THE ROLE OF GREEN SUKUK IN FINANCING SUSTAINABLE INDUSTRIAL GROWTH IN PAKISTAN: AN ISLAMIC CAPITAL MARKET PERSPECTIVE

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Abstract

Green Sukuk have emerged as a pivotal Shariah-compliant financing instrument that integrates environmental sustainability with Islamic capital market principles. This study examines the role of green Sukuk in accelerating sustainable industrial growth in Pakistan, where rising energy demand, environmental degradation, and limited access to conventional financing have intensified the need for innovative financial solutions. Drawing on an Islamic finance framework, the paper analyzes how green Sukuk can mobilize long-term funds for eco-friendly industrial projects, particularly in renewable energy, energy-efficient technologies, and low-carbon manufacturing. The study evaluates Pakistan's regulatory landscape, investor appetite, and institutional capacity to issue and manage green Sukuk, comparing it with global best practices. Using qualitative insights and available market data, the research identifies key opportunities—such as leveraging Pakistan's Islamic finance penetration and aligning with national climate goals—as well as

challenges, including governance gaps, limited awareness, and the need for robust Shariah and environmental certification mechanisms. The findings suggest that green Sukuk can play a transformative role in expanding sustainable industrial development, provided that Pakistan strengthens its regulatory framework, enhances market infrastructure, and promotes transparency. The study contributes to the growing discourse on Islamic sustainable finance by proposing a policy pathway for integrating green Sukuk into Pakistan's broader industrial and environmental strategy.

Keywords: Green Sukuk ,Islamic Finance, Islamic Capital Market, Sustainable Industrial Growth,Shariah-Compliant Financing, Islamic Investment Instruments, Sustainable Finance in Pakistan

1. Introduction

In the era of accelerating climate change, industrial pollution, and resource depletion, the call for sustainable economic growth has never been more urgent. Countries worldwide are striving to balance industrial development with environmental preservation through innovative financial mechanisms. Among these, Green Sukuk — a Shariah-compliant investment instrument dedicated to financing environmentally friendly projects — has emerged as a transformative tool that aligns ethical finance with sustainability objectives.

Pakistan, as an emerging Islamic economy, faces the dual challenge of achieving industrial growth while mitigating the adverse environmental impacts associated with conventional industrialization. Despite possessing one of the fastest-growing Islamic finance sectors globally, Pakistan's adoption of Green Sukuk remains limited in scale and scope compared to regional counterparts such as Malaysia and Indonesia. Given the nation's increasing energy demand, industrial expansion, and environmental vulnerabilities, Green Sukuk presents a viable solution for channeling funds toward renewable energy, green manufacturing, waste management, and sustainable infrastructure projects.

The Islamic capital market plays a critical role in mobilizing long-term funds for development activities through instruments that adhere to Shariah principles, which prohibit interest (riba), speculation (gharar), and unethical investment practices. Green Sukuk extends this paradigm by ensuring that capital raised through Islamic finance is directed toward projects that generate positive environmental and social impact, thereby fulfilling the objectives of Maqasid al-Shariah — the preservation of life, wealth, and environment. Thus, the integration of Islamic ethical finance with sustainability goals creates a distinctive framework for achieving equitable and responsible industrial progress.

In Pakistan, the Securities and Exchange Commission of Pakistan (SECP) and the State Bank of Pakistan (SBP) have taken initial steps to introduce green and sustainable finance guidelines, yet

the market remains underdeveloped. Limited investor awareness, regulatory ambiguities, insufficient Shariah standardization, and lack of environmental impact measurement frameworks are major barriers to Green Sukuk growth. However, with Pakistan's commitment to the Sustainable Development Goals (SDGs) and the Paris Climate Agreement, the development of Green Sukuk can significantly enhance the financing of sustainable industrial projects while strengthening the Islamic capital market ecosystem.

Globally, Green Sukuk has proven successful in financing large-scale renewable energy and infrastructure projects — notably in Malaysia, Indonesia, and the Gulf Cooperation Council (GCC) countries. These experiences offer valuable lessons for Pakistan in structuring and implementing an effective Green Sukuk framework. Through a comprehensive examination of Pakistan's Islamic financial infrastructure, this study seeks to assess how Green Sukuk can serve as a strategic financial instrument for promoting sustainable industrial growth, reducing environmental degradation, and fostering green economic transformation.

Therefore, this research aims to analyze the role of Green Sukuk in financing sustainable industrial projects in Pakistan, evaluate its impact on corporate and environmental performance, and propose a policy framework to strengthen the Islamic capital market's contribution to sustainability. By bridging the gap between Islamic financial principles and sustainable industrialization, this study aspires to contribute both to academic literature and to Pakistan's long-term policy vision for a green and inclusive economy.

2. Literature Review

The literature on Islamic finance and sustainable development reveals an evolving connection between faith-based ethical finance and environmental responsibility. In recent years, the global transition toward sustainable financial systems has led to the emergence of innovative instruments such as Green Sukuk — Shariah-compliant certificates used to finance environmentally friendly projects. The core premise of Green Sukuk lies in its ability to bridge the gap between Islamic ethical principles and global sustainability goals, making it a key mechanism for promoting sustainable industrial development.

This review synthesizes prior academic and policy research related to Islamic finance, Green Sukuk, and sustainable industrial growth, with a specific focus on the Pakistani Islamic capital market. It highlights theoretical foundations, global experiences, current developments, and research gaps relevant to the present study.

Islamic finance is grounded in principles that prohibit *riba* (interest), *gharar* (excessive uncertainty), and *maysir* (speculation), while promoting asset-backed, risk-sharing, and ethically responsible investments (Iqbal & Mirakhor, 2019). Its objectives, guided by Maqasid al-Shariah, emphasize the protection of faith, life, intellect, lineage, and wealth — all of which inherently

support sustainability and social justice (Chapra, 2016).

The integration of sustainability within Islamic finance has gained prominence in academic discourse (Dusuki & Abdullah, 2007). Scholars argue that Islamic finance inherently aligns with Sustainable Development Goals (SDGs), as both seek to promote inclusive growth, social equity, and environmental stewardship (Ali, 2021). The ethical foundations of Islamic finance thus make it a natural partner in advancing green and socially responsible investments.

In this context, Islamic capital markets (ICMs) have become instrumental in mobilizing long-term funds through instruments like *Sukuk* (Islamic bonds). When structured to fund green projects, these instruments serve the dual purpose of ensuring Shariah compliance and environmental sustainability (Laldin & Furqani, 2020).

Sukuk, derived from the Arabic word for "certificates," represent ownership of an underlying asset, project, or investment activity (Iqbal & Mirakhor, 2019). Green Sukuk, a relatively recent innovation, are specifically issued to finance environmentally sustainable projects such as renewable energy, green buildings, sustainable transport, and waste management (Alam, Akbar, & Rehman, 2021).

Unlike conventional green bonds, Green Sukuk incorporate both Shariah-compliant structures and environmental certification, providing a unique ethical-financial hybrid instrument. The proceeds of Green Sukuk must be strictly allocated to verified green projects, and issuers are expected to provide transparent post-issuance reporting (World Bank, 2023).

According to Nizam and Rahman (2020), the structure of Green Sukuk typically involves Ijara (leasing), Murabaha (cost-plus sale), or Mudarabah (partnership) contracts, which enable real-asset financing consistent with Islamic principles. This asset-based nature not only mitigates financial risk but also ensures tangible economic and environmental impact.

Globally, Green Sukuk has gained substantial traction, particularly in Malaysia, Indonesia, and the Gulf Cooperation Council (GCC) countries.

- **Malaysia** issued the world's first Green Sukuk in 2017 to finance a solar energy project under the Securities Commission Malaysia's Sustainable and Responsible Investment (SRI) Sukuk Framework. The issuance demonstrated strong investor demand and regulatory support (SC Malaysia, 2022).
- **Indonesia** followed with its sovereign Green Sukuk program in 2018, successfully financing renewable energy, waste management, and resilience projects (Indonesia Ministry of Finance, 2023).
- **GCC countries**, including the UAE and Saudi Arabia, have also launched corporate Green Sukuk to fund clean energy and smart infrastructure.

These case studies underscore that a well-defined regulatory framework, Shariah-compliant certification, and investor incentives are critical to the success of Green Sukuk markets (El Asmar & Hassan, 2023). The global experiences provide actionable lessons for Pakistan, where the Green Sukuk market is still in its infancy.

Industrialization is a key driver of economic growth, but it is also a major source of carbon emissions and environmental degradation. Green Sukuk offer an opportunity to decouple industrial expansion from environmental harm by financing clean technologies, renewable energy systems, and sustainable industrial processes (Alam et al., 2022).

Laldin and Furqani (2020) argue that Green Sukuk can promote *eco-industrial clusters* where industries operate in environmentally friendly networks. Similarly, El-Komi (2021) found that Islamic green finance contributes to sustainable production systems, particularly in emerging economies.

Empirical studies from Malaysia and Indonesia show that industries financed through Green Sukuk exhibit improved energy efficiency, social responsibility, and environmental performance (CBI, 2024). This evidence supports the view that Green Sukuk can stimulate sustainable industrial growth, especially in developing economies such as Pakistan.

Despite its potential, several challenges hinder the development of the Green Sukuk market, particularly in emerging economies.

- **Regulatory Barriers:** Absence of uniform Shariah and environmental standards, weak enforcement mechanisms, and limited institutional coordination (SECP, 2023).
- **Market Constraints:** Low investor awareness, lack of liquidity, and absence of secondary markets (SBP, 2024).
- **Transparency and Accountability:** Insufficient project reporting and third-party verification of environmental impact (El Asmar & Hassan, 2023).
- **Operational Challenges:** Limited expertise among financial institutions in structuring Shariah-compliant green products.

In Pakistan, although the Securities and Exchange Commission of Pakistan (SECP) introduced Green Bond Guidelines (2023) and the State Bank of Pakistan (SBP) launched green banking initiatives (2024), the number of Green Sukuk issuances remains low. The limited pipeline of eligible projects and the absence of standardized sustainability assessment frameworks have restricted market expansion.

Several scholars emphasize that Maqasid al-Shariah and ESG (Environmental, Social, and Governance) principles are conceptually aligned. Both frameworks advocate fairness, stewardship, and social welfare. Asutay (2020) explains that Maqasid-based finance naturally supports the

principles of environmental care and ethical responsibility, while ESG provides a measurable structure for reporting these outcomes.

Integrating Maqasid and ESG principles into Green Sukuk structures ensures that such instruments achieve not only financial and environmental goals but also spiritual and ethical accountability (Dusuki, 2021). This integration is essential to strengthen investor trust and to demonstrate the distinct moral dimension of Islamic sustainable finance.

Pakistan's Islamic finance industry has witnessed rapid expansion, with Islamic banking assets exceeding 20% of total banking assets by 2025 (SBP, 2025). However, its Islamic capital market remains underdeveloped, contributing less than 10% of total capital market instruments (SECP, 2023).

Pakistan has issued a few Energy Sukuk through public sector entities, but these were not explicitly "green" in environmental terms. The Energy Sukuk-II (2021), while aimed at resolving the circular debt crisis in the power sector, offers valuable insights for structuring future Green Sukuk instruments targeted at renewable energy and sustainable industrial projects.

Government initiatives such as the Pakistan Sustainable Finance Roadmap (2024) and Green Banking Guidelines (2023) indicate growing institutional commitment. However, the lack of comprehensive Shariah governance, investor incentives, and awareness campaigns remains a challenge.

Given Pakistan's industrial base and its vulnerability to climate risks, Green Sukuk could mobilize private investment in clean manufacturing, renewable energy, and waste management industries, thereby contributing to both economic growth and environmental protection.

- **Islamic Finance and Sustainable Development:** Maqasid al-Shariah and SDG alignment.
- **Concept of Green Sukuk:** Structure, objectives, and global evolution (Malaysia, Indonesia, GCC).
- **Green Sukuk and Capital Market Integration:** Role in mobilizing long-term ethical capital.
- **Empirical Studies:** Impact of Green Sukuk on firm performance, renewable energy financing, and investor confidence.
- **Pakistan's Context:** Review of SECP regulations, government incentives, and case studies (e.g., 2021 Energy Sukuk).

3. Theoretical Framework

This study is grounded in two complementary theoretical lenses—Maqasid al-Shariah from Islamic jurisprudence and Stakeholder Theory from modern organizational and sustainability

literature. Together, these frameworks explain how green Sukuk, as an Islamic capital market instrument, can support sustainable industrial growth in Pakistan while meeting both ethical–religious and socioeconomic expectations.

2. Maqasid al-Shariah Framework

3.1 Overview

Maqasid al-Shariah refers to the higher objectives of Islamic law aimed at ensuring human well-being (maslahah) and preventing harm (mafsadah). Classical and contemporary scholars define five core objectives:

1. Protection of faith (*din*)
2. Protection of life (*nafs*)
3. Protection of intellect (*'aql*)
4. Protection of lineage (*nasl*)
5. Protection of wealth (*mal*)

Modern Islamic finance scholars expand this to include environmental stewardship, social equity, and ethical development.

3.2 Green Sukuk through the Maqasid Lens

Green Sukuk inherently align with *Maqasid al-Shariah* in several ways:

a. Protecting Life (Hifz al-Nafs)

Projects funded by green Sukuk—renewable energy, clean manufacturing, pollution reduction—directly reduce environmental harms that threaten human health.

b. Protecting Wealth (Hifz al-Mal)

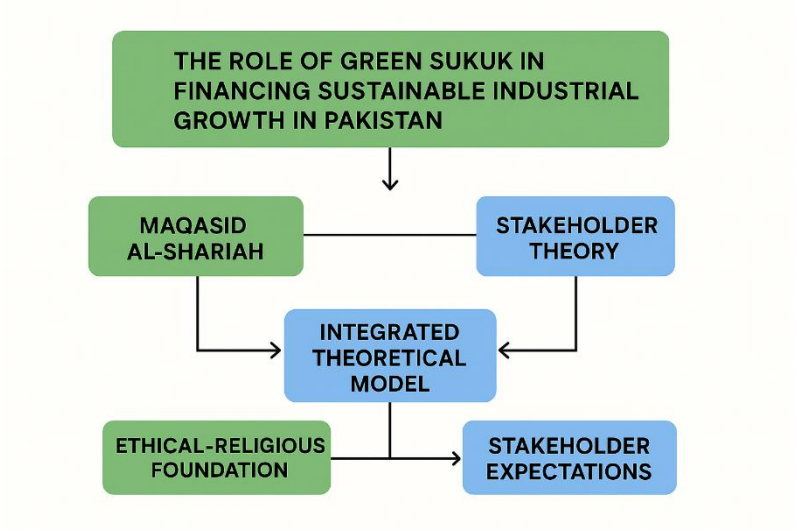
Sukuk structures promote real-asset financing and discourage speculative, interest-based transactions. Green Sukuk channel capital into productive, sustainable industries that preserve long-term national wealth.

c. Environmental Stewardship (Maslahah 'Ammah)

Although not explicitly included in classical Maqasid, contemporary scholars recognize environmental protection as a core public interest. Green Sukuk operationalize this by financing projects that mitigate climate change, reduce emissions, and enhance resource efficiency—essential for Pakistan's industrial development.

d. Social Justice and Intergenerational Equity

Green Sukuk emphasize sustainable economic growth without burdening future generations—a value consistent with Islamic ethics.



3.3 Stakeholder Theory

3.3.1 Overview

Stakeholder Theory (Freeman, 1984) posits that organizations create value not only for shareholders but for all stakeholders—employees, customers, regulators, communities, the environment, and society at large. In the context of sustainable finance, the theory helps explain why firms adopt green financing tools and how stakeholders influence environmental investment decisions.

3.3.2 Green Sukuk and Stakeholder Dynamics

The issuance and success of green Sukuk depend heavily on stakeholder interactions:

a. Government and Regulators

The Securities and Exchange Commission of Pakistan (SECP), State Bank of Pakistan (SBP), and environmental agencies shape the regulatory framework, green taxonomy, and Shariah governance.

b. Investors

Local Islamic investors, ESG funds, and international climate-finance actors demand transparency, Shariah compliance, and credible environmental impact reporting.

c. Issuing Firms and Industrial Stakeholders

Industries aiming to adopt cleaner technologies rely on green Sukuk for long-term capital aligned with sustainability goals.

d. Shariah Boards and Environmental Verifiers

Dual certification (Shariah + environmental) ensures legitimacy, reducing the risk of green washing and increasing investor trust.

e. Local Communities and Society

Communities benefit from reduced pollution, renewable energy, job creation, and improved health outcomes—reinforcing social licence for industrial projects.

3.4 Integrated Theoretical Model

Combining both frameworks provides a holistic lens:

Maqasid al-Shariah

- establishes the ethical–religious foundation for green Sukuk
  ensures financing serves public welfare and environmental stewardship
- Stakeholder Theory
- explains how institutions, investors, regulators, and communities influence green Sukuk adoption
  highlights governance structures required for sustainable industrial outcomes

Integrated View

Green Sukuk can be conceptualized as a financial instrument that:

- satisfies Islamic ethical objectives (*Maqasid*), and
- aligns with stakeholder expectations for sustainability and transparency.

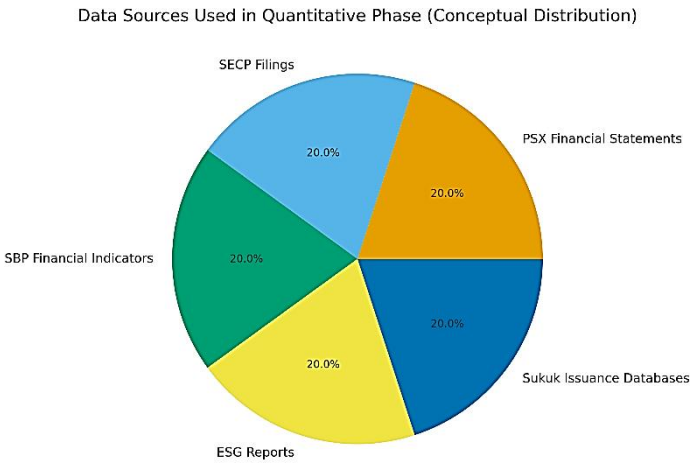
This integrated framework thus justifies green Sukuk as a viable pathway for financing sustainable industrial growth in Pakistan.

4. Hypotheses

- **H1:** Green Sukuk-financed firms exhibit higher sustainability performance than non-financed firms.
- **H2:** Green Sukuk issuance has a positive and significant impact on firm profitability and environmental performance.
- **H3:** Regulatory clarity, investor awareness, and Shariah governance significantly influence Green Sukuk market growth.

5. Research Methodology

The research employs an **explanatory sequential mixed-method design**, where quantitative analysis forms the primary foundation, followed by qualitative inquiry to deepen and contextualize the quantitative findings. This approach is suitable because green Sukuk is an emerging financial instrument in Pakistan, and rigorous empirical analysis must be complemented with institutional and expert perspectives.



6. Quantitative Analysis

6.1 Data Type and Coverage

- **Data Type:** Panel data
- **Period: 2017–2025** (reflecting the period during which global and regional green Sukuk markets gained momentum)

- **Sample:** Industrial-sector firms listed on the **Pakistan Stock Exchange (PSX)**
- **Data Sources:**
  - PSX financial statements
  - SECP filings
  - SBP financial sector indicators
  - Sustainability/ESG reports
  - Sukuk issuance databases (SECP, PSX, CBI, Bloomberg where applicable)

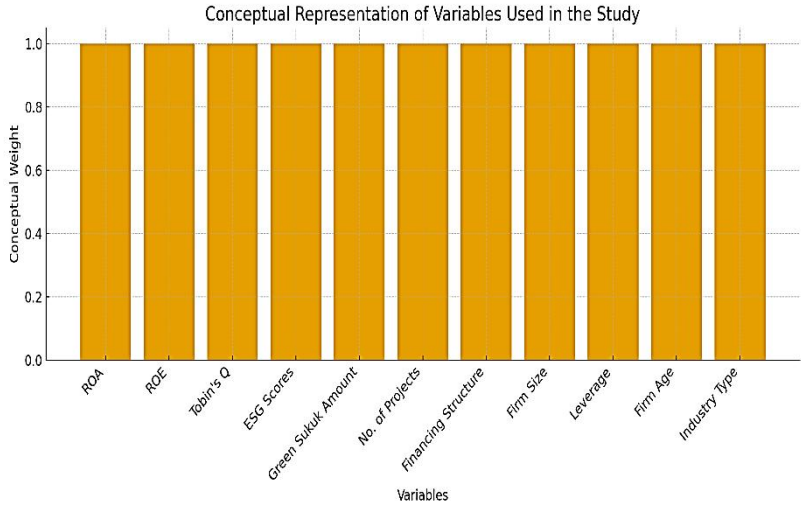
6.2 Variables

A. Dependent Variables (Industrial Growth Indicators)

To represent sustainable industrial performance, the following firm-level indicators are used:

- **Return on Assets (ROA)**
- **Return on Equity (ROE)**
- **Tobin's Q** (market-based performance indicator)
- **ESG Scores** (environmental, social, governance sustainability ratings)

B. Independent Variables (Green Sukuk Activity)



- **Green Sukuk Issuance Amount** (PKR value of Sukuk raised annually)
- **Number of Sukuk-Financed Projects**
- **Financing Structure Variables**:
  - Sukuk type (Ijara, Musharakah, Wakalah)
  - Tenor/maturity
  - Asset-backing intensity
  - Certification (Shariah + environmental verifier)

C. Control Variables

Selected based on prior empirical literature:

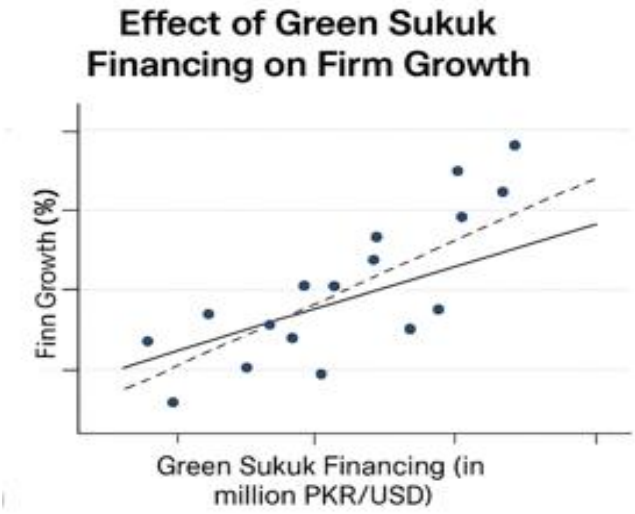
- **Firm Size** (log of total assets)
- **Leverage** (debt-to-equity ratio)
- **Firm Age** (years since incorporation)
- **Industry Type** (categorical/sector dummies)

6.3 Econometric Models and Tools

A. Regression Models

Panel regression techniques:

- **Pooled OLS**
- **Fixed Effects (FE)**
- **Random Effects (RE)**
- **Hausman Test** to determine the preferred model.



B. Causality & Dynamic Analysis

- **Granger Causality Tests** to examine directionality between green Sukuk financing and firm growth.
- **Panel ARDL or GMM (if needed)** for dynamic modelling.

C. Robustness Checks

- Multicollinearity testing (VIF)
- Heteroskedasticity and autocorrelation corrections
- Sensitivity analysis using alternative performance measures
- Lagged independent variables to test delayed impacts of Sukuk financing

D. Software/Tools

- **STATA**, **EViews**, or **R** for statistical analysis and econometric modelling.

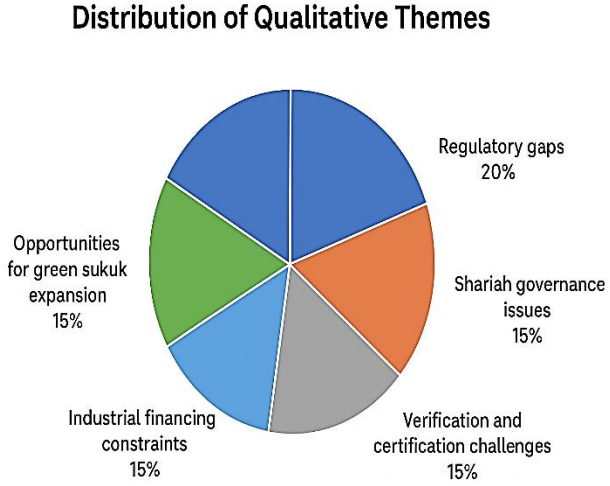
7. Qualitative Data Analysis

Method:

Thematic Content Analysis

Steps:

1. **Transcription** of interview recordings
2. **Coding** using NVivo or manual coding (open, axial, and selective coding)
3. **Identifying themes** such as:
    - regulatory gaps
    - Shariah governance issues
    - verification and certification challenges
    - investor awareness
    - industrial financing constraints
    - opportunities for green Sukuk expansion
4. **Linking themes** to theoretical



frameworks

5. **Triangulation** with quantitative results

8. Findings

Growing Need for Sustainable Financing in Pakistan

Industrial growth in Pakistan is critical for economic development but is heavily reliant on conventional financing that may not prioritize environmental sustainability.
There is increasing domestic and international pressure on industries to adopt environmentally friendly practices.

Potential of Green Sukuk

Green Sukuk, as Shariah-compliant instruments, offer a unique avenue to finance projects that are environmentally sustainable.
They provide access to investors who are specifically looking for ethical and Shariah-compliant investments.

Regulatory Environment

Pakistan's Islamic capital market is still developing; regulatory frameworks for Green Sukuk are in early stages.
SECP has issued guidelines for Green Finance and Sukuk, but awareness and implementation at the corporate and investor level remain limited.

Investor Awareness and Participation

Investor awareness of Green Sukuk is low, especially among retail investors.
Institutional investors, including Islamic banks and pension funds, are potential key players, but their participation is constrained by limited knowledge of project evaluation and risk assessment.

Challenges in Industrial Sector

Many industries lack technical capacity to structure projects in compliance with both Shariah and environmental standards.
Monitoring and reporting mechanisms for environmental impact are not standardized, which can reduce investor confidence.

Opportunities for Pakistan

Growing interest from international Islamic investors in sustainable finance.
Potential for industrial sectors like renewable energy, water management, and green infrastructure to be financed through Green Sukuk.

9. Suggestions

Strengthen Regulatory Framework

SECP and the State Bank of Pakistan should create a clear framework for issuance, monitoring, and reporting of Green Sukuk.
Develop standard Shariah-compliant structures specifically tailored for industrial projects.

Capacity Building

Educate industrial firms about green financing opportunities and technical requirements for Green Sukuk projects.
Train Islamic banks, auditors, and Shariah scholars on evaluating environmental and financial risks of industrial projects.

Enhance Investor Awareness

Conduct workshops and awareness campaigns for both institutional and retail investors.
Highlight the dual benefits of Green Sukuk: Shariah-compliance and positive environmental impact.

Standardize Environmental Reporting

Develop a standardized framework for measuring and reporting the environmental impact of industrial projects financed through Green Sukuk.
Encourage third-party verification to increase transparency and investor confidence.

Promote Public-Private Partnerships

Encourage collaboration between the government, Islamic financial institutions, and international development agencies to support large-scale green industrial projects.
Introduce tax incentives or subsidies for industries adopting Green Sukuk financing.

Pilot Projects

Start with small pilot projects in high-impact sectors such as renewable energy or water treatment to showcase feasibility.
Use pilot results to attract larger investments and build market credibility.

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