

DEVELOPMENT OF GREEN BANKING IN SUSTAINABLE FINANCING: AN ANALYSIS OF CHALLENGES AND OPPORTUNITIES FOR SHARIA BANKING IN INDONESIA

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Abstract. This study aims to examine the development of green banking within the framework of sustainable financing in Islamic Financial Institutions in Indonesia, particularly Islamic banking, using a journal mapping method. The phenomenon of global climate change and the growing awareness of sustainability have encouraged the financial sector, including Islamic banks, to adopt environmentally friendly policies. As financial intermediaries, banks play a strategic role in channeling financing to industries and communities by implementing the concept of green banking. Sustainable financing seeks to support development that meets present needs without compromising environmental preservation for future generations. Moreover, green banking serves as an essential instrument in supporting Indonesia's commitment to reducing carbon emissions through the promotion of environmentally friendly technologies and green financing initiatives. This research focuses on identifying the gaps in the implementation of green banking as well as analyzing the challenges and opportunities faced by the Islamic banking sector in realizing a more sustainable financial system. Based on the analysis of various scientific journals, the study finds that the adoption of green banking in Islamic banking holds significant potential to contribute to the achievement of Sustainable Development Goals (SDGs) and maqashid sharia. However, several barriers remain, including the lack of specific regulations, low literacy in green financing, and limited human resource readiness. As strategic solutions, this study recommends strengthening regulatory frameworks, enhancing human resource capacity, digitalizing green financing systems, and fostering collaboration between Islamic financial institutions and regulatory authorities.

Keywords: Green Banking, Sustainable Financing, Challenges, Opportunities

1. Introduction

The global transformation toward a green economy has encouraged financial institutions in various countries to adapt to sustainable development patterns. One form of implementing this policy in the financial sector is the concept of green banking, a banking system that integrates environmental and social aspects into operational and financing activities. This research is increasingly relevant in light of the government's commitment to the Sustainable Development Goals (which refer to the ability to meet current needs without compromising the ability of future generations to meet their needs). This concept emphasizes the wise use of natural resources, balancing environmental, economic, and social aspects for long-term sustainability, and increasing preparedness for climate change. The main factors causing environmental problems include technology, population growth, economic motives, and value systems. Environmental damage due to unsustainable industrial practices negatively impacts the global economy, especially in the era of globalization. Environmental sustainability is crucial because problems in one environmental aspect will impact others.

Sharia banking in Indonesia has the opportunity to support the sustainability agenda. Principles of Islamic economics, such as tawazun (balance), maslahah (benefit), and ihsan (social good), are philosophically aligned with the concept of environmental sustainability. In the banking sector, the concept of green banking has become an issue for economic growth (Anggraini et al., 2019). Green banks adopt and implement environmentally friendly technologies in their operations, both internally and externally, to reduce their carbon footprint and support better environmental management (Bose et al., 2017). Green banking is also commonly referred to as environmental banking, ethical banking, or sustainable banking. Broadly speaking, green banking reflects banking practices that support customers in reducing their carbon footprint through their activities (Tara et al., 2015).

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Sharia-based banking has strong potential as a financial institution to contribute to a sustainable financing ecosystem for a greener world (Alfarizi et al., 2023). This is based on the application of the concept of sharia, a moral code of Islamic law that regulates many aspects of life, including the environment. Islam focuses on preserving resources and respecting God's creation (Johan, 2022; Julia and Kassim, 2020). In practice, Islamic banking has a role to play in contributing to a sustainable financing ecosystem through a green banking business model or a series of financing programs for environmentally friendly projects, focusing more on sustainable businesses, and avoiding investments in products prohibited by the Quran or investments with environmentally harmful implications (Uddin, 2016; Zheng et al., 2021).

However, the implementation of green banking in Islamic banking in Indonesia still faces several obstacles, including regulatory challenges, human resource capacity, and public awareness. Therefore, this study aims to identify the development of research related to green banking in the context of Islamic banking in Indonesia, while also analyzing the challenges and opportunities that arise in its implementation. A journal mapping approach was used to map research trends and identify research gaps that remain open for the development of sustainable Islamic financial policies and practices.

2. Literature Review

Green banking is a financial institution strategy to facilitate environmentally friendly economic activities. Its basic principle is to minimize negative impacts on the environment through energy efficiency, funding green projects, and educating customers about environmental awareness. Within the framework of Sharia law. This aligns with Islamic teachings, which prioritize a balance between economic needs and environmental sustainability.

Sustainable financing in Islam is based on the maqasid sharia (the principles of Islamic law), namely safeguarding religion, life, intellect, posterity, and wealth. The concept of sustainability is understood as a form of social and moral responsibility to safeguard the earth (khalifah fil ardh). Instruments such as green sukuk, green mudharabah, and environmentally friendly ijarah are financial innovations that can support sustainability in accordance with Sharia.

The Financial Services Authority (OJK) has issued POJK No. 51/POJK.03/2017 concerning the implementation of sustainable finance for financial services institutions, issuers, and public companies. This regulation serves as the legal basis for banks, including Islamic banks, to implement environmental, social, and governance (ESG) aspects. Furthermore, the government is also encouraging the issuance of green sukuk (a Sharia financial instrument to finance environmentally friendly and sustainable activities, such as renewable energy, sustainable transportation, and waste recycling) as a sustainable investment instrument.

Green banking is a financial institution that prioritizes sustainability in all its business activities. This aligns with sustainable financing, which has become a new pattern in the banking sector and other financial institutions to support sustainable development. Green financing, as an essential component of sustainable financing, provides financial support for green economic growth that significantly reduces greenhouse gas (GHG) emissions and air pollutants (Suharno, 2010). According to the Financial Services Authority (OJK) Regulation, green financing has four dimensions: achieving excellence in social and economic aspects to mitigate the threat of global warming and prevent other environmental and social problems; shifting toward a competitive low-carbon economy; and promoting environmentally friendly investment across various economic sectors (Hanif et al., 2020).

Meanwhile, the types of businesses included in green financing include renewable energy, energy efficiency, solid waste management, liquid waste management, alternative energy, fired bricks, non-fired bricks, recycled products, green industry, and factory safety and security aspects. (Ilahi et al., 2023)

Table 1. Green Banking and Green Finance Journal Analysis.

No	Journal Title	Focus of Study	Key Findings
1	Green Banking Transformation in Islamic Banking: Challenges and Opportunities Towards Sustainable Finance in Islamic Economics	Evaluate the challenges and opportunities for implementing Green Banking in Islamic banking in Indonesia.	This research contributes to the formulation of sharia-based policy strategies to support the sustainable finance agenda, encouraging sharia banking to be more proactive in environmentally friendly service innovation.
2	The Role of Green Financing in Islamic Economics as an Adaptive Response to Economic Volatility and the Global Climate Crisis	The role of green financing in Islamic economics	Green financing strengthens a sustainable and environmentally friendly economy.

3	Islamic banking Opportunities and obstacles to green banking	Obstacles to implementing green financing in Islamic institutions	Lack of literacy and policies are the main obstacles.
4	Implementation of Green Finance in Islamic Banking: An Islamic Economic Perspective	Implementation of green finance in Islamic banking from an economic perspective	The challenges faced include limited regulations, low public literacy, high initial costs, and limited funding for green projects.
5	Implementation of Financing Distribution at Bank Syariah Indonesia (BSI) in Accordance with the Implementation of Green Banking	to find out how green banking is implemented in the BSI environment	BSI has implemented several green banking programs, namely: application of green principles with green financing, electronic financial reports, use of water, paper, waste processing and green buildings.
6	Green Banking Innovation in Sharia Banking Services	analyze the relationship between electronic banking as operational support and customer service improvement.	It is believed that knowledge about Green Banking will improve the quality of services..
7	compliance of Green Financing products with sharia principles: Analysis of Islamic jurisprudence on environmentally friendly financing in Islamic banks	The general concept of Islamic economic law	Fiqh muamalah becomes a normative framework for Islamic economic policy.
8	Green Banking Innovation in Islamic Banking Services: BSI Case Study	To explore various forms of green banking innovation implemented by Islamic banks.	This innovation supports improving the quality of services that customers can enjoy.
9	Green Financing Policy Assistance at Sharia Microfinance Institutions (Socialization of LKMS throughout Pekalongan Regency)	Green financing system in Islamic banks	Green finance raises awareness of sustainable investments.
10	Implementation of Green Banking in the Environment of Bank BJB Syariah Indonesia	Case study of the implementation of green financing at BJB Syariah Bank	Islamic banks are starting to adopt environmentally friendly financing gradually.
11	Analysis of Indonesian government policy in encouraging the distribution of green credit in the Islamic banking sector	The research results show that the adopted green financing regulations have succeeded in increasing the distribution of green credit.	Although there are positive impacts on the sustainability and growth of Islamic banking, there is a need for strengthening regulations and broader promotion.
12	The Implications of Islamic Leadership Commitment and the Dimension of Green Finance in Encouraging Performance Sustainable Indonesian Islamic Banking	This study aims to further explore the influence of green financing on the sustainable performance of Islamic banks in Indonesia, taking into account the bank's commitment and Islamic leadership.	The results of the study show that Islamic leadership has a significant influence on the economic, social and environmental dimensions of GF, while bank commitment has no significant influence on the social dimension.
13	Green Banking Development Strategy in Sustainable Financing: Challenges and	identify gaps in the implementation of green banking, and outline the	While green banking has the potential to support economic and

Opportunities for Islamic Banking in Indonesia	challenges and opportunities for the banking sector in realizing a more sustainable financial system.	and environmental sustainability, its implementation remains hampered by low levels of green financial literacy and regulatory limitations. However, opportunities remain through government policies, increased public awareness, and innovations in sustainable finance.
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3. Research Methods

This study uses a descriptive qualitative approach with a journal mapping method to examine the challenges and opportunities for implementing green banking and sustainable financing in the financial institutions sector in Indonesia, particularly Islamic banking. Literature sources were selected based on the criteria of relevance, credibility, novelty, and methodological validity, including reputable scientific journals, academic books, research reports, and supporting secondary documents. This approach aims to identify research models and key themes developing in the scientific literature related to green banking in Indonesian Islamic banking. Then, they were selected based on the title, focus of the study, and relevant key findings. This approach allows the study to produce comprehensive conclusions regarding Islamic banking strategies in increasing its contribution to sustainable financing (Green Financing) in Indonesia.

4. Result and Discussion

4.1 Implementation of Green Banking in Islamic Banking

Several Islamic banks in Indonesia have implemented green banking principles by utilizing digital technology, such as paperless e-banking and financing renewable energy projects. However, implementation remains limited to a specific scale and has not yet become a comprehensive policy across all Islamic financial institutions. The theme of green banking is now a key focus in the modern financial system, particularly in the context of sustainable green economic development. This concept emphasizes the crucial role of banking institutions in directing financing to environmentally friendly sectors and encouraging business practices that take into account social aspects and good governance. To support these activities, Bank Indonesia (BI) has launched a number of comprehensive policies and strategies to strengthen the implementation of green banking in Indonesia. BI has taken three main steps within the framework of sustainable financial development: the development of green banking guidelines, mandatory sustainability reporting, and policy support. (Kontesa, Fernando, and Hartati, 2023).

4.1.1 Green Banking Guidelines (Sustainable Finance)

Bank Indonesia has issued Sustainable Finance Guidelines to guide Indonesian banks in implementing sustainability principles into their business and operational strategies. These guidelines cover environmental and social risk management, the development of environmentally friendly products and services, and sustainability reporting. These guidelines align with other regulations, such as Financial Services Authority (OJK) Regulation No. 51/POJK.03/2017 concerning the Implementation of Sustainable Finance for Financial Services Institutions, Issuers, and Public Companies. This regulation requires financial services institutions, issuers, and public companies to implement sustainable finance principles, develop a Sustainable Finance Action Plan (RAKB), and submit a Sustainability Report. As a first step, these Guidelines emphasize the importance of environmental and social risk management, the development of green investment policies, and the development of products and services that support environmental sustainability. Furthermore, the guidelines encourage banks to adopt a responsible business approach towards society and the environment by financing projects with social added value. Bank Indonesia and the Financial Services Authority (OJK) strive to ensure that the banking system is oriented not only towards financial profit but also towards long-term economic sustainability and environmental preservation.

4.1.2 Sustainability Reporting

The next strategic step is requiring banks to prepare sustainability reports containing information on the environmental and social impacts of their operations, as well as the mitigation measures they have taken. This report serves as an instrument of accountability and transparency, allowing the public to assess the extent of the bank's commitment to sustainable finance principles. These standards are designed to ensure that sustainability reports are not merely formalities but truly reflect the banking institution's concrete efforts to manage environmental risks, reduce its carbon footprint, and enhance positive social impact. Furthermore, Bank Indonesia and the Financial Services Authority (OJK) are encouraging the integration of sustainability reports with banks' annual reports, ensuring that sustainability aspects become part of the overall corporate strategy, not merely an administrative addition.

4.1.3 Sustainability Reporting

Bank Indonesia plays a role not only as a regulator but also as a facilitator, actively supporting the implementation of green banking. This support is manifested in policies that guide Islamic banks in participating in green financing activities. One such policy is the provision of regulatory streamlining. Furthermore, Bank Indonesia provides low-interest financing facilities to support investment in green technology and renewable energy. In the context of innovation, Bank Indonesia encourages banks to adopt energy-efficient and environmentally friendly digital technology. This step is expected to reduce carbon emissions from banking operations and increase financial inclusion in the community.

Regulations such as POJK No. 51/POJK.03/2017 also strengthen synergy between financial authorities and the banking sector in implementing the green finance agenda. Policy support provided includes simplifying or simplifying green product licensing, providing low-interest guarantees for environmentally friendly loans, and fiscal policies that support investment in sustainability-oriented projects.

4.2 Sharia Financial Instruments in Supporting Sustainability (Green Banking)

Islamic financial instruments play a strategic role in promoting sustainability, one of which is through the issuance of green sukuk. These instruments are used to finance projects oriented towards environmental conservation, such as the development of renewable energy, environmentally friendly transportation, and low-emission infrastructure. Indonesia's issuance of green sukuk since 2018 confirms that Islamic instruments can contribute to the global agenda regarding climate change while strengthening the position of Islamic banking in the international financial market (Febrian, 2024).

In addition to green sukuk, Islamic investment instruments issued by the government to finance environmentally friendly and sustainable projects, including socio-religious instruments such as zakat, productive waqf, and qard hasan, are also relevant to supporting environmentally friendly programs. Zakat funds can be directed towards community empowerment through organic farming or waste management, while productive waqf is developing with new models such as energy waqf and environmental waqf. Qard hasan also has the potential to support small businesses engaged in conservation or recycling. These three instruments demonstrate that the principle of solidarity in Islam aligns with the spirit of sustainability (Kholiq, 2023).

4.3 Challenges of Green Banking Development

Some challenges in implementing green finance in Islamic financial institutions, particularly Islamic banking in Indonesia, include the limited availability of specific rules and regulations. Although the government has issued policies related to sustainable finance, technical regulations detailing green financing mechanisms in Islamic banking remain limited. As a result, banks often rely on their own interpretations when designing products, leading to differences in standards between institutions, which can hinder consistency. (Vitriani & Fasa, 2020).

Besides regulations, a second challenge lies in public literacy and awareness. Many customers do not yet understand the concept of green finance or its differences from conventional Islamic banking products. This low literacy level results in a lack of demand for green products, thus discouraging banks from developing more innovative services. The success of green finance depends heavily on the active participation of the public as service users (Tempo.co, 2024).

The third internal challenge is limited human resources. Not all Islamic bank employees in Indonesia have a thorough understanding of sustainability principles or the ability to assess environmental risks in financing projects. This slows down the analysis and selection process for green financing and makes it less than optimal. Continuous training is needed to enable bank employees to integrate an environmental perspective into business decision-making (Nurmayanti & Ansori, 2025).

Finally, the availability of financeable green projects remains limited. Many business sectors in Indonesia have not yet fully transitioned to an environmentally friendly model, resulting in a relatively small portfolio of projects meeting green finance criteria. This situation makes it difficult for banks to disburse large amounts of green financing. Therefore, collaboration between the government, the private sector, and Islamic financial institutions, particularly Islamic banking, in Indonesia is needed to expand the green ecosystem ready for financing. (Contributors, 2025).

4.4 Prospects and Opportunities for Green Finance in Sharia Banking

The prospects for green finance in Islamic banking are very promising, along with increasing awareness of climate change and sustainability issues. Public demand for financial products that are not only economically profitable but also positively contribute to social and environmental outcomes continues to grow. This opens up space for Islamic banks to expand their green product portfolios, aligning with Sharia principles while addressing the needs of the modern market. (Ahmed & Zulkhibri, 2020).

A significant opportunity also arises from government support encouraging the implementation of sustainable finance. Green sukuk-based financing and strategic partnerships with the private sector are crucial assets for Islamic banks to strengthen their position in the global market. With a reputation as institutions grounded in moral and ethical values, Islamic banks have a competitive advantage in promoting green products oriented toward the welfare of the community (Lahsasna et al., 2020).

Furthermore, advances in digital technology provide innovative opportunities for the development of green finance services. Digital transformation enables Islamic banks to create environmentally friendly products that are more efficient, transparent, and easily accessible to the public. The synergy between sharia values, sustainability principles, and modern technology makes the prospect of green finance not just a passing trend, but also the future of highly competitive Islamic banking.

4.5 Solutions to Increase Awareness of Sustainable Finance (Green Financing)

Bank Indonesia demonstrates its commitment to green economic development by participating in various networks of central banks and supervisory institutions focused on transforming the financial system toward sustainability. Furthermore, Bank Indonesia is actively involved in the ASEAN Central Bank Task Force on Sustainable Finance as an effort to strengthen regional cooperation in sustainable finance (Press, 2022). One approach developed to support this goal is the implementation of green financing, a process of integrating sustainability values into the national financial system to encourage financing for activities and projects oriented towards environmental conservation and sustainable development.

To overcome the various obstacles that arise in the implementation of green banking in the Islamic banking sector, comprehensive, structured, and collaborative strategic steps are required. Solutions must come not only from banking institutions themselves, but also from synergy between the government, regulators, business actors, and the community. The following are some solutions that can be implemented based on the challenges previously identified:

4.5.1 Strengthening of Regulations and Technical Standardization

One step to strengthen the regulatory framework and technical policies for green financing activities, such as POJK No. 51/POJK.03/2017 concerning Sustainable Finance, is still general in nature and does not accommodate the characteristics of sharia contracts such as mudharabah, murabahah, or musyarakah in green financing activities. Therefore, the Financial Services Authority together with the National Sharia Council (DSN MUI) and Bank Indonesia need to develop specific operational guidelines for sharia green banking, which include: Criteria and indicators for green projects that comply with sharia principles, environmental-based risk assessment mechanisms, sustainability reporting and audit standards, and incentive provisions for institutions that achieve green targets.

4.5.2 Increasing Literacy and Public Awareness

The public's lack of understanding of the concept of green finance can be addressed through more in-depth and targeted green Islamic financial literacy programs

Banking institutions, in collaboration with the Financial Services Authority, Bank Indonesia, and higher education institutions, can organize: Public education on the benefits of green banking and its impact on social and environmental welfare; digital campaigns that highlight Islamic values regarding environmental protection (such as the concepts of khalifah fil ardh and maslahah); integration of sustainable finance materials into Islamic

economics curricula at universities; and community-based awareness programs through Islamic boarding schools (pesantren), mosques, and Islamic community organizations.

With increased literacy, the public will better understand the importance of green financing and begin to actively participate as environmentally conscious customers.

4.5.3 Development and Training of Islamic Banking Human Resources

Bank Indonesia plays a role not only as a regulator but also as a facilitator, actively supporting the Human resource capacity is the primary foundation for successful green banking implementation. Therefore, every Islamic financial institution needs to develop a strategy for strengthening human resource competencies that focuses on integrating sustainability aspects.

Steps that can be taken include: Training and certification for employees on Environmental Risk Management, green project analysis, and ESG (Environmental, Social, and Governance) reporting, a form of sustainability reporting that illustrates the extent to which an institution, including financial institutions or banks, has integrated sustainability principles into its strategy, operations, and business decision-making; the establishment of a Green Banking Unit or dedicated sustainability team within each Islamic bank; collaboration with educational and training institutions to develop Sharia-compliant green finance training modules; and career incentives for employees who contribute to the development of green products and services. Improving human resource capacity will strengthen the competitiveness of Islamic banking in effectively managing green business risks and opportunities. (Nurmayanti and Ansori, 2025).

4.5.4 Increasing Product Innovation and Environmentally Friendly Digitalization

To attract public and business interest, Islamic banks must continue to innovate by developing digital-based green financial products. Some examples of innovations that can be developed include: green Islamic sukuk products for financing renewable energy projects, wakalah-based microfinance or qardhul hasan for green MSMEs, and eco-friendly mobile banking services with paperless systems and energy efficiency. Digitalization not only increases efficiency but also reduces the carbon footprint of banking operations.

4.5.5 Strengthening the Green Project Ecosystem and Cross-Sector Collaboration

The challenge of limited fundable green projects can be addressed by building a collaborative green investment ecosystem. Synergy between the government, the private sector, and Islamic banking is needed to expand the base of sustainable projects.

Several strategies can be implemented: The government providing fiscal and tax incentives for environmentally friendly projects; banks collaborating with state-owned enterprises and green startups to finance clean energy projects, waste management, organic farming, or water conservation; and establishing a "Sharia Green Investment Platform" as a collaborative platform between investors, banks, and green businesses. Successful green financing can be achieved through cross-sector coordination that creates a productive and mutually supportive ecosystem. (Contributors, 2025).

5. Conclusion and Suggestion

Conclusion

Based on the analysis, it can be concluded that the development of green banking within the Islamic banking system in Indonesia has enormous potential to contribute to sustainable economic and social development. This concept aligns with the values of maqasid sharia, namely safeguarding human welfare through the protection of religion, life, intellect, descendants, and property. By applying green finance principles, Islamic banking has the potential to become a crucial instrument in directing financing to productive sectors that are environmentally friendly and oriented towards social welfare.

However, the implementation of green banking in Islamic financial institutions still faces several significant challenges. These obstacles include the lack of regulations specifically governing Sharia-based green banking practices, limited public and human resource (HR) literacy regarding sustainable finance concepts, and suboptimal technological infrastructure and sustainability reporting systems in the Islamic banking industry. Furthermore, industry players' awareness of the importance of integrating environmental and social values into business policies still needs to be strengthened to support a comprehensive green finance transformation.

Suggestion

To overcome these obstacles, strategic and collaborative steps are required from various parties. First, regulatory strengthening is necessary by establishing specific guidelines and operational standards for Islamic green banking that align with the principles of Islamic jurisprudence (fiqh muamalah). This regulation is expected to provide legal certainty while encouraging innovation in the development of green financial products. Second, increasing the capacity and literacy of human resources (HR) is key. Islamic banking institutions need to conduct ongoing training programs related to sustainable finance, environmental risk management, and strategies for implementing sustainable financing from an Islamic perspective.

Third, environmentally friendly product innovation and digitalization must continue to be developed, for example through the use of digital technology to reduce the use of physical resources and facilitate access to green financing for the public.

Fourth, cross-sector collaboration between the government, financial authorities, educational institutions, and the private sector must be strengthened to create an ecosystem that supports the transformation towards national green finance.

Overall, Islamic banking is expected to become a pioneer in sustainable financing that integrates economic, social, and spiritual values. By prioritizing the principle of sustainability that is in line with the maqashid sharia, Islamic banking institutions can play an active role in realizing an inclusive, equitable, and environmentally friendly economy in Indonesia

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