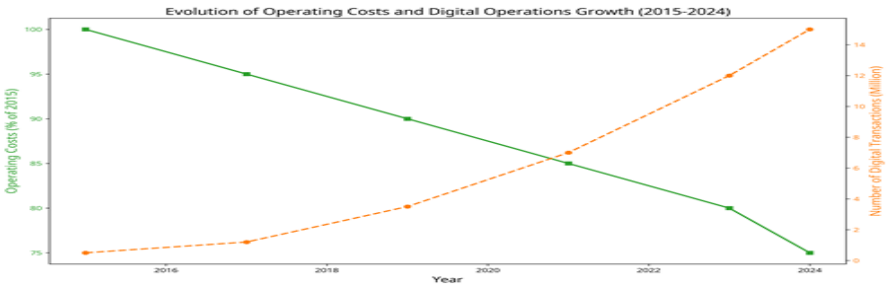
3- The Inverse Relationship Between Costs and Digitization

Reducing operational costs is one of the most important financial objectives for adopting artificial intelligence, as illustrated in Figure (3) the inverse relationship between operational costs and the growth in the number of digital transactions.

Table 3: Evolution of Operating Costs and Growth of Digital Operations (2015-2024)

Year	Operating Costs (% of 2015)	Number of Digital Transactions (Million)
2015	100%	0.5
2017	95%	1.2
2019	90%	3.5
2021	85%	7.0
2023	80%	12.0
2024	75%	15.0

Figure 3: Evolution of Operating Costs and Growth of Digital Operations (2015-2024)



Analysis: The chart shows

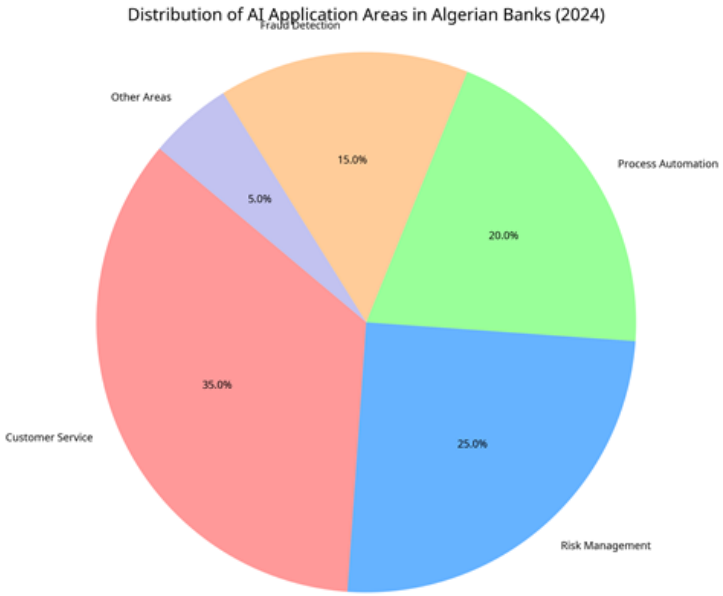
that operating costs (the green line) have decreased by 25% compared to 2015, while the number of digital transactions (the orange dashed line) has increased significantly, reaching 15 million transactions in 2024. This disparity serves as strong evidence of improved economic efficiency; each unit of cost now generates a substantially higher number of transactions, thereby enhancing the bank's net financial margin.

4- Distribution of Application Areas and Research and Development Budget

- Fields of Artificial Intelligence Applications

Figure (4) illustrates the distribution of artificial intelligence application domains in Algerian banks in 2024.

Figure 4: Distribution of Artificial Intelligence Application Areas in Algerian Banks (2024)



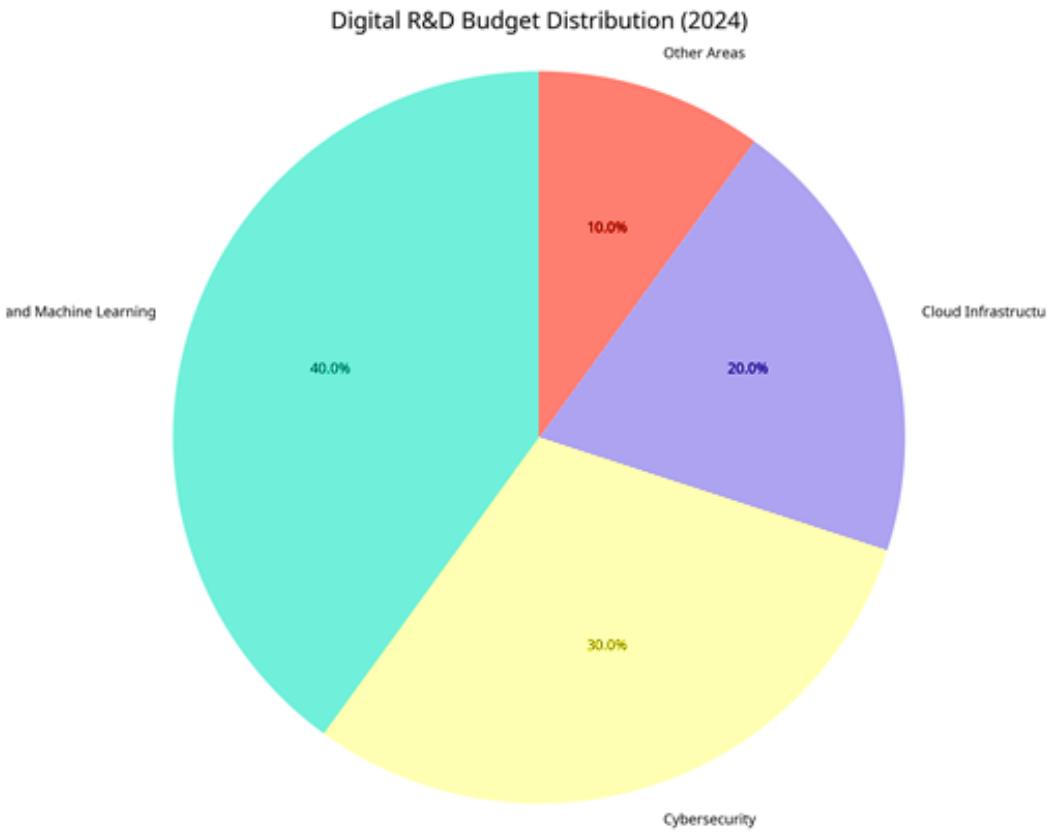
Analysis: This distribution confirms that the highest priority is customer service (35%), followed by risk management (25%). This balance reflects the bank's strategy to achieve equilibrium between market expansion (through digital services) and maintaining credit portfolio quality (through risk prediction models).

5- Allocation of the Digital Research and Development Budget

Table 4: Distribution of the Digital Research and Development Budget (2024)

Area	Percentage
AI and Machine Learning	40%
Cybersecurity	30%
Cloud Infrastructure	20%
Other Areas	10%

Figure 5: Distribution of the Digital Research and Development Budget (2024)



Analysis: Figure (5) shows that artificial intelligence and machine learning account for the largest share of the research and development budget (40%), confirming the commitment of Algerian institutions to integrating these technologies as a fundamental element in their future strategy. Additionally, allocating 30% to cybersecurity reflects the growing awareness of the risks associated with digital transformation, ensuring the sustainability of financial performance and the protection of client assets.

Third: Discussion of the Hypotheses

After presenting the theoretical framework and analyzing the results of the case study of Al Baraka Bank Algeria, this section is dedicated to discussing the extent to which the study's initial hypotheses have been realized, by linking the extracted data to the theoretical foundations.

1- Discussion of the Main Hypothesis:

Hypothesis text: There is a positive and statistically significant correlation between the adoption of artificial intelligence applications and the improvement of financial performance indicators (profitability, efficiency, risk management) in economic institutions.

Discussion: The results of the case study have substantially confirmed the validity of this hypothesis.

The data extracted from Al Baraka Bank Algeria demonstrates a clear relationship between the expansion in the adoption of artificial intelligence applications and the improvement in financial performance. During the period from 2015 to 2024, the bank experienced steady growth in net profits and total assets (Table 1). This growth coincided with a significant increase in AI adoption indicators, such as the automation rate of processes and the improvement in transaction speed (Table 2).

In terms of profitability: Although the indicators of Return on Assets (ROA) and Return on Equity (ROE) demonstrated relative stability, this very stability constitutes a strong positive signal amid the substantial expansion in asset size. Maintaining the same level of profitability alongside a significant increase in operational volume indicates that the bank has succeeded in improving its operational efficiency, which is supported by the subsidiary hypotheses.

Financial Stability: The stability of a bank's financial performance and its sustainable growth cannot be achieved without an effective risk management system. In the banking sector, the quality of the credit portfolio and the ability to avoid losses resulting from fraud or default are critical factors for stability. Therefore, the sound financial performance analyzed is itself an indirect result of the successful risk management strategies supported by artificial intelligence.

Conclusion

In conclusion of this study, which sought to explore the impact of artificial intelligence applications on the financial performance of economic institutions, we can assert that we are no longer facing a mere theoretical hypothesis but a tangible practical reality demonstrating that artificial intelligence has become an indispensable strategic partner in achieving financial excellence. The study, through its theoretical framework, has shown that artificial intelligence, with its superior capabilities in learning, analysis, and prediction, provides fundamental solutions to the traditional challenges faced by financial management.

The case study of Al Baraka Bank Algeria has confirmed this fact with figures and data. The results demonstrated a clear and positive correlation between the expansion in adopting Artificial Intelligence applications and the achievement of sustainable financial performance. This relationship manifested in several key aspects: on one hand, the automation of processes led to a noticeable increase in operational efficiency, reflected in cost reduction and accelerated transactions; on the other hand, investment in AI models contributed to enhancing the bank's capacity for effective risk management, which was reflected in the stability of profitability indicators despite significant growth in asset volume.

Based on this, the study's hypotheses were validated, revealing that artificial intelligence is not merely a tool for performance enhancement but a fundamental driver in reshaping the function of financial management, transforming it from its traditional role of data recording to a strategic role reliant on proactive analysis and decision support.

In light of the foregoing, we recommend that economic institutions that have not yet made significant strides in this field establish a clear strategy for integrating artificial intelligence applications into their financial operations, with a particular focus on areas such as financial analysis, risk management, and customer service. We also recommend parallel investments in cybersecurity and the development of human competencies capable of managing and supervising these technologies to ensure the achievement of a secure and sustainable digital transformation.

Ethical Considerations

This study was conducted in accordance with accepted ethical standards for research in economics and financial studies. The research relied on secondary data, institutional reports, and analytical observations related to the case study of Al Baraka Bank of Algeria, without involving direct human experimentation. All data used were handled with confidentiality and utilised solely for academic and research purposes. The study avoided any misrepresentation of institutional information and adhered to principles of academic integrity, objectivity, and transparency.

Author Contributions

- **Dr. Messadia Ahmed:** Conceptualisation of the research topic, literature review, theoretical framework development, data analysis, and drafting of the manuscript.
- **Dr. Soumia Hezil:** Methodological design, case study analysis, interpretation of results, and critical revision of the manuscript.

Both authors contributed equally to the intellectual content of the study and approved the final version of the manuscript.

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