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AI and Sustainability in Islamic Banks: Crafting innovative solutions for major challenges

L'IA et la durabilité des opérations bancaires islamiques : Une alchimie innovante face aux défis majeurs

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Abstract

Sustainability is now a major issue for the Islamic banking sector, encompassing responsible economic, environmental, and social practices, such as integrating ESG criteria, reducing the ecological footprint, and promoting financial inclusion. Artificial intelligence (AI), through technologies such as machine learning and chatbots, offers opportunities to optimize the efficiency of Islamic banking operations and provide personalized services. However, its integration into Islamic banks presents specific challenges related to compliance with Sharia principles, which prohibit interest and exclude certain investments. This study, based on a systematic literature review, examines how AI could enhance the sustainability of Islamic banking operations while respecting their principles, identifying technological and organizational challenges, and exploring solutions for effective AI integration. The results indicate that although AI can improve sustainability, its adoption requires adaptation to Islamic principles and careful management of the associated challenges.

Keywords: Sustainability, AI, Islamic banks, challenges, opportunities and perspectives
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1. Introduction

Sustainability is a key concept in modern banking, referring to the ability of financial institutions to integrate economically, environmentally and socially responsible practices (Scholtens, 2006). Sustainability in banking is manifested through initiatives aimed at reducing the ecological footprint of banking activities, promoting financial inclusion, and ensuring long-term economic stability (Nguyen & Simkin, 2020). These practices encompass the integration of environmental, social and governance (ESG) criteria into banks' decision-making processes and investment strategies (Sullivan & Mackenzie, 2017). For example, many banks implement green financing policies, reduce energy consumption and support social projects aimed at improving the living conditions of local communities (Meyer, 2017).

Artificial intelligence (AI) is playing an increasingly central role in banking, transforming operations through innovative technologies like machine learning, predictive analytics, and natural language processing systems (Jouini et al., 2022). AI enables financial institutions to improve operational efficiency, optimize decision-making processes, and provide personalized services on a broader scale (Kumar & Garg, 2021). For example, machine learning algorithms are used to detect fraud, automate compliance processes, and improve risk management (Feng et al., 2019). Additionally, AI-based chatbots and virtual assistants provide 24/7 banking services, meeting customer needs quickly and efficiently (Chung et al., 2020).

Islamic banks are distinguished from conventional banks by their strict adherence to the principles of Islamic finance, which are based on values such as the prohibition of interest (riba), the need to share risks between parties, and the prohibition of investments in activities deemed haram, such as gambling or alcohol (Iqbal & Mirakhor, 2011). These principles require banking operations to be Sharia compliant, which can sometimes be a barrier to the adoption of new technologies like AI (Khan, 2018). Islamic banks face unique challenges, including the need to maintain rigorous compliance with Islamic standards while adopting modern technologies to improve the efficiency and environmental impact of their operations (Ahmed, 2020).

Thus, although AI offers significant opportunities to improve the sustainability of banking operations, its integration in the specific context of Islamic banks presents particular challenges. Exploring these challenges and the prospects offered by AI to strengthen sustainability in the Islamic banking sector is essential to understand how these institutions can evolve in a modern financial environment while respecting Sharia principles.

AI is recognized as a strategic lever to improve the efficiency and impact of operations in various sectors, including the banking sector (Jouini et al., 2022). However, the application of these technologies in the specific context of Islamic banks is still in an exploratory phase, especially regarding their ability to promote sustainability (Kumar & Garg, 2021).

Islamic banks are governed by strict Sharia principles (Iqbal & Mirakhor, 2011). These principles impose a particular regulatory and ethical framework that can limit the integration of modern technologies such as AI. Therefore, it is crucial to explore how AI could be aligned with these principles while contributing to sustainability goals, such as reducing the environmental impact of banking operations and promoting financial inclusion (Ahmed, 2020). Furthermore, there is a gap in the literature regarding specific applications of AI in Islamic banks to improve their sustainability, which warrants further exploration of this topic (Khan, 2023). This study seeks to understand how AI could be integrated in a way that respects Sharia principles while addressing current sustainability challenges.

Hence, our problem can be formulated as follows:

"***How could artificial intelligence (AI) be effectively integrated to contribute to the sustainability of Islamic banking operations, while overcoming technological and organizational challenges, ensuring compliance with Sharia principles, and maximizing opportunities for increased sustainability? »***

The objectives of the study are to define and analyze the challenges and prospects associated with the integration of AI in the Islamic banking sector to improve sustainability. These objectives are as follows:

- Identify the technological and organizational challenges related to the adoption of AI in Islamic banks.
- Examine how AI can be compliant with Shariah principles in the Islamic banking context.
- Analyze the opportunities offered by AI to improve the sustainability of Islamic banking operations.
- Formulate recommendations for optimal integration of AI in Moroccan Islamic banks in order to promote sustainability.

To answer our problem, a documentary analysis was chosen as the main research method for several reasons. First, the field of the impact of artificial intelligence (AI) on the sustainability of Islamic banks is new and evolving, requiring an exploratory approach to examine emerging concepts and current trends (Green & Thorogood, 2018). Additionally, the abundant availability of academic and professional sources on AI in banking and Islamic finance allows for a comprehensive analysis of trends, challenges, and opportunities (Snyder, 2019). This method also helps to highlight current theoretical and practical concepts, by identifying existing theoretical models and best practices (Hancock & Algozzine, 2017). It also provides the opportunity to critique previous research to assess the quality of the data and identify gaps in the current literature (Boote & Beile, 2005). Finally, the literature review is perfectly aligned with the objectives of the study, allowing to explore the challenges and opportunities of AI to improve sustainability in Islamic banks, while proposing practical recommendations based on a synthesis of the data available (Kmet, Lee, & Cook, 2004).

To better understand how artificial intelligence can strengthen sustainability in the Islamic banking sector, this article will focus on several axes. First, we will examine emerging technological innovations in AI and their potential for Islamic finance, highlighting successful case studies of AI integration. Next, we will analyze the impacts of AI on operational efficiency and cost reduction in Islamic banks. We will also discuss AI's contributions to social and environmental responsibility, particularly through green initiatives and financial inclusion. Finally, we will discuss specific challenges to AI adoption in Islamic banks, exploring ways to overcome these obstacles while respecting Sharia principles.

2. Conceptual framework:

2-1- Revolutionizing banking operations: Towards a sustainable future

Sustainability in banking is a multidimensional concept that encompasses three main dimensions: environmental, social and economic. These dimensions reflect the commitment of financial institutions to promote sustainable development in their operations and investments (Scholtens,2006). It includes three key dimensions:

• **Environmental Dimension:** The environmental dimension of sustainability concerns the impact of banking operations on the environment. Sustainable practices include reducing carbon emissions, managing waste, and optimizing energy consumption (Bishop, 2019). Banks are implementing green financing policies, supporting renewable energy projects, and adopting internal practices such as reducing their carbon footprint (Gibson, 2019). For example, the World Bank has developed initiatives such as green bonds to finance projects with a positive impact on the environment (World Bank, 2020).

• **Social Dimension:** The social dimension of sustainability encompasses the efforts of banks to contribute to the well-being of communities and promote financial inclusion. This includes initiatives such as financing social projects, supporting small and medium-sized enterprises (SMEs), and improving access to financial services for disadvantaged populations (Meyer,

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2017). Banks also engage in corporate social responsibility (CSR) programs to improve the living conditions of local communities (Sullivan & Mackenzie, 2017).

• **Economic Dimension:** The economic dimension of sustainability concerns financial stability and long-term value creation. Practices include prudently managing financial risks, improving operational efficiency, and supporting stable economic growth (Zadek, 2004). Banks adopt strategies to ensure resilience in the face of economic crises and maximize returns while balancing the needs of stakeholders (Scholtens, 2008).

2-2-Theoretical review

-Maqasid al-Shariah and Islamic finance: The foundation of Islamic finance lies in the principles of Maqasid al-Shariah, which seeks to achieve the overall well-being of society by protecting faith, life, intellect, progeny, and wealth. These objectives guide the development and application of financial products in Islamic finance, ensuring that they contribute to the social and economic welfare of the community. This theory aligns closely with the concept of sustainability, which also aims to balance economic growth, social inclusion, and environmental protection. The Maqasid al-Shariah framework supports the integration of Environmental, Social, and Governance (ESG) criteria in Islamic finance, promoting responsible investment practices that avoid harm and contribute to societal welfare (Chapra, 2008).

- Risk sharing and Islamic finance: Islamic finance operates on the principle of risk-sharing, which contrasts with the risk-transfer mechanisms predominant in conventional finance. Risk-sharing mechanisms such as Mudarabah (profit-sharing) and Musharakah (partnership) not only comply with Sharia principles but also promote financial inclusion and social equity. By sharing risks and rewards among all parties involved, Islamic finance fosters a more just and equitable financial system. This risk-sharing principle supports sustainable development by encouraging investments in socially responsible projects that contribute to long-term community well-being (Mirakhor & Iqbal, 2012).

- The theory of social responsibility in Islamic finance: Islamic finance inherently incorporates social responsibility, emphasizing the ethical and moral dimensions of financial transactions. This includes the prohibition of interest (riba) and investments in harmful or unethical activities (haram). The theory of social responsibility in Islamic finance is closely related to the concept of sustainability, as it mandates financial practices that benefit society as a whole. This theoretical perspective encourages investments in projects that align with sustainable development goals, such as renewable energy, affordable housing, and infrastructure development, all of which contribute to the betterment of society (Dusuki & Abdullah, 2007).

- Stakeholder theory in Islamic finance: Stakeholder theory, as applied in Islamic finance, emphasizes the importance of considering the interests of all stakeholders, including shareholders, employees, customers, and the broader community. This holistic approach aligns with the principles of Sharia, which advocate for fairness and justice in all dealings. Stakeholder theory in Islamic finance promotes transparency, accountability, and ethical governance, which are essential for achieving sustainable development. By prioritizing the well-being of all stakeholders, Islamic financial institutions can contribute to a more sustainable and equitable economy (Freeman, 1984; Hassan & Lewis, 2007).

2-3- Artificial intelligence in the banking sector:

The applications of artificial intelligence (AI) in banking are vast and varied, with technologies like machine learning, predictive analytics and chatbots playing essential roles. Machine learning (ML) is used to create predictive models by analyzing large amounts of data to make predictions or detect anomalies (Davenport & Ronanki, 2018). For example, ML helps detect

fraud by identifying suspicious transactions in real time by analyzing atypical behavior patterns (Nobani et al., 2022). It is also used for risk management by assessing credit risks and for investment optimization by designing optimal investment portfolios (Cox & Vukina, 2020; Krauss et al., 2017).
Predictive analytics is another application of AI that uses statistical models and algorithms to anticipate future events based on historical data (Jablecki et al., 2018). This technology allows banks to predict customer behaviors and anticipate financial crises by identifying early signals of problematic economic trends (Kira et al., 2020; Bollerslev et al., 2021).
Finally, chatbots and virtual assistants use natural language processing (NLP) technologies to interact with customers and provide automated services (Gnewuch et al., 2017). They provide 24/7 automated customer service, improve customer experience through personalized interactions, and efficiently manage service requests (Liu et al., 2021; Xu et al., 2019).

2-4- Islamic finance: Compliance with Sharia law, prohibition of interest, and promotion of equity:

Islamic finance is based on ethical and legal principles established by Sharia law, which aims to guarantee justice and fairness in financial transactions. A fundamental aspect is the prohibition of interest (riba), considered unfair and exploitative. Financial transactions must therefore be based on the sharing of risks and profits, which implies the design of financial products consistent with these principles (El-Gamal, 2006; Ayub, 2007). For example, structures like Mudarabah and Musharakah promote partnerships where profits and losses are shared equitably between the parties involved (Khan & Ahmed, 2001).
The prohibition of interest (riba) is at the heart of Islamic finance, requiring financial institutions to develop products and services that do not generate interest. Instead, Islamic banks focus on risk and profit-sharing mechanisms (Saeed, 1999). This not only respects Islamic principles but also encourages a more equitable relationship between lenders and borrowers, thereby reducing the risk of over-indebtedness and exploitation.
Better yet, Islamic finance aims to promote economic and social equity. Islamic financial institutions are required to contribute to economic development while respecting ethical principles of justice and equity (Wilson, 2012). This includes prohibiting investment in non-Sharia-compliant sectors, such as those related to alcohol, tobacco and gambling (Ahmed, 2020). By adhering to these principles, Islamic finance seeks to create a more just and balanced financial system, promoting the well-being of society as a whole.

2-5- Potential applications of AI in Islamic banks:

Artificial intelligence (AI) offers varied potential applications in Islamic banks, including risk management, process optimization and improving customer experience. In risk management, AI can develop Shariah-compliant credit scoring models based on merit and repayment capacity criteria and analyze market risks to monitor fluctuations in asset prices (Ariff and al., 2018; For process optimization, AI enables the automation of banking operations, reducing costs and improving efficiency, as well as the design of innovative financial products respecting Islamic principles (Grewal et al., 2017; Choudhury, 2017). Finally, for customer experience, AI technologies such as chatbots and recommendation systems can provide personalized services, effectively meeting customer needs (Gnewuch et al., 2017).
2-6- What about Moroccan Islamic banks?
Islamic banks in Morocco, known locally as "participatory banks," operate under a unique framework that combines the principles of Islamic finance with the regulatory requirements of the Moroccan financial system. These banks adhere strictly to Sharia law, which prohibits interest (riba), excessive uncertainty (gharar), and investments in certain prohibited (haram) industries, such as alcohol and gambling. Instead, they engage in profit-and-loss sharing

arrangements, mark-up-based sales (Murabaha), leasing (Ijara), and partnership structures (Musharaka and Mudaraba) that comply with Islamic law.
The particularity of Islamic banks in Morocco lies in their recent establishment and the specific legal and regulatory environment shaped by the country's dual banking system. The Moroccan government, recognizing the growing demand for Sharia-compliant financial products, introduced a dedicated regulatory framework with the Banking Law No. 103-12 in 2015. This law formalized the operation of Islamic banks in the country and established the Sharia Committee for Participatory Finance (SCFP), which ensures that all financial products and services offered by these banks are in compliance with Sharia principles.
Moreover, the Moroccan Islamic banking sector is characterized by its strong emphasis on financial inclusion and its role in supporting economic development. Islamic banks in Morocco aim to provide ethical financial solutions that cater to a broader segment of the population, including those who may have been previously excluded from the conventional banking system due to religious beliefs. They also play a significant role in financing small and medium-sized enterprises (SMEs), which are critical to Morocco's economic growth.
Despite these opportunities, Islamic banks in Morocco face several challenges, including the need for greater public awareness and understanding of Islamic finance principles, competition with well-established conventional banks, and the necessity of developing a broader range of Sharia-compliant financial products. Furthermore, the integration of modern financial technologies, such as artificial intelligence (AI), into the operations of Moroccan Islamic banks requires careful consideration to ensure that these innovations align with Sharia principles and contribute to the sector's sustainability.

3- Synergy between artificial intelligence, sustainability and Islamic finance: What alchemy?

The integration of artificial intelligence (AI) in the financial sector offers significant opportunities to promote sustainability, particularly in the context of Islamic finance. Islamic finance, based on principles of social justice, interest prohibition and risk sharing, presents a unique framework where AI can be used to improve sustainability (Iqbal & Mirakhor, 2011).
AI, as a cutting-edge technology, helps optimize banking processes, reduce operational costs and improve the efficiency of financial services. For example, machine learning (ML) can be used for fraud detection, risk management, and investment optimization (Davenport & Ronanki, 2018; Nobani et al., 2022). These applications not only contribute to financial stability, but also social responsibility by ensuring secure and transparent transactions.
Additionally, predictive analytics helps anticipate customer behaviors and potential financial crises, thus providing proactive solutions to maintain economic stability (Jablecki et al., 2018; Bollerslev et al., 2021). Chatbots and virtual assistants, by improving customer experience and providing automated service, reduce the need for physical interactions, thereby decreasing the carbon footprint of banks (Liu et al., 2021; Xu et al., 2019).
However, integrating AI into Islamic finance also presents challenges. Compliance with Sharia principles requires careful adaptation of AI technologies to ensure they comply with interest prohibitions and risk-sharing requirements (Ahmed, 2020). Data quality and the complexity of AI systems represent major technical obstacles, while organizational challenges include staff training and change management (Hancock & Algozzine, 2017; Snyder, 2019).
In sum, the alchemy between AI, sustainability and Islamic finance lies in the ability to integrate these technologies ethically and efficiently, maximizing benefits while respecting Islamic principles and overcoming associated challenges.

4- Analysis of AI challenges for sustainability in Islamic banks

The integration of artificial intelligence (AI) into Islamic banks represents a major opportunity to improve the sustainability of financial operations, but it comes with significant technical, regulatory and organizational challenges.

- **Technical Challenges**

The first major technical challenge is the complexity of AI systems, including integrating, maintaining and updating technologies. Integrating AI systems with existing banking infrastructures requires careful adaptation of technologies to existing architectures and management of dependencies between different software systems (Huang et al., 2017; Davenport, 2018). Furthermore, the maintenance of AI algorithms and models requires specialized technical resources to ensure their continued effectiveness and regular updating (Amershi et al., 2019). Data quality, essential for the performance of AI systems, also presents a challenge: banks must ensure the availability and accuracy of financial data to train effective models, which involves significant efforts for collection, management, and data quality assurance (Jouini et al., 2021; Bollier, 2019; Kwon et al., 2020).

- **Regulatory Challenges**

Regulatory challenges center on compliance with Sharia rules and the requirements of financial regulations. Ensuring that AI technologies respect Islamic principles is complex, requiring adjustments to algorithms to ensure practices consistent with justice and Sharia ethics (Siddiqui, 2021). Additionally, banks must collaborate with Sharia committees to supervise and verify the compliance of AI solutions, which can slow down the implementation process (Ali et al., 2018). At the same time, banks must comply with current regulatory standards in terms of transparency, security, and data protection, while aligning with global financial regulations and specific to Islamic banks (Arner et al., 2020; Zhao et al., 2021). Regulators must also develop regulatory frameworks adapted to new AI technologies to protect consumers and maintain the integrity of the financial market (Bertoldi et al., 2022).

- **Organizational Challenges**

From an organizational perspective, employee resistance to change and the need for adequate training are crucial challenges. Employees may face resistance to adopting new technologies, fueled by fear of the unknown or concerns about job security, requiring effective change management (Kotter, 1996). It is also imperative to provide appropriate training to employees so that they can work effectively with new AI technologies and understand their impact on their functions and processes (Bersin, 2019).
Although AI can offer innovative solutions to improve sustainability in Islamic banks, its adoption requires rigorous management of technical, regulatory and organizational challenges to achieve this transformation.

5- Perspectives of AI to improve sustainability in Islamic banks

The introduction of artificial intelligence (AI) in Islamic banks is not limited to managing current challenges, but also opens promising prospects for improving the sustainability of banking operations. This section explores the opportunities offered by emerging AI technologies and their potential impacts on sustainability in the Islamic finance sector.

- **Technological opportunities**

AI technologies offer several key innovations that can transform Islamic finance. Machine learning algorithms, such as deep neural networks and random forests, enable the development of sophisticated predictive models for risk management and fraud detection, while adapting to Shariah principles to optimize asset portfolios. investment and predict market trends (LeCun et al., 2015; Goodfellow et al., 2016). Furthermore, blockchain has significant potential to strengthen the transparency and traceability of financial transactions in Islamic finance. Smart contracts can automate financial processes such as Mudarabah and Musharakah systems, ensuring compliance with Islamic principles (Catalini & Gans, 2016; Tapscott & Tapscott, 2016). In addition, Robotic Process Automation (RPA), by automating repetitive administrative tasks, improves operational efficiency and reduces costs (Aguirre & Rodriguez, 2017).

- **Examples of best practices**

Best practice examples illustrate how AI can be successfully integrated into Islamic banks. For example, Al Baraka Banking Group uses machine learning algorithms to strengthen credit risk management and improve fraud detection, while respecting Sharia principles (Al-Saleh, 2018). Similarly, Dubai Islamic Bank has integrated AI-powered chatbots to offer enhanced customer service, accessible 24/7, and in line with the principles of Islamic finance (Siddiqui, 2020).

- **Benefits for Sustainability**

AI plays a crucial role in improving the sustainability of Islamic banking operations. In terms of operational efficiency, AI technologies enable increased automation of tasks, optimization of processes and reduction of human errors, resulting in better management of banking operations and lower costs (Davenport & Ronanki , 2018). For example, AI can automate the assessment of credit applications, reducing the associated time and costs (Bock et al., 2018). Regarding social and environmental responsibility, AI contributes to ecological initiatives by optimizing the energy management of banking infrastructures and reducing the carbon footprint of operations (Hazen et al., 2014). Additionally, AI facilitates financial inclusion by providing accessible services to unbanked or underbanked populations, notably through mobile Islamic banking applications that serve remote or disadvantaged regions (Gomber et al., 2018).
Ultimately, AI offers significant opportunities to improve sustainability in Islamic banks by promoting technological innovations and contributing to social and environmental responsibility objectives. Its potential to transform banking operations is immense, provided that the associated technical and organizational challenges are overcome.

6- Recommendations to enhance the sustainability of Islamic Banks with AI

Islamic banks must exploit the opportunities offered by AI and improve their sustainability; several development strategies can be considered:

- **Integrate AI to improve sustainable management practices**

Islamic banks should integrate AI solutions to improve their sustainable management practices, such as assessing the environmental impact of investments and managing resources more efficiently (Wang & Wong, 2021). AI can help analyze green investment data and promote environmentally friendly financial practices.

- **Use AI to promote transparency and compliance with Sharia principles**

AI can be employed to automate and strengthen Sharia compliance verification processes, using algorithms to monitor transactions and ensure that financial products comply with Islamic principles (Hassan & Lewis, 2018). These technologies can help maintain transparency and build customer trust.

- **Develop AI tools for risk and opportunity management**

The development of AI models for managing financial risks and identifying sustainable investment opportunities is crucial. AI can be used to create predictive models that assess financial risks and support investment decisions based on sustainability criteria (Chen, 2022).

- **Take a holistic approach to data management and security**

Islamic banks must adopt holistic approaches to data management and security to ensure that customer information is protected, and AI systems are used ethically (Jung & Kim, 2022). Implementing robust security protocols and transparent data management practices is essential to supporting long-term sustainability.

- **Invest in continuing training for staff**

To maximize the benefits of AI and promote sustainable practices, Islamic banks must invest in ongoing staff training. Training should cover the use of AI technologies, as well as their role in promoting the principles of sustainability and social responsibility (Smith, 2020).

- **Promote sustainable innovation through strategic partnerships**

Islamic banks should explore partnerships with FinTech startups and other financial institutions to foster sustainable innovation and develop AI solutions that address current challenges in the financial sector (Hassan & Prasad, 2021). These collaborations can lead to technological advances that support more sustainable financial practices.

- **Explore applications of AI for sustainable financial inclusion**

AI can also be used to improve financial inclusion, by developing accessible solutions for underbanked populations and supporting sustainable finance initiatives (Garg, 2022). AI tools can help create Islamic financial products tailored to the needs of marginalized communities.

- **Evaluate and adapt strategies according to market developments**

Islamic banks must constantly evaluate and adapt their strategies based on market developments and new technologies available. This proactive approach will help maintain the relevance of sustainable practices and respond to changing customer needs (Zhang & Wang, 2022).

7. Conclusion:

This study has highlighted the key challenges and opportunities associated with the integration of artificial intelligence (AI) to ensure the sustainability of Islamic banks' operations. On the one hand, we have identified major technical, regulatory and organizational challenges. On a technical level, the complexity of AI systems and the quality of data represent significant obstacles to their effective implementation. From a regulatory perspective, it is crucial to adapt AI technologies to Sharia principles while respecting current financial standards. On an organizational level, resistance to change and the need for continuous training of employees are challenges to overcome to ensure successful adoption of AI. On the other hand, the prospects offered by AI are promising. Technologies such as machine learning, blockchain and process automation offer innovative solutions to improve operational efficiencies, enhance sustainability and support social and environmental responsibility initiatives in the Islamic banking sector.

In the context of the Moroccan experience, the integration of AI into Islamic banking operations is particularly significant due to the country's relatively recent adoption and development of Islamic finance. Moroccan Islamic banks, or "participatory banks," operate within a unique regulatory framework that strictly adheres to Sharia principles while simultaneously navigating the dual banking system that includes conventional banks. This duality presents both opportunities and challenges for the integration of AI. On one hand, AI can be leveraged to

enhance operational efficiencies, reduce costs, and develop new Sharia-compliant financial products that meet the evolving needs of Moroccan customers. On the other hand, the relatively nascent stage of Islamic banking in Morocco, coupled with a need for greater public awareness and understanding, means that the adoption of AI must be approached with caution. There is a strong need to ensure that AI technologies are not only compliant with Sharia but also align with the specific cultural and economic context of Morocco. This includes addressing the technological literacy of both customers and bank employees, overcoming resistance to change, and ensuring that AI-driven innovations genuinely contribute to financial inclusion and economic development in the country. Therefore, the Moroccan experience highlights the critical role of a well-regulated, culturally sensitive approach to AI integration in Islamic finance, which could serve as a model for other emerging Islamic banking markets (Belouafi & Belabes, 2015; Dkhissi, 2019; Saidi & Djouani, 2019).
The findings of this literature review have important implications for Islamic banking practice and future research. On a practical level, it is essential for Islamic banks to develop robust compliance frameworks with Shariah principles, encourage responsible innovation in AI, and invest in ongoing employee training. These measures will maximize the benefits of AI while respecting the ethical and religious commitments of Islamic banks. Regarding future research, there is a need to explore new areas such as assessing the impacts of AI on Shariah compliance by developing suitable assessment frameworks and analyzing the effectiveness of AI technologies to improve the sustainability of services and operations of Islamic banks. These areas of research could not only enrich the understanding of AI applications in Islamic finance but also guide the development of innovative, ethical and above all sustainable financial technologies.

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