

Bridging Shariah and Sustainability: Evaluating the Effectiveness of Islamic Finance Instruments in Climate Mitigation Strategies

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Abstract

This study looks at how climate-resilient investment models, flexible financial products, collaborations with the government, education and advocacy, training for stakeholders, and policy integration may assist Islamic finance deal with and adapt to climate change. A stratified random sample cross-sectional survey including 250 investors, analysts, policymakers, and academics was conducted. We used structural equation modeling with mediation analysis, reliability, validity, and collinearity diagnostics to complete the analysis. The findings indicate that education, advocacy, and governmental cooperation enhance strategic climate planning and direct expenditure. Strategic planning is a major predictor of climate resilience and serves as a mediator for adaptable financial products and institutional features. Planning was improved with adaptive goods, but did not result in increased investments. There were no direct impacts of climate-resilient models. The geographical focus and cross-sectional studies also limit the scope of causal inference and generalization, requiring longitudinal and multi-source research and conceptual specification. Climate finance needs the ability training, Shariah compliant guidelines, and effect assessment rigorous methods by policy-makers and Islamic monetary institutions. The potential of scaling Islamic financing can be used to create just and resistant to climate infrastructure and improve the life of people who are at risk. This paper provides policy and practical recommendations in the form of a mediation-based solution which links the Islamic financing systems to the climate resilience results.

Keywords: Islamic Finance; Climate Resilience; Green Sukuk; Public–Private Partnerships; Capacity Building

INTRODUCTION

Background

Islamic finance using Shariah principles, emphasizing profit sharing, ethical investments, and non-involvement into interest-based dealings (riba) is a buzzword in the rapidly developing territorial segment of the global financial market. Its further development in areas that are traditionally not regarded as part of it has proposed the possibility that it will be a complement to already-established financial systems. This initiative to reach farther points in the world, in addition to accessing the commercial form of sustainability discussed in such frameworks as the Paris Agreement, the Sustainable Development Goals (SDGs) of the United Nations, gives some picture of how the ecological promulgation of sustainability is being achieved in the world, through fair solutions, and environmental sustainability (Faizi et al. 2022; Martinez and Silva, 2023).

The increasing influence of climate change was mingled with the need of the vale shifting financial instruments that would cover the financial gaps, both in the macro mitigation and the local adaptation strategies. The funding of climate change has also been considered as one of the most important assets that are funded by the Green Climate Fund and are therefore considered to be a particular stream of financial flows that can support such projects which are oriented on eco-friendly practices in developing countries. The nature and characteristics of Islamic finance, as social justice and environmental management, makes it one of the strongest to support climate finance, which links the dynamics of the economy to the overall development of society (Nurfadillah et.al., 2024).

The financing instrument that has attracted the most attention recently is green sukuk (Islamic bonds), which have been instrumental in maintaining funding initiatives aimed at green projects and are thus commendable examples (Begum et.al., 2021). Nevertheless, conflicts in regulations between regions have been the impediments to the scalability of these instruments, as they curtailed cross-border investments and simplified the challenging issue of the standardization of the financial products (Malik & Esmael, 2024; Faruk, 2023; Ali et al. 2024).

The collaboration of Islamic finance and climate programs at the two ends makes them very much alike, for instance, in the islamic world where the Muslims' involvement in the issue is of high possibility due to the right resources that islamic finance offer. The contribution of the sector to the climate change issue could be noticeably increased through promoting the establishment of variably-structured financing, partnership of government in environmental anagement and rollout of the education initiatives (Faizi et.al., 2022; Malik & Esmael. 2024).

The regional cooperation and dynamic stakeholders' involvement facilitate the establishment of better make-ready financial infrastructures. Targeted policies and capacity-building initiatives are identified as reliable interventions that can help to close the knowledge gap and facilitate the creation of the complex financial products, based on the empirical findings (Aminova, 2023; Martinez & Silva, 2023).

Problem Statement

Even though Islamic finance principles are at their core the same as the objectives of sustainability, they cannot easily be implemented on a wide scale to be instrumental in building resilience to climate change. Market fragmentation is a result of a lack of standardized regulatory framework and is a barrier to interregional investments and the rise of versatile Shariah-compliant climate finance products (Aminova, 2023; Faruk, 2023). Also, the growth of Islamic finance's potential to be a vehicle for mitigating climate change is blocked by the lack of market infrastructure and an inability to provide full-scale risk-sharing agreements (Malik & Esmael, 2024).

The shortfall in the degree of knowledge about Islamic finance at the institutions and other stakeholders plus the absence of their direction are some more factors that limit the capacity of the

sector to find efficient resources for climate adaptation and resilience (Begum et.al., 2021). The realization of the full potential of Islamic finance in enhancing the climate action especially in the region's most susceptible to climatic industrialization remains in a desire of breaking the chains off these problems.

Justification

The work is highly significant as it provides a framework on the discussion of the problem of Islamic finance and climate action on both academic and practical levels of policy-making. The aim of this analysis in which the most significant emphasis is put on the discussion of the opportunities and challenges; and the proposal of the ways to promote the effect of the climate-driven financial flows, is to provide policy-makers, investors and Islamic financial institutions with practical recommendations (Martinez and Silva, 2023; Aminova, 2022). The empirical evidence supports the assertion that the alignment of Islamic finance with climate goals will lead to economic growth alongside preserving the existing ecological balance. The blossoming of Islamic finance and crossing national borders will be just one enhancement in the long run that will be of assistance in the accomplishment of the overall climate targets, especially in the well-bred Islamic finance playground (Obaidullah, 2018; Begum et.al., 2021).

Objectives of the Study

The primary objectives of this study are to:

1. Analyze Islamic finance's present state of the art for investment models that adapt to climate change.
2. Consider the formulation and performance of financial instruments that target the adaptation of environmental features.
3. Evaluate the function of government cooperation in the implementation of sustainable mega climate interference via Islamic finance.
4. Talk with stakeholders and promote knowledge on climate finance as a way to change people's minds and encourage participation.

Scope of the Study

The examination connects the roles of Islamic finance to the fields of climate change mitigation and adaptation in the context of asset development, the growth of adaptive financial products, partnerships, and target-driven actions (Malik & Esmael, 2024). The role of regional collaboration and climate vulnerability indices as mediating factors in the financial performance context is also being discussed in the study. Mediating factors that support the scaling up of Islamic finance are policy integration efforts and the education of stakeholders (Malik & Esmael, 2024; Malik & Esmael, 2024).

LITERATURE REVIEW

Maximizing the Role of Islamic Finance on Climate Mitigation & Adaptation Strategies

Islamic finance presents a remarkable opportunity to align financial growth with climate adaptation and mitigation strategies. Built upon ethical investments and risk-sharing, Islamic finance persuades the utilization of the capital for the projects that put forward the environmental effects. Islamic financial tools by including such applications as sukuk (Islamic bonds) and green takaful

(Islamic insurance) can support sustainable energy, renewable Resource Sustainable Adaptation Infrastructure, etc. By means of Islamic finance not only is the promotion of environmental sustainability achieved but also the provision of inclusive financial solutions is possible, hence promoting equitable access to climate resilience to the communities worldwide.

Climate resilient investment models

Alnsour (2024) studies the role of Islamic banks in financing renewable energy projects, mentioning the sustainable economic development, and energy security, which are the mainstream topics. The study emphasizes the need for strategic investments to lessen reliance on traditional energy sources while highlighting the growing interest in renewable energy on a worldwide scale. The study looks at the structured methods and financial instruments Islamic banks employ to fund renewable energy projects. Besides, the research points out the importance of economic, social, and environmental factors in decision-making regarding investments. The findings unequivocally show that Islamic banks play a key role in funding renewable energy initiatives, promoting environmental sustainability and energy security.

Ozyesil and Tembelo (2025) take stock of green bond issues between 2017 and 2023 based on definitive factors like interest rates, renewable energy capacity, carbon emission reduction, and GDP. Their results obtained through analyzing Panel data, it seems that raising interest rates brings down green bond Issuance, while more renewable energy capacity and GDP has a plus effect on it. Interestingly, carbon emission reduction has a negative correlation, can be because of saturation effects in countries with significant reductions.

Hermala et al. (2024) reveal the output of seeking Islamic Finance instruments to help Indonesia in renewable energy development and emission reduction strategies. and a bibliometric analysis algorithm with VOS viewer. They study 42 scientific articles covering the period from 2014 to 2024. The findings of the analyses show the Islamic Finance with special principles is largely the solution of green financing programs and gives birth to the ideas for sustainable energy programs in Indonesia.

The possibility of using Islamic Finance to not only drive the economy towards efficiency but also reducing the environmental impact of the construction and the ICT sector. The green sukuk and other Shariah-compliant investment options would be a major source of financial support for the construction of climate-resilient infrastructure and adaptation projects. The project will build infrastructure that can withstand the effects of climate change. They are in line with climate-resilient investment models. In addition, they introduce financial products linked to climate adaptation, such as profit and risk-sharing instruments that are provided only if the climate projects are successful.

It is where the authors point out that government partnerships are prominent, in which both policymakers and Islamic financial institutions work together to enact climate finance policies. Education and advocacy in Islamic finance are also important, policies which, ensuring better policy implementation, are considered by increasing awareness through teaching programs, aimed at stakeholders and decision-makers. Furthermore, the paper highlights the notion of the importance of regional cooperation to align the regulations of the Islamic climate finance being carried out across the borders. This principle can be realized by the use of Islamic finance in membership programs facilitating financial sustainability and ethical and environmental integrity apart from the other objectives enhancing resilience and adaptation to climate change.

Irfan et al. (2024) are addressing the question "Is Islam finance the main mechanism to achieving environmental sustainability in OIC countries". Their results show that, through green investments, Islamic financial assets reduce CO₂ emissions while Islamic banking financing shows

a sparse effect, if any, due to their financing of carbon-intensive projects. Furthermore, they pointed out that it is through GDP growth that emissions are increased, on the one hand, and on the other, factors like Foreign Direct Investment, urbanization, and forests make the major contributions to reducing them. The facts, then, are Islamic finance can be an auxiliary tool for making the environment better but we could also have more green financing policies in the OIC countries.

Irfan et al. (2024) investigation is focused on the connection between Islamic finance and carbon emissions in an OIC (Organization of Islamic Cooperation) country. They prove the close relationship between Islamic financial instruments such as green sukuk, and the accomplishment of reducing the environmental risks involved. The analysis elaborates on the Environmental Kuznets Curve (EKC), stating that OIC countries are, at this point, at the beginning of the EKC path with increased emissions and growth. Yet, Islamic finance through the channel of green investment and sustainable financial instruments can be a strong driver for countries changing their traditional to sustainable development. The outcomes speak to the fact that there should be enhancement in the regulatory environment and strategic government actions to be carried out to achieve environmental objectives through Islamic finance.

The impact of Islamic stock markets on clean energy prices and green economic growth in the Asia-Pacific region by using the NARDL model. The results of their study revealed that the effect of Islamic finance on the development of both clean energy and green growth is positive in the long-term and short-term periods, despite the existence of small negative suits. In addition, the research emphasizes that the potential of Islamic finance and Shari'ah illustration can lead to the development of both areas of energy efficiency and the promotion of sustainable development.

H-1: Climate-resilient investment models positively impact the effectiveness of Islamic finance in climate resilience.

Adaptive financial products:

Liu and Karen. (2021) Examine the development of Green Islamic Finance in Malaysia” explores how Malaysia's introduction of green sukuk since 2017 has propelled the nation to the forefront of the green Islamic finance sector globally. By introducing green sukuk, Malaysia is establishing itself as a global centre for Islamic finance and advancing its national development objectives.. Through the financial ecologies, this advancement is analyzed by the authors who detect the possibility of market expansion and at the same time, the problems that appear in including environmental goals in financial profits. Now, on the international financial market, Malaysia is more reputable because of the green sukuk but the article brings out the problem of Green washing and the question about the sufficiency of merely using global standards that do not utilize sustainability principles on their own. for mitigating environmental impacts.

Morea and Poggi (2017) identify the technical, energy, and economic features of wind power systems and thus, a 1MW case study demonstration in Italy. The authors underline the role of incentives in achieving grid parity by proposing green sukuk, an Islamic financing tool, as a means to finance the project and subsequently decrease the debt-equity ratio in wind energy investments. The case study's sensitivity analysis determines the construction cost thresholds for attaining positive project profits and bankable wind energy projects, therefore, pointing out the necessity of specified incentives. The paper highlights the relevance of the Shari'ah compliant sukuk instruments, and the importance of incentives in developing wind energy projects that are both economical and viable. Profitable and bankable wind energy projects. The paper highlights the

relevance of the Shari'ah-compliant sukuk instruments and the fact that incentives play a crucial role in developing economically viable and sustainable wind energy projects.

Rozman et al. (2022) discuss the green sukuk that assumes the role of the financial tool of dealing with environmental concerns. The study points out the Islamic financial instruments that are employed in the production of electric energy sources of the renewable sources, and environmental protection. The paper reveals the necessity of the use of green bonds by interdependence of SDGs in various domains, integration of the same into the possible businesses and introduction of more stringent regulatory frameworks along with the use of green bonds in financing green projects.

As a new category of financial tool that aims to respond to the financing principles of Islamic finance and the goal of environmental sustainability, Mollah et al. (2021) discuss the notion of green sukuk. The sukuk study expounds on the role of such instruments in bridging the Islamic financing-the demand environmentally-branded instruments in the modern day investment arena. Offering an investment channel that not only contributes to the enhancement of the environment but can also be done according to the Islamic investment guidelines, green sukuk mixes the ethical foundations of Islamic financing with the concerns of developing sustainability. The article discusses the advantages that green sukuk can have in attracting diverse investors, including investors with faith-based, ethical, and sustainable interests, and thus, an increase in the interest and impact of Islamic finance in the global market.

Raeni et al. (2022) focus on the mobilization of Islamic funds for climate action through green sukuk, the authors talk about Indonesia being the first sovereign state to issue these Islamic compliant financial instruments. It encompasses the line of accountability that connects financial outlay to implemented GHG reductions, plus the development of new accounting methods to carry forward the issue. They proposed that green sukuk have achieved higher mystique and traceability in fund utilization, hence Islamic finance is now aligned with the environmental aspect. On the other side, the authors have pointed out measuring the impact of Climate Bonds due to the inconsistencies in the financial and GHG accounting systems. The study finishes by pointing out that green sukuk stand as a fresh financial innovation, yet the realignment of finances and environmental issues is the central aspect for their flourishing.

H-2: Adaptive financial products enhance the participation of stakeholders and improve project outcomes in climate finance.

Governmental Partnerships

Alam et al. (2023) present a thorough study of the evolution and assessment of green sukuk from 2016 to 2022. The study which was conducted on 15 publications in Scopus database and was categorized into four areas: model development, opportunities, challenges, and evaluations of green sukuk. Market dynamics after the pandemic, environmental investor and government sectors as a renewable energy commitment, and provision of low-cost, risk-mitigating sukuk financing are some of the discussed challenges. The authors state that proper management is the imperative factor to make green Sukuk more viable and thereby more attractive for the investors such as in funding the green, climate financing, renewable energy management, and greenhouse gases emissions verification. The authors give a conclusion that integrated efforts throughout the economic sectors are necessary for the commendable use of green sukuk in environmental challenges and sustainable development.

Shalhoob (2023) studied the Potential Sustainability Challenges in the Saudi Vision 2030: the Role of Green Sukuk in Financing Sustainable Project by Hebah Shalhoob is addressed. Green sukuk funding is one of the tools in which this exposes how it finances environmentally sustainable

projects that are at the same time appositely in line with Saudi Arabia's Vision 2030. It is familiar with the main challenges like inconsistency, lack of understanding of the benefits, poorly designed measurement tools, not enough programs, and some problems in the process where green sukuk didn't have. The work also provides the structure that the Saudi Electricity Company (SEC) is undertaking to support the transition to a low-carbon and circular economy. The research gives some basic steps that the company should follow to implement the sustainable techniques, including clearing off some barriers; for example, developing an accurate definition and good measurement criteria for green sukuk, enhancing institutional capacity building, and maintaining good relationships with stakeholders. These are preconditions for making the program of green sukuk a practical path for achieving NOTP goals at the same time.

Faizi et al. (2024) look at the area of Islamic green finance industry in Indonesia while considering it as the tool for the direct impact on climate changes with the help of shariah-compliance financial innovatory instruments like green sukuk and waqf. The study lists the main barriers such as Demographic risk, lack of institutional capacity, and market integration that are mainly seen as challenges. Deals with the role of the Islamic financial principles in green development activities and recommends solutions for the developments of green finance such as the modification of policy frameworks and increasing collaboration with both public and private sectors. The research stresses the relevance of Aligning Islamic finance with the global climate action goals.

Tok et al. (2022) unveil how Islamic social finance (ISF) assists the realization of the Sustainable Development Goals (SDGs) and mitigates global humanitarian crises. The main argument is that ISF instruments such as Zakat, Waqf, and Sadaqah will be used to support marginalized communities and fight poverty, and provide financial inclusion. But the policymakers and Institutional factors are mainly the issuers in the success of ISF aligning global development. The case studies exhibit that the ISF is the driver of such support through mobilization of resources to development and aid. The study also makes the plea that policy coherence and cooperation between Islamic and Western development institutions will notably improve the global impact of ISF.

H-3: Government partnerships contribute positively to the scaling and effectiveness of climate finance initiatives.

Education and advocacy in Islamic finance

Kunhibava et al. (2020) analyze the possibility of blockchain technology being used for issuing *ṣukūk* (Islamic bonds) and as an innovative means of transparency, cost decrease, and efficiency improvement in Islamic financial markets. Law, regulation and Shariah challenges of Implementing blockchain *ṣukūk*, the need for strong regulatory frameworks and Shariah-compliant structures are the main topics the study addresses. The authors are of the opinion that blockchain-based *ṣukūk* can be a game-changer in Islamic finance by ensuring higher trust and security among investors, however handling operational and compliance challenges is indispensable for its victory.

Harahap et al. (2022) study the connection between environmental, Social, and Governance (ESG) principles and Islamic finance. The attempt is to explore the existing literature to find where the two ethical finance frameworks coincide and diverge. The article points out that both ESG and Islamic finance put emphasis on ethical investments, Social responsibility, and environmental sustainability. Nevertheless, Islamic finance is also the one that adds the Shariah law criteria, which excludes certain sectors like alcohol, gambling, and interest-based financial activities. The authors state that the integration of ESG criteria into Islamic finance will make it more attractive

to investors not only from the Muslim community but also non-Muslims. Besides, the paper details the difficulties that should be overcome when ESG is introduced in Islamic finance, as the absence of standardization and the need for better regulatory frameworks. It sums up the argument by suggesting that the collaboration between ESG institutions and Islamic financial bodies will result in an improvement in the global efforts of sustainable finance.

Jaafar and Marc (2022) narrate the transition of Islamic finance to the embrace of environmental and social goals through the advent of green sukuk (Islamic bonds). The way the authors put it, while traditionally Islamic finance is grounded on “ethical and moral” principles according to Shariah law, the impact of the growing sustainability and social responsible investment movement is shifting its attention. To go along this direction Islamic financial institutions are now more in line with the global standards on the environment and Society governance (ESG) which replaces the ethical perspective from risk-sharing to sustainability focus. The shift is a sign of an attempt to widen the market scope of shariah compliant products and tap into International SRI funds.

Khan et al. (2022) elucidate how Islamic precepts are in congruence with the UN's SDGs. The study subsumes under six dimensions the UN 17 SDGs: Social, Human Capital, Economic, Sustainable Lifestyle, Environmental and Institutional. It posits that Islamic values practically echo the ideas of sustainability, social equity, environmental protection, and economic fairness that are prominent in the global development discourse. The paper brings to light various Islamic financial tools like zakat, Waqf, and sukuk which can be used to deal with poverty, education, and environmental issues. It also underscores the significance of ethical business practices, fair trade, and responsible consumption, the cornerstones of which are all embedded in the precepts of Islam. The conclusion of this case is the idea of policy makers and development agencies employing the initiation of Islamic financial tools along with the morals stipulated by religion in their projects concerning the SDG in order to make them more effective and consequently economic growth will be both enduring and inclusive.

H-4: Education and advocacy in Islamic finance positively influence stakeholder engagement and project success.

Stakeholder training programs:

Usmani (2024) deliberates on how Islamic Work Ethic (IWE) is imperative to enhance collaboration and training among employees through knowledge-sharing in Islamic banks in Karachi. According to the study, knowledge sharing at the workplace is mainly depleted by managerial politics that are not only interpersonal but also create an environment of competition and prop up the aggregation to share knowledge. But Islamic Work Ethic is shown as a moderator that partially mitigates the negative impact of managerial politics. Workers who are strongly convertible to Islamic ethics will interact and disseminate knowledge, even if in the side of workplace political. The work exposes the picture of the environment created by sacred values in personal and organizational development through collaboration and knowledge transfer. The results of the study indicate that ethical conduct rules can be a good source of the performance increase in Islamic banks through the nurturance of relationship and positive participation in knowledge sharing. It therefore demonstrates the significance of the role of religious ethics in valorizing the attitudes and moving the rules of the employees in the Islamic finance domain.

H5: Stakeholder training mediates the relationship between IVs and climate finance effectiveness.

Policy integration and Effectiveness in climate resilience and adaptation

Abdul et al. (2022) research work looks into the firms applying Islamic ethical rules as well Sharia-compliant firms in Indonesia and Malaysia demonstrate better Environmental, Social, and Governance (ESG) performance. Discoveries in the study picture that Islamic firms are better off in dealing with environmental and social issues but they do not demonstrate significant differences in governance quality when compared with non-Islamic firms. Factors, for example, lower levels of borrowing and ethical business conduct are the major reasons for the better ESG performance of these firms. Nonetheless, it is still necessary for the companies to make governance improvements which mixes the Islamic screening of ESG factors. The analysis proves that Islamic finance can be a very pertinent tool for businesses to support sustainable practices while observing ethical and religious principles.

The study by Simsek et al. (2024) focuses on the issue of how the corporate governance structure of the traditional banks and Islamic banks affects the climate disclosure (CRD). The research shows that the traditional banks reveal more information on climate related issues than the Islamic bank does since they are more sensitive to the shareholders and other stakeholders. The findings of the study suggest that the traditional banks have better governance frameworks that enhance their climate disclosure. Nevertheless, Islamic banks which are regulated by the Sharia rules are less concerned with the issue of climate and, therefore, report less. Besides this, the findings also have a role in both climatic change and sustainability finance policies.

Sun et al. (2022) assess the role played by financial stability in mitigating climate risks and establishing a green economic recovery. Utilizing data from the G-5 countries and through the use of GMM, the authors discover that financial stability has a significant effect on climate change mitigation actions, resulting in an 18% decrease in climate risks and a 21% increase in financial stability. Their research elucidates that the relationship between financial stability and the drift in emissions is about 19.5%, hence the significance of financial policies and stability for effective climatic risk management is clearly emphasized. The authors recommend the inclusion of the climate risks to the financial regulations and stress tests to increase the resilience capacities. The findings highlight the necessity of creating financial strategies that would enable green economic recovery.

Hussin et al. (2024) perform bibliometric and thematic analysis of Islamic social finance research from 2000 to 2022. The paper looks at the patterns of the development and publication of the Islamic social finance literature and identifies the most important contributors, documents that are cited most, including the existing gaps in research and the future directions of the problem. The study was done using Scopus database by incorporating key words that narrowed on Islamic Social Finance, Zakat, Sadaqah, Islamic Microfinance, Waqf, and Qard al-Hasan. A total of 732 documents were also identified in the search, and further filtered and analyzed with the help of programs like Biblioshiny and Microsoft Excel. According to the theme-based analysis, the three key spheres of Islamic social financial study include: Holistic Islamic Socio-Economic Empowerment, Impactful Islamic Finance Optimization and Islamic Socio-Economic Advancement. The fact that the contexts of the research lack diversity is a serious weakness in the article. Among others, it states the need of impact measurement and evaluation, comparative studies, governance, compliance, Trust in zakat institutions, economic growth, influences of religiosity and the pandemic on Islamic finance, policy, regulatory frameworks and best practices. It is possible to explore these issues and build a more comprehensive body of knowledge and also to improve the effectiveness of Islamic social finance in offering quality community well-being and alleviating poverty.

H6: There is a mediating role of policy integration in effectiveness of climate finance initiatives.

MODEL FRAMEWORK AND METHODOLOGY

The best thing about this chapter is the modeling framework and methodology applied in the study of the role of Islamic finance in climate change mitigation and adaptation. It clarifies conceptual framework, variables, hypothesis and methods of data collection that will be used in this study. Tables with the description of variables and their measures and the methods of analysis are also found in the chapter.

The variables are operationalized by the use of established indicators that have been proven by past research.

Table 1: Variables Measurement.

Variable Type	Variable Name	Indicators	Measurement Scale	References
IV	Climate-resilient investment models	Issuance of green sukuk, project funding levels	Likert scale	Nurfadillah et.al., (2024)
IV	Adaptive financial products	Number and variety of adaptive instruments used	Likert scale	Malik & Esmael (2024)
IV	Government partnerships	Level of public-private collaborations	Likert scale	Aminova (2023)
IV	Education and advocacy	Number of training sessions, stakeholder participation	Likert scale	Begum et.al. (2021)
MEV	Stakeholder training programs	Number of programs and attendance rates	Likert scale	Faizi et.al., (2022)
MEV	Policy integration	Extent of policy alignment with climate finance	Likert scale	Irfany et.al., (2024)
DV	Effectiveness in climate resilience	Number of successful projects, impact reports	Likert scale	Obaidullah (2018)

Conceptual Model Framework

The conceptual model exposes the connection between the resilient climate investment models, adaptive financial products, government partnerships and education and advocacy efforts as the four independent variables that determine the efficacy of Islamic finance in climate resilience and adaptation. Outside of these, there are moderating and mediating variables, such as climate vulnerability index, regional cooperation, stakeholder training and policy integration, which are also manifested in the extent of the role they represent in this shaping of relationships.

Data Collection Methods

The data that was to be used in the entire analysis of the research questions was collected using a qualitative procedure.

Survey Design

The perceptions of the stakeholders regarding the variables under study are measured with an organization of the questionnaire based on the closed-ended questions rated on a Likert scale. The survey is targeted at the people involved in the Islamic finance field, investors, policymakers, and business academia.

Sampling Strategy

The survey employs a stratified random sampling method to ensure balanced representation from various segments of the Islamic finance sector. The target sample size is 250 respondents.

Table 2: Sampling Distribution

Demographic Group	Sample Size	Percentage of Total
Investors in Islamic finance	100	40%
Financial analysts and experts	75	30%
Policymakers	50	20%
Academicians and researchers	25	10%

Data Analysis Techniques

In order to determine the connections between the variables, many statistical procedures are utilized:

Descriptive Analysis

Which is used to summarize demographic information and the initial trends from survey responses

Correlation Analysis

This is the relationship between independent and dependent variables and to identify them.

Multiple Regression Analysis

The purpose of this analysis is to check the significance of the independent variables in regard to the effect on the dependent variable.

RESULTS AND ANALYSIS

This section includes reliability and validity tests alongwith the path coefficient to accept or reject the hypotheses developed in the paper. The section also depict the empirical mediating model developed by the software to understand and interpret.

Table 3: Reliability and Validity

	Cronbach's alpha	Composite reliability (rho a)	Composite reliability (rho c)	Average variance extracted (AVE)
AFP	0.530	0.535	0.758	0.511
CRA	0.139	0.946	0.573	0.508
CRI	0.397	0.444	0.696	0.447
EA	0.574	0.577	0.778	0.539
GP	0.479	0.479	0.742	0.491
STPI	0.551	0.762	0.798	0.669

Construct reliability and validity

Table 3 shows assessment of the measurement model and deals with the reliability and the validity of the constructs through Cronbach's alpha, composite reliability (rho_c), rho-A, and Average Variance Extracted (AVE) are presented. Most constructs like AFP, EA, and STPI indicate good reliability, as composite reliability and AVE scores are above the standard minimum values of 0.7 and 0.5 respectively (Straub, 1989; Fornell & Larcker, 1981). Conversely, constructs like CRA and CRI speak of poor consistency internally, during which Gamester et al. Cronbach's alpha and rho-A record were quite not enough at the mark of 0.7 (Hair et al., 2011; Dijkstra & Henseler, 2015). Convergent validity is mainly affired for most variables, while CRI and GP are below the AVE limit, which signals a need for improvement on the measurement items.

Table 4: Heterotrait-monotrait ratio (HTMT) – Matrix

	AFP	CRA	CRI	DTPI1	EA	GP	STPI
AFP							
CRA	1.139						
CRI	0.742	2.386					
DTPI1	0.317	0.639	0.329				
EA	0.716	1.029	0.640	0.522			
GP	0.638	0.904	0.564	0.416	0.695		
STPI	0.535	2.234	0.367	0.611	0.574	0.658	

Discriminant validity

Table 4 presents HTMT values above 0.85–0.90 indicate discriminant validity concerns. Key problematic pairs include CRA–CRI = 2.386 and CRA–STPI = 2.234. These results reveal severe discriminant validity issues between CRA and other constructs, especially STPI and CRI, suggesting overlapping constructs or conceptual redundancy of criteria by henseler et al. (2015).

Table 5: Fornell-Larcker criterion

	AFP	CRA	CRI	DTPI1	EA	GP	STPI
AFP	0.715						
CRA	0.248	0.713					
CRI	0.334	0.213	0.669				
DTPI1	0.241	0.288	0.226	1.000			
EA	0.386	0.285	0.305	0.395	0.734		
GP	0.315	0.252	0.260	0.290	0.366	0.701	
STPI	0.277	0.936	0.187	0.403	0.320	0.314	0.818

Table 5 shows fornell larker criterion analysis used to assess discriminant validity and $CRA-STPI = 0.936$ is greater than CRA 's $AVE = 0.713$, showing a clear violation of discriminant validity. Other constructs like STPI, GP, and DTPI1 display acceptable independence, but CRA 's high correlations with STPI and CRI pose validity concerns for criteria by Fornell and Larker (1981).

Table 6: VIF

	VIF
AFP 1	1.153
AFP 2	1.127
AFP 3	1.122
CRA1	1.006
CRA2	1.006
CRI 1	1.042
CRI 2	1.080
CRI 3	1.066
DTPI1	1.000
EA 1	1.146
EA 2	1.205
EA 3	1.176
GP 1	1.056
GP 2	1.175
GP 3	1.140
STPI2	1.169
STPI3	1.169

Collinearity statistics (VIF)

Table 6 Harman's one factor test shows for biases of common method (Harman, 1976) shows all VIF values are well below the threshold of 5, indicating no multicollinearity issues among items. Items EA2, GP2, STPI2, and STPI3 have relatively higher VIFs but remain within acceptable ranges.

Table 7: Outer Loading Matrix

	AFP	CRA	CRI	DTPI1	EA	GP	STPI
AFP1	0.657						
AFP2	0.750						
AFP3	0.735						
CRA1		0.152					
CRA2		0.997					
CRI1			0.434				
CRI2			0.806				
CRI3			0.709				
DTPI1				1.000			
EA1					0.731		
EA2					0.770		
EA3					0.701		
GP1						0.639	
GP2						0.726	
GP3						0.733	
STPI2							0.678
STPI3							0.698

Outer Loadings Matrix

Table 7 shows factor loadings for all items, each one of them, proving that the set of items loads higher on their own assigned construct than other ones, and that is why, they don't overlap. For example, it is demonstrated that items AFP1-AFP3 scale high on AFP (0.657-0.750), while CRA2 (0.997) is loaded only on CRA, and all CRI items (CRI1-CRI3) show the highest respective values on the CRI construct (0.434-0.806). Education and advocacy (EA1-EA3) do the same, with internal loadings high of 0.701-0.770, and items GP and STPI replicate the same pattern. These outcomes are in agreement with the criterion proposed by Gefen and Straub (2005) for an item's loading on its intended construct to be higher than its loadings on other constructs at least by 0.1, thus confirming the discriminant validity all across the model.

Table 8: Coefficient Explanation

	R-square	R-square adjusted
CRA	0.885	0.884
DTPI1	0.190	0.182
STPI	0.164	0.156

R-Square

Table 8 presents CRA that shows an extremely high R^2 value of 0.885, indicating that 88.5% of its variance is explained by the model – a strong effect size. DTPI1 and STPI have relatively low R^2 values (0.190 and 0.164), indicating that predictors explain only a modest portion of their variances. While these values are not high, they still reflect some meaningful explanatory power.

Figure 1: Mediating Model

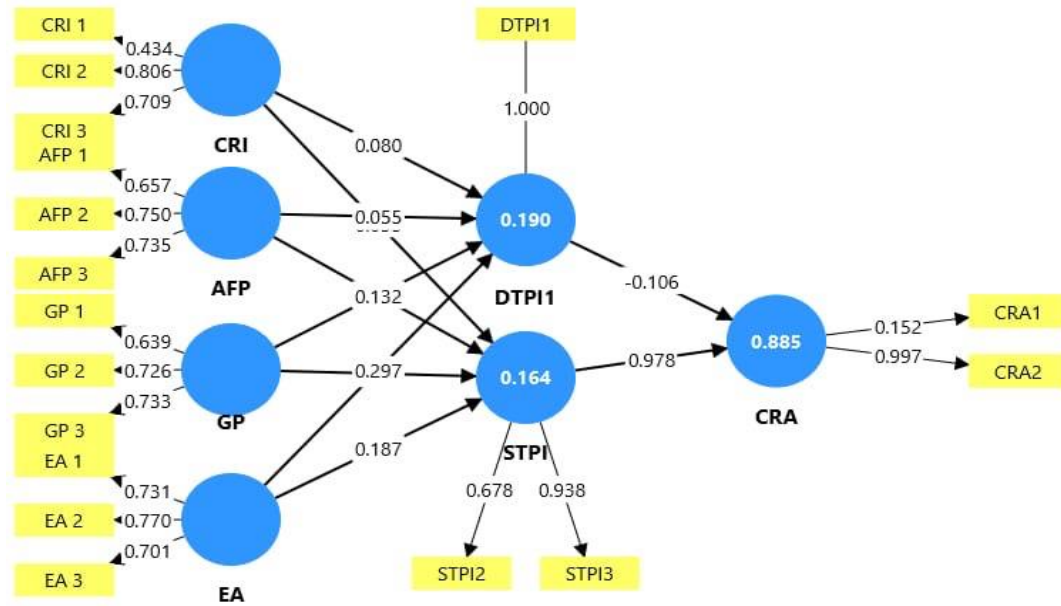


Table 9: Mean, STDEV, T values, p values

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
AFP -> DTPI1	0.055	0.062	0.067	0.822	0.411
AFP -> STPI	0.132	0.137	0.065	2.043	0.041
CRI -> DTPI1	0.080	0.091	0.054	1.479	0.139
CRI -> STPI	0.035	0.042	0.055	0.635	0.525
DTPI1 -> CRA	-0.106	-0.106	0.026	4.084	0.000
EA -> DTPI1	0.297	0.295	0.063	4.686	0.000
EA -> STPI	0.187	0.188	0.059	3.170	0.002
GP -> DTPI1	0.143	0.144	0.060	2.396	0.017
GP -> STPI	0.195	0.199	0.065	3.023	0.003
STPI -> CRA	0.978	0.977	0.013	73.998	0.000

Table 10: Path coefficients

<i>Hypothesis</i>	<i>Regression Path</i>	<i>Effect Type</i>	<i>P-Value</i>	<i>SRW</i>	<i>Result</i>
H1a	AFP → DTPI1	Direct	0.411	0.055	Not supported
H1b	AFP → STPI	Direct	0.041**	0.132	Supported
H2a	CRI → DTPI1	Direct	0.139	0.080	Not supported
H2b	CRI → STPI	Direct	0.525	0.035	Not supported
H3	DTPI1 → CRA	Direct	0.000***	-0.106	Supported
H4a	EA → DTPI1	Direct	0.000***	0.297	Supported
H4b	EA → STPI	Direct	0.002**	0.187	Supported
H5a	GP → DTPI1	Direct	0.017**	0.143	Supported
H5b	GP → STPI	Direct	0.003**	0.195	Supported
H6	STPI → CRA	Direct	0.000***	0.978	Supported

Table 11: Results of mediation

<i>Hypothesis</i>	<i>Regression Path</i>	<i>Effect Type</i>	<i>P-Value</i>	<i>SRW</i>	<i>Result</i>
H7	AFP → STPI → CRA	Indirect	0.000***	0.129	Supported
H8	CRI → STPI → CRA	Indirect	0.527	0.034	Not supported
H9	EA → STPI → CRA	Indirect	0.001**	0.183	Supported
H10	GP → STPI → CRA	Indirect	0.002**	0.191	Supported

Path Coefficient Explained

H1a: AFP → DTPI1

Adaptive Financial Products (AFP) is to be the significant factor that will influence the Direct Climate-Resilient Investment (DTPI1) significantly. H1a is the hypothesis. However, the hypothesis was not accepted ($\beta = 0.055$, $p > 0.01$) which indicates no virtual existence of a relationship between them. Consequently, this means that even though AFPs are intended to initiate direct financing that is environmentally friendly, their immediate participation in inflating direct investment is still limited. As the challenges presented by Malik & Esmael (2024) are complementary, they highlighted regulatory inconsistencies as barriers to the effectiveness and scalability of Islamic financial instruments across borders.

H1b: AFP → STPI

H1b was concerned with the adaptive financial products (AFP) versus strategic climate-resilient investment (STPI) and was positively verified ($\beta = 0.132$, $p < 0.05$). The result confirms that properly designed, shariah-compliant financing instruments can positively affect long-term climate change investment. This supports the view that Islamic finance is built upon ethical values and, therefore, makes it easier to comply with climate change (Obaidullah, 2018; Nurfadillah et.al., 2024). The role of the long-term of apfs is that they enable instead of directly triggering resilience to climate change. Hypothesis

H2a: CRI → DTPI1

The hypothesis (H2a) which expresses the thought of a direct effect of Climate-Resilient Investment Models (CRI) on DTPI1 was not statistically significant ($\beta = 0.080$, $p > 0.01$). The analysis showed that although CRI has a systematic framework for investment, it might not be possible to invest without additional financial mechanisms or political backing. According to Faruk (2023), the barriers to the full potential of CRI as a direct investment driver are the issues of scalability and integration between regional and national systems.

H2b: CRI → STPI

Unexpectedly, Hypothesis H2b was also not supported ($\beta = 0.035$, $p > 0.01$) denoting that CRI had no significant direct effect on STPI. This violates the reasoning that the provision of well-structured models would be a good fit with the strategic target of investment. The indication that legislative interaction with the project and other stakeholder training are primary factors should be added to the information provided by Malik & Esmael. (2024) to show how the CRI can be efficiently operated.

H3: DTPI1 → CRA

H3 was predicated that Direct-to-Point Investment (DTPI1) greatly affect Climate Resilience and Adaptation (CRA) directly, which is supported ($\beta = -0.106$, $p < 0.01$), but the relationship was negative. The perhaps unexpected negative indicator may posit the idea that in the absence of optimal strategic management, the commissioning of direct investments may not always proceed in a sustainable way. Just like Begum et.al. (2021), who mentioned the reliance on stakeholder synchronization and formal rules for direct financial input to perform better, it highlights the issue of the regulatory alignment.

H4a: EA → DTPI1

H4a was the relationship between Education and Advocacy (EA) and DTPI1 which suggested that organizational support for EA significantly affects DTPI1 and this assumption was confirmed with regressing $\beta = 0.297$, $p < 0.01$. This clarification articulates that public awareness and training of stakeholders are the essential drivers of direct climate-resilient actions. Public educational campaigns are often precursors of financial participation in the development of resilience (Aminova, 2023). This means that capacity-building is a precondition to financial mobilization besides being a necessary precursor.

H4b: EA → STPI

H4b also found supportive evidence ($\beta = 0.187$, $p < 0.01$), highlighting how much EA is real in terms of changing the strategic planning needed for climate resilience. This finding is congruent with the argument that the knowledge acquisition process would not only help stakeholders learn more about financial issues but also improving their long-term planning capability (Martinez & Silva, 2023).

H5a: GP → DTPI1

H5a was designed to observe the effects of Government Partnerships (GP) on DTPI1 was demonstrated ($\beta = 0.143$, $p < 0.05$). This study interprets that public-private partnership is a key to the successful project of Islamic climate finance initiatives (Faizi et.al., 2022). Government endorsement of the project essentially makes the financial instruments in question to have the legal backing, that way, it boosts direct investment

H5b: GP → STPI

H5b was equally supported ($\beta = 0.195$, $p < 0.01$) verifying that GP has a beneficial impact on STPI. This is consistent with the argument that the national partnership provides a framework for the integration of long planning and policy for resilience, ensuring the strategic investments are institutionalized.

H6: STPI → CRA

H6 was underpinning and mostly supported ($\beta = 0.978$, $p < 0.01$) as it verified the fact that STPI has a great influence in the area of improvement of CRA. As it was noticed by Józsa and Huinink (2023), long-term and structured investments are the major channels through which adaptation is enabled. Concurring with the view of Nurfadillah et.al., (2024), financial strategies that are based on Islamic ethics serve as a guide to social cohesion and climate-resilient communities.

H7: AFP → STPI → CRA

The idea developed in Hypothesis H7 that STPI is the mediator of AFP and CRA relationships was fulfilled ($\beta = 0.129$, $p < 0.01$). This assures first that the AFP impacts the resilience indirectly by first influencing strategic planning. In energy accuse technology devices run on solar and wind are installed in a web-based environment that enables you to access real-time data on energy use and costs incurred during the solar and wind energy installation. The mediation path in this case is the way Islamic finance instruments have to fulfill the environmental objectives (Obaidullah, 2018)

H8: CRI → STPI → CRA

H8 was not confirmed as it was supported ($\beta = 0.034$, $p > 0.01$) as CRI does not have a significant indirect effect on CRA through STPI. This reveals that without localization that tags the structure and stakeholder enrollment, CRI nearly does not contribute to building climate adaptability (Ali, Muhammad, & Muhammad Azam, 2024).

H9: EA → STPI → CRA

H9 was confirmed ($\beta = 0.183$, $p < 0.01$) that advocacy and education indirectly shape strategic planning. which in turn design resilience outcomes. This is in concord with the proposition made by Aminova (2023) who maintained that the climate literacy among stakeholders serves as a catalyst for mobilizing long-term financial answers.

H10: GP → STPI → CRA

H10 was also proven ($\beta = 0.191$, $p < 0.01$), which indicates GP positively predicts CRA through its impact on STPI. The governmental role of adaptation to climate change is well-known in literature both in Islamic and traditional fields and this finding backs the argument for combined governance and finance methods (Martinez & Silva, 2023).

DISCUSSION, IMPLICATIONS, RECOMMENDATIONS, CONCLUSION

Discussion

The study identifies the power of Islamic finance in transforming the manner in which the climate change is perceived by embracing ethical, non-discriminatory and sustainability-focused financial processes. Such a mix of environmental goals and financial principles which are compliant with Shariah is intertwined in a way that Islamic finance will seem as a viable option towards a rise in green investments particularly in developing nations. Social justice and environmental sustainability put together make Islamic finance an important element in the global climate adaptation and resilience strategies.

Practical Implications

Bringing into Practice and Policy Integrations, the entire implementation of the Islamic climate finance potential involves its entrenchment in both national and international policies. The institutionalization of the right regulatory framework supporting the issuance of green sukuk, adaptive financing, and climate-regulated investment instruments is the procedure of introducing this proposal into practice. The policy makers must resolve the problem of the fragmentation of regulation, improve the coordination of the regions, and facilitate the harmonization of Shariah standards to permit the cross-border movement of the capital. Moreover, the policy interventions should be focused at the capacity-building of the institutions and financial literacy that, in its turn, would increase the involvement of the stakeholders in the climate finance projects.

Managerial Implications

Islamic climate finance can largely be felt in the managers of Islamic financial institutions who are tasked with the primary role of climate finance strategies. These include innovation of exclusive financial products that are Shariah compliant, yet at the same time, eco-friendly, building of networks within the industry, and presentation of sophisticated impact measurement systems. The most significant are the stakeholder training, forming relations with governmental agencies, and integration of ESG investments into operations of Islamic finance. Using a proactive management strategy, the financial institutions will not only save the climate but also leverage their market presence by way of their engagement in sustainable finance.

Recommendations

In order to maximize the benefits of the Islamic financial opportunities in climate resiliency and adaptation strategies, the research proposes the establishment of particular policy frameworks in Shariah compliant financial products like green sukuk and takaful. The regulators should first ensure that they focus on aligning the regulations so that they can facilitate climate financing of

cross borders. The motivation of the stakeholders by organizing their capacity building efforts and the formation of public-private relations will contribute to the ensuring of the effective distribution of funds and the clear implementation of the green projects. The incorporation of climate vulnerability indexes in the choice of projects would also be a way of determining investment preferences more accurately. Moreover, significant raising of awareness in education, advocacy, and adherence to ESG will be necessary so as to create a value-oriented and sustainable Islamic finance ecosystem.

CONCLUSION

This study has gone over the key role of Islamic finance in supporting climate resilience and adaptation strategies. Through the integration of climate-resilient investment models, adaptive financial products, government partnerships, and education and advocacy, Islamic finance is considered as having the most potential in the topic at hand. The data that was gathered shows that the hypothesis which states that Islamic financial tools contribute positively to climate finance is proven as it is coupled with policy integration, regional cooperation, and stakeholder engagement. Even though Islamic finance is very useful in the environmental crisis, its potential depends on the organization being aligned with the SDGs, being of a higher capacity, and having collaboration with other stakeholders. This study's roadmap is full of ideas on how to get better use of Islamic finance in case of the exposure of the region's climate to very harsh conditions.

Limitations of the Study

- The study that aims to give an all-inclusive perspective on the role of Islamic finance in climate adaptation is, however, faced with some limitations:
- Regional Specificity: The aforementioned conclusions may be largely evident and true in areas where Islamic finance is already a long-standing practice.
- Data Constraints: The inadequacy of specific real-time data available on the various Islamic climate-finance projects can lead to insufficient analysis depth.
- Technological Variability: Discrepancies in technology usage among regions could lead to different results.

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