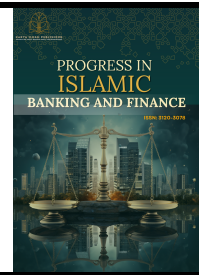




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Developing an Islamic PPP Financing Model using Musharakah and Istisna for Geothermal Projects in Djibouti: A Contribution toward Achieving SDG 7

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ABSTRACT

This study examines the feasibility of implementing an Islamic Public-Private Partnership (PPP) model based on Musharakah (joint venture partnership) and Istisna (construction financing) for Djibouti's Gale La Koma geothermal project, contributing to Sustainable Development Goal (SDG) 7, which aims for affordable and clean energy. The theoretical underpinnings of this study are Islamic finance principles and the literature on public-private partnerships (PPPs), with a focus on ethical investment, risk-sharing, and sustainable infrastructure development. The research implemented a qualitative approach, conducting semi-structured interviews and surveys with key stakeholders, including government agencies, project developers, Islamic financial institutions, and local communities. The findings of this study revealed that the proposed Islamic PPP model can enhance project financing by promoting risk-sharing and adherence to Shariah principles. Nevertheless, challenges such as regulatory alignment, financial sustainability, and integration of Islamic and conventional financing need to be addressed. The study contributes to the growing discourse on integrating Islamic finance into renewable energy projects, providing a framework for expanding geothermal energy development in Djibouti and similar contexts. The added value of this study lies in developing a novel Islamic PPP model tailored to geothermal projects, demonstrating how Islamic finance can support SDG 7 while addressing stakeholder concerns in sustainable energy infrastructure.

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1. Introduction

Djibouti's energy sector primarily relies on imported fossil fuels, such as diesel and heavy fuel oil, which are used to fuel electricity generation, transportation, and industrial activities. Hydroelectricity imported from Ethiopia via an interconnected grid significantly contributes to the domestic energy, generating around 70% of the country's electricity, while domestic diesel-powered facilities account for the remaining 30% [21]. Despite these sources, access to energy remains limited, especially in rural areas, with only 60-70% of the population having access. Urban regions enjoy higher electrification rates, but infrastructure limitations still hinder consistent power availability [43]. The high cost of electricity, averaging US\$0.26 per kilowatt-hour, is well above regional benchmarks and hampers private sector competitiveness [41]. This energy dependency highlights the need for Djibouti to explore alternative, sustainable energy solutions. Geothermal energy offers a promising option for attaining energy security, given Djibouti's position within the East African Rift Valley, which is rich in geothermal potential. The Gale La Koma geothermal project, located in the Lake Asal region, is a key initiative aimed at harnessing this resource. The government of Djibouti, through ODDEG (Office Djiboutien de Développement de l'Energie Géothermique), has led early-stage development with support from development finance institutions (DFIs), such as the African Development Bank (AfDB), Kuwait Fund for Arab Economic Development (KFAED), and the Arab Fund for Economic and Social Development (FADES) (Refer to Table 1) [40]. ODDEG formed a partnership with the Turkish Drilling Company (PARS), carried out the first well drilling, and obtained favourable results. Subsequently, in 2017, ODDEG signed investment agreements with FADES and the Kuwaitis. The total development cost has not been publicly disclosed. Still, the project has secured a US\$24.73 million loan from AfDB and US\$27 million in grants from KFAED and FADES to fund eight exploration wells, two reinjection wells, and the construction of a 15 MW capacity power plant as the initial phase [40]. ODDEG signed a US\$6.5 million drilling contract with KenGen for three wells; however, the EPC and O&M contractor has yet to be appointed. Although financing has been secured for the phase of production drilling, additional funds are needed for the remaining construction and O&M phases (Refer to Figure 1) [40]. The project aims to stimulate local economic development by creating jobs, attracting investment, and promoting industrial growth. Additionally, it seeks to contribute to the country's climate goals by reducing reliance on fossil fuels and lowering greenhouse gas emissions [40].

Despite securing funding for exploration and drilling phases, additional financing is required for the construction and operational phases of the project [2,40]. To bridge the funding gap, Public-Private Partnerships (PPPs) have emerged as crucial mechanisms in Sub-Saharan Africa [21]. PPPs leverage private sector investments, expertise, and technology to deliver successful renewable energy projects. However, their effectiveness varies based on legal frameworks, policies, incentives, and local strategies [20]. Moreover, traditional PPP models often fail to account for local governance limitations, sociocultural contexts, and the demands for risk sharing. Scholars such as Gatzert and Kosub [15] emphasise the need for tailored public-private partnership (PPP) frameworks that effectively distribute risk and, in turn, bolster investor confidence, especially within the context of emerging markets. These frameworks must take into account the unique characteristics and challenges that arise in these regions, including political instability, fluctuating economic conditions, and varying levels of institutional support. In the context of geothermal energy, Kiplagat *et al.*, [29] highlight that exploration risks and regulatory gaps significantly deter private sector involvement. Hence, traditional financing models, which rely heavily on debt-based instruments, have proven insufficient in mitigating the risks associated with geothermal energy projects. In this context, an Islamic Public-Private Partnership (PPP) financing model, based on Musharakah (a joint venture partnership) and Istisna (construction financing), presents a promising alternative.

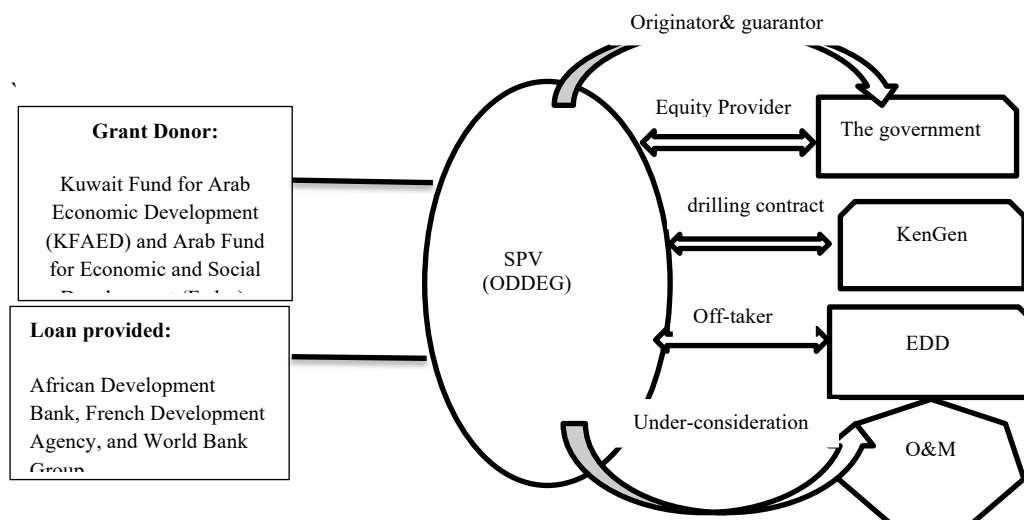
This model supports Djibouti's strategic goal of incorporating Shariah-compliant financing methods into infrastructure development. By encouraging risk-sharing and ethical investment practices, Islamic PPPs can improve financial sustainability, attract private sector investment, and ensure the long-term success of projects. This study examines the feasibility of applying an Islamic PPP model to the Gale La Koma geothermal project, evaluating its relevance from the viewpoints of key stakeholders, including government officials, project developers, Islamic financial institutions, and local communities. By analysing these perspectives, the study aims to contribute both academically through integrating Islamic and infrastructure finance models and practically by proposing a contextualised model aligned with SDG 7.

Table 1

Project development timeline and partners of Gala La Koma project

Milestone	Details
Initial exploration and planning	Led by the Government of Djibouti and ODDEG (Office Djiboutien de Développement de l'Énergie Géothermique)
First drilling (positive outcome)	Conducted in partnership with PARS (a Turkish Drilling Company)
Funding agreement (2017)	Signed with the Kuwait Fund (KFAED) and the Arab Fund for Economic Development (FADES)
Additional financing	USD 24.73 million loan from AfDB + USD 27 million in grants
Drilling contract with KenGen	USD 6.5 million to drill three new wells

Source: Constructed by the author based on the UNIDO Report (2023)



Source: Constructed by the Authors based on UNIDO (2023)

Fig. 1. Geothermal financing structure for the Gale La Koma project

2. Review of the Literature

The World Bank defines a Public-Private Partnership as a long-term contract between a private party and a government entity to provide a public asset or service, with the private party bearing significant risk and management responsibility, and remuneration linked to performance [46]. Based on the World Bank's definition, the key features of PPPs are I. long-term contractual agreements, II. Inclusion of brownfield (existing) or greenfield (new) assets, III. Bundling of project phases (design,

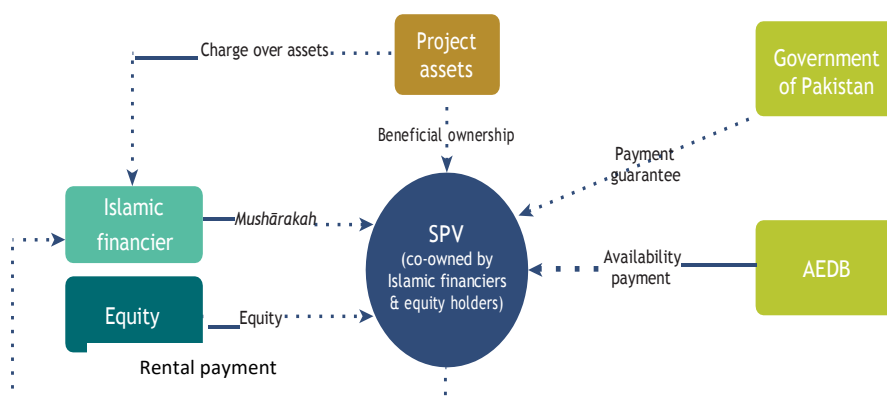
build, rehabilitate, finance, maintain, and operate) with private involvement in technical asset operations, IV. Risk-sharing between private and public parties, and V. payment mechanisms involving user fees, government payments, or a combination thereof, with remuneration tied to performance [46]. Public-Private Partnerships (PPPs) have become a central mechanism for financing and implementing large-scale infrastructure projects, including those in the renewable energy sector. They enable risk-sharing, encourage capital investment, and promote the transfer of technical expertise between the public and private sectors, thereby contributing to sustainable infrastructure development [11]. PPPs are particularly important for East African countries seeking to accelerate infrastructure development, especially in the renewable energy sector. They harness the strengths of both sectors to drive sustainable energy development [31]. The Africa Oil & Gas Report also highlights the importance of PPPs for emerging geothermal projects in Africa [4]. Given the substantial initial expenses and associated risks, these partnerships allow governments to access the expertise and financial efficiency of the private sector. Ongoing PPP initiatives in many developing countries, such as solar PV parks, hydroelectric power stations, and expressways, are often implemented under BOT and BOOT models [3,46].

These models enable private firms to recover their investments through long-term operations before the eventual transfer to the state, which is essential in countries with limited public financing capacity [38,45]. Countries such as Kenya, Ethiopia, Uganda, Tanzania, and Djibouti have adopted different PPP models such as Build-Own-Operate (BOO), Build-Own-Operate-Transfer (BOOT), and Build-Operate-Transfer (BOT) to attract private investment, share project risks, and leverage technical expertise. A notable example is Kenya's Olkaria III geothermal project, where PPPs successfully attracted long-term investment and overcame financial barriers [11]. Its success has spurred further BOO-type developments in the Menengai, Akiira, and Barri geothermal fields. Additionally, Kenya's Lake Turkana Wind Power Project was implemented under a BOT-like structure with private investors financing and operating the project before transitioning it to government control [13]. For Djibouti, the PPP model presents a strategic opportunity to attract private capital for the Gale La Koma geothermal project while maintaining state oversight and regulation. However, traditional PPP financing models rely on interest-bearing debt, exacerbating Djibouti's debt issues and hindering the country's goal of generating all its electricity from renewable energy by 2035.

Islamic finance offers a Shariah-compliant alternative, emphasising risk-sharing, ethical investment, and the avoidance of interest (*riba*). These principles are particularly well-suited to renewable energy and other infrastructure-heavy projects, given their emphasis on asset-backed and socially responsible financing. Research increasingly supports Islamic PPPs as a means of addressing development challenges in sectors like healthcare, poverty alleviation, and renewable energy, especially in Sub-Saharan Africa [16]. Scholars have introduced the concept of "heterodox PPPs," which blend conventional finance with Islamic economic ethics to appeal to a broader audience [29]. Islamic PPP models such as *istisna'-ijarah* (construction and leasing), *wakalah-ijarah* (agency and leasing), and *musharakah-ijarah* (partnership and leasing) provide viable structural alternatives. For example, the DCT port terminal in Dubai adopted a four-part Islamic structure, comprising *musharakah*, *istisna'*, *ijarah*, and *takaful*, to deliver a high-capital infrastructure project [36]. Moreover, Pakistan's Patirind Hydropower Project, which combined *musharakah* (partnership) during construction with *ijarah* (leasing) in the operational phase [44]. Additionally, Jordan employed a hybrid financing model for the Al Qatrana Power Plant, combining *Istisna* and *Ijarah*. *Istisna* is a contractual agreement for the construction of the power plant. The subsequent *Ijarah* contract facilitates leasing the completed plant to NEPCO (National Electric Power Company), thereby ensuring a steady income stream post-construction [31]. This combination of financing tools not only mitigates risk for investors but also supports the Build-Operate-Transfer (BOT) ethos, allowing for a

smooth transition of ownership once the project reaches maturity [39]. Furthermore, the involvement of private equity investment and government subsidies underscores the importance of collaborative financing in fostering large-scale infrastructure projects. Government support, particularly from entities like the Islamic Development Bank, provides critical backing that enhances the project's viability and aligns it with national energy goals [31,39].

Similarly, the UAE's Sharjah Waste-to-Energy Plant employs a hybrid financing model that merges Musharakah and Ijarah contracts to deliver a sustainable energy solution. The Musharakah agreement between Bee'ah (the Sharjah environment company) and Masdar (the Abu Dhabi Future Energy Company) represents a profit-sharing partnership, where both parties invest and share the risks and rewards of the project [8]. This form of cooperative financing aligns interests and encourages mutual commitment to the project's success. Complementing this is the Ijarah contract, which covers the leasing of the state-of-the-art equipment and facilities necessary for power production [24]. This duality in financing ensures that both operational and capital expenditure needs are met while conforming to Islamic finance principles [8,24]. Moreover, the long-term concessions under which these entities operate, along with government-backed payment guarantees, provide additional security to investors, thereby reducing the perceived risks associated with public infrastructure projects. This supportive regulatory environment can attract further investments into sustainable energy ventures, boosting the region's economic growth while addressing energy demands and environmental concerns [8,24].



Source: World Bank 2017

Fig. 2. Master wind project Islamic finance structure

The effective implementation of Islamic PPP models depends on establishing a comprehensive legal framework, transparent policies, clearly defined procedures, and designated institutional roles. Efficient public financing management, strategic geographic positioning, competitive procurement processes, proper risk distribution, well-structured contracts, technological progress, effective negotiation skills, transparency, accountability, risk-sharing, and adherence to Islamic principles are vital elements. First and foremost, strong Shariah governance and compliance are crucial for the success of the Islamic PPP model. This involves explicit guidelines for structuring contracts, executing transactions, and resolving disputes based on Islamic principles, ensuring that all financial dealings conform to Shariah law [6,19,42]. Having independent and effective Shariah boards or advisory committees, separate from the project sponsors, is essential to ensure compliance, which encourages trust among Islamic investors and maintains the integrity of the model [45]. If Shariah

compliance is unclear or inconsistent, the unique advantages of Islamic finance may not be fully realised, potentially deterring prospective investors from entering the Islamic finance market. Gundogdu [17] demonstrated, through qualitative methods, that adherence to Maqasid al-Shari'ah, Shariah principles, and mobilisation of resources from Islamic capital markets are key factors for the successful deployment of the Islamic Public-Private Partnership (PPP) model. Kasri [27] examined the determinants of PPP implementation across 57 OIC Muslim countries from 2015 to 2019. The study found that regulatory quality, political stability, the Islamicity Index, and inflation positively influence the implementation of PPPs for funding public infrastructure.

Secondly, the inherent strength of Islamic finance lies in risk-sharing and profit-loss arrangements rather than risk transfer. Instruments such as Musharakah and Istisna align investor incentives with project performance. This structure improves transparency and accountability, which are essential for long-term infrastructure projects [18,19]. For geothermal projects, instruments like Musharakah and Istisna offer an innovative way to share exploration risk, technology risk, and operational risk among public entities, private developers, and Islamic financiers. This approach clearly establishes profit-and-loss sharing ratios and exit strategies, which are crucial for transparency and investor confidence [36]. Thirdly, thorough project feasibility and financial viability are vital for the successful implementation of the Islamic PPP model. Regardless of the financing approach, the underlying project must be financially viable and technically sound. This involves detailed feasibility studies, strong financial modelling demonstrating healthy cash flows, reliable revenue streams (e.g., stable Power Purchase Agreements for geothermal), and proven technology [14]. While Islamic finance emphasises ethical considerations, it still requires projects to deliver sufficient returns to attract investors and ensure sustainability.

Alongside the stated factors, Maqasid Al Shariah provides comprehensive guidance for transforming the concept of sustainable energy into action. The extant literature has considered the Maqasid Shariah as a performance appraisal for green projects, including renewable energy projects. For instance, a study conducted by Julia *et al.*, [26] ascertained that the sustainability of green firms is positively related to the Maqasid Al-Shariah. Similarly, Nsouli [36] considers Maqasid Shariah as a performance appraisal to assess the application and performance of the Islamic PPPs model in green projects. In addition, Nur Hidayat *et al.*, [37] argue that renewable energy production and consumption align with the five objectives of Maqasid Al-Shariah: religion, intellect, life, wealth, and lineage. Protecting the environment, which was created by God as a trust, upholds faith, the first objective. The use of non-renewable energy contributes to greenhouse gas emissions and environmental disasters that pose a significant threat to human existence. Therefore, investing in renewable energy safeguards life, the second objective. The environment facilitates human civilisation, requiring the use of intellect, the third objective. Sustainable development, as defined by the Brundtland Report, aligns with the fourth objective by ensuring that resources are available for future generations. Finally, Allah emphasises the importance of protecting natural resources, as exploitation leads to disasters, addressing the fifth objective [37]. Focusing on these key success factors, East African nations can effectively integrate Islamic finance principles into their Public-Private Partnership frameworks, unlocking significant capital for geothermal and other sustainable infrastructure projects, while ensuring equitable, transparent, and socially responsible development.

Table 2
Key Enablers for effective Islamic PPP implementation

Enabler	Description
Regulatory Quality & Policy Support	A robust legal and regulatory environment, including clear PPP frameworks and Shariah-aligned policies, fosters investor confidence and project sustainability.
Technical & Financial Understanding	Capacity-building initiatives for stakeholders to understand both PPPs and Islamic finance structures improve project viability.
Market Liquidity & Political Will	Ensuring accessible financial markets and political commitment supports large-scale investment in renewable energy.
Shariah Compliance & Maqasid al-Shari'ah	Islamic financing aligns with environmental stewardship and social justice—core tenets of Shariah—thereby supporting the Sustainable Development Goals (SDGs), particularly SDG 7 on affordable and clean energy.

Source: Constructed by the author based on World Bank [46], Kasri [26], and Julia et al., [25]

3. Research Methodology

This study adopts a qualitative case study approach to assess the feasibility of the Islamic PPP financing model for the Gale La Koma geothermal project. The case study method allows for an in-depth exploration of stakeholder perceptions, financing challenges, and the practical implementation of Islamic finance within Djibouti's energy sector. The study relies on semi-structured interviews, a Qualitative survey as primary data collection methods and document analysis as secondary data. Semi-structured interviews are conducted with key stakeholders, including government officials, project developers, and Islamic financial institutions. The interview Questions focused on financing challenges, risk mitigation strategies, and the feasibility of an Islamic PPP model. Document Analysis was based on reviewing policy reports, government publications, and financial feasibility studies on geothermal projects in Djibouti. It includes case studies of Islamic PPPs in infrastructure development from other countries. A qualitative survey is conducted with community Stakeholders, including residents, business owners, academics, and civil society members, to gather perspectives on the social, environmental, and economic impacts.

3.1 Data Analysis

Thematic Analysis: A thematic analysis approach is employed to identify and interpret recurring themes and patterns in stakeholder responses. This method enables the organisation of data into categories that address the study's core questions regarding Islamic PPP models, geothermal project financing, and stakeholder engagement. The themes and patterns extracted from the coding process are interpreted to build a nuanced understanding of the factors influencing the feasibility and effectiveness of Islamic PPP financing models within Djibouti's geothermal sector.

4. Results and Discussion

This study employed thematic analysis, following Clarke and Braun's [10] six-phase approach to identify and interpret key themes emerging from qualitative data. The central themes identified are: Environmental and Community Impact, Stakeholder Involvement, PPP Viability for Renewable Energy Projects, and The Role of Islamic PPP Models in Renewable Energy (RE) Development and Capacity Building. The theme, Environmental and Community Impact, highlights the importance of geothermal energy in promoting sustainable development in Djibouti. Clean energy production, job creation, and improvements in health and education infrastructure are among the significant benefits. The success of Kenya's Olkaria project exemplifies these impacts, demonstrating the broad

socio-economic value geothermal energy can deliver to local communities. Stakeholder Involvement emerged as a vital enabler across all other themes. The engagement of government bodies, international partners, academic institutions, and local communities ensures that geothermal projects are not only technically sound and financially feasible but also socially inclusive. Stakeholders play crucial roles in regulation, resource management, financing, and local capacity building, creating a foundation for community-focused energy development. The viability of Public-Private Partnerships (PPP) is emphasised as a strategic mechanism to overcome financial barriers to geothermal development in Djibouti. By attracting private capital and sharing financial risks, PPPs can stimulate infrastructure growth while ensuring long-term project sustainability. This theme closely aligns with environmental and community outcomes, as well as stakeholder roles, demonstrating how PPPs can integrate public goals with private investment. Ultimately, the Islamic PPP Model offers a Shariah-compliant financing alternative that aligns with ethical and sustainable principles. Instruments like Musharakah, Istisna, and Green Sukuk provide culturally and religiously resonant funding mechanisms for Djibouti's Muslim-majority population. This model not only diversifies the financial landscape but also deepens trust, community engagement, and the inclusion of Islamic financial institutions, thereby complementing the traditional PPP approach and reinforcing stakeholder collaboration. Collectively, these interconnected themes outline a comprehensive approach to implementing socially responsible, financially viable, and environmentally sustainable geothermal energy projects in Djibouti.

5. Developing an Islamic PPP Model for Gale-Le-Koma

Gale La Koma serves as an ideal case study for applying an Islamic PPP model integrating Musharakah (partnership) and Istisna (construction financing). It embodies the need for risk-sharing, institutional involvement, gaps in existing financing structures, and the opportunity to implement Shariah-compliant models for energy infrastructure. It also suggests a co-financing approach that combines both conventional and Islamic institutions.

1. Financial Structure

Musharakah (Joint Venture Partnership): As the main financing structure, Musharakah involves shared equity, profits, and risks between government and private investors. It facilitates public-private collaboration, allowing pooled resources to support geothermal project development. In the geothermal sector, Musharakah can be employed during the exploratory and drilling stages, where both the government and private investors contribute equity. This joint effort helps distribute risks related to exploration (e.g., the possibility of not discovering sufficient geothermal resources), which is vital given the sector's high risk and capital needs at early stages. Because geothermal projects are long-term, Musharakah can be structured to allow phased ownership and profit-sharing. This might mean private investors receive a larger share of profits in the initial years to recover their investments more quickly, gradually balancing profit distribution as the project progresses. **Istisna:** Geothermal projects require specialised expertise and technology for drilling, steam field development, and power plant construction. Istisna enables the public sector to contract the private sector to deliver infrastructure to precise specifications, ensuring these investments are directly linked to key physical assets. Given the multi-phase nature of geothermal projects (exploration, drilling, construction, operation), Istisna can be tailored with structured payments linked to important milestones (e.g., completion of drilling, power plant construction). This method reduces risk by aligning payments with completed project phases, which is crucial for high-cost geothermal construction.

II. Djibouti's PPP Legal Framework

Djibouti's PPP Act ("Djibouti Loi 2017-186 PPP") and the establishment of a National Shariah Council provide a supportive framework for this financing structure. This law promotes ethical, fair, and socially responsible investment, aligning well with Shariah principles. By setting a transparent, Shariah-compliant foundation, Djibouti can attract Islamic financial institutions to invest in its renewable energy sector, mobilising funds through diverse Islamic financial instruments. The National Shariah Council will further oversee these projects to ensure they comply with Islamic guidelines, reinforcing investor confidence and supporting sustainable energy goals.

Table 3

Alignment of Djibouti's PPP Act with Islamic PPP models

Category	Key Points
1. Principles and Objectives of PPPs	Shariah Compliance: Emphasis on transparency, competition, and fairness aligns with Islamic finance principles. Strategic Goals: Projects that support national development and renewable energy align with Islamic finance's focus on social welfare.
2. Scope and Application	Entities Involved: Public institutions and local authorities can structure large-scale renewable energy projects as PPPs, attracting Islamic finance investors. Flexible Models: The distinction between Public Payment and Concessionary PPPs allows for the use of Islamic finance instruments, such as Sukuk or Ijarah.
3. Institutional Framework	PPP Unit: Ensures Shariah compliance in PPP projects, attracting Islamic financiers. Regulatory Oversight: Bodies such as the PPP Regulation Commission ensure transparency and compliance, which are crucial for Islamic finance.
4. Procedures and Processes	Project Preparation: Comprehensive studies, including environmental assessments, align with Islamic stewardship principles, making projects attractive to Islamic financiers. Fair Bidding: Competitive and transparent bidding processes resonate with Islamic finance's ethical standards.
5. Contract Management	Performance-Based Payments: Islamic finance contracts, such as Istisna or Ijarah, can be structured for payments based on project milestones. Risk Management: Clear definitions of roles support risk-sharing arrangements, which are key in Islamic finance.
6. Amendments and Termination	Flexibility: Provisions for amending contracts help maintain Shariah compliance throughout the project lifecycle, appealing to Islamic investors.
7. Dispute Resolution	Fair Resolution: Dispute resolution methods, such as negotiation, mediation, and arbitration, align with Islamic finance's preference for amicable settlements.
8. Regulatory and Legal Framework	Legislative Alignment: Ensures a stable environment, crucial for attracting long-term Islamic financial investments.

Source: Constructed by the authors.

III. Identifying Stakeholders and Roles

Geothermal projects in Djibouti depend on a diverse range of stakeholders, each crucial to the project's success. The government plays a central role by creating a supportive environment through policies, regulations, and a legal framework conducive to geothermal development. International organisations, including the World Bank, the African Development Bank, and UN agencies, provide vital financial and technical support. Although private sector and financial institution involvement remains limited, an Islamic PPP model utilising Musharakah (partnership) and Istisna (construction-based financing) could encourage participation from private entities and Islamic financial institutions like the Islamic Development Bank (IsDB) and Islamic banks. Effective collaboration and clear communication among these stakeholders are essential to tackling challenges such as high startup costs, environmental impacts, and the need for specialised expertise. By leveraging the resources

and strengths of key stakeholders—including ODDEG, KFAED, FADES, Electricité de Djibouti, IsDB, Islamic banks, and private investors—Djibouti can harness its geothermal resources to advance energy security and sustainable development.

IV. Risk Identification & Risk Management

Geothermal projects face various risks, including those related to exploration, drilling, resource management, as well as organisational risks arising from the involvement of private and Islamic finance institutions. Notably, there are credit risks associated with ODDEG (the steam supplier) and EdD (the buyer). Effective risk management is vital for structuring an Islamic PPP model based on Musharakah (partnership) and Istisna (construction-based financing). The government can reduce early-stage risks by leading initial exploration and drilling, thereby decreasing uncertainties for private investors. Support from development finance institutions (DFIs) such as AfDB, KFAED, and FADES is also essential, offering concessional finance to lower overall project costs and risks. The Djibouti government's Power Purchase Agreement (PPA) policy guarantees a market for generated electricity, providing long-term revenue and decreasing market risk, which is attractive to private investors. The risk-sharing principles of Islamic finance, especially in Musharakah and Istisna, help distribute financial responsibility among stakeholders, aligning interests and alleviating the burden on any single entity. Sovereign guarantees, feed-in tariffs, and tax incentives are additional measures by the government that can enhance project financial viability and attract private investment. Furthermore, the Islamic Development Bank (IsDB) plays a supportive role in project implementation by offering financing, insurance, monitoring, and mobilising co-financing from other Islamic and multilateral banks. Such institutional support aids in reducing operational and financial risks, making the Islamic PPP model for geothermal energy more practical and appealing for investors.

V. Sustainability and Ethical Considerations

In developing an Islamic PPP model for geothermal projects based on Musharakah and Istisna, sustainability and ethical considerations are essential. Environmental and social sustainability are maintained through best practices such as responsible site selection, environmentally friendly drilling, and Environmental Impact Assessments (EIAs) to minimise ecological damage. Engaging local communities is crucial for fair compensation, job creation, and improved infrastructure. Ethical financial practices, grounded in Musharakah and Istisna, promote risk-sharing and equity, aligning with Islamic ethical standards to prevent exploitation. Following Maqasid al-Shariah principles for societal welfare ensures that these PPP models serve both material and spiritual needs, supporting fair and sustainable development (As shown in Table 4). This alignment boosts the legitimacy and acceptance of renewable energy projects, providing shared benefits across environmental, economic, and social spheres.

Table 4

Adherence to Maqasid al-Shariah as a Determinant of Islamic PPP models

Maqasid al-Shariah Objective	Description	Application in the Islamic PPP Model	Citations
Preservation of Religion (Hifz al-Din)	Ensuring compliance with Islamic law in all financial activities.	The PPP model must avoid prohibited activities, such as riba (interest), gharar (excessive uncertainty), and maysir (gambling), and adhere to contracts like Musharakah and Istisna that are Shariah-compliant.	[5]
Preservation of Life (Hifz al-Nafs)	Promoting public welfare and ensuring safety.	The primary aim is to improve the quality of life by developing essential infrastructure, such as geothermal energy projects that provide reliable electricity.	[30]
Preservation of Intellect (Hifz al-Aql)	Enhancing education and intellectual development.	The PPP model should include initiatives for training local workers and fostering technical expertise in geothermal energy projects.	[31]
Preservation of Wealth (Hifz al-Mal)	Ensuring economic justice and sustainable growth.	The Musharakah model promotes fair risk-sharing, preventing exploitation and ensuring wealth is distributed fairly. PPPs should focus on long-term economic sustainability.	[38]
Preservation of Progeny (Hifz al-Nasl)	Protecting the environment for future generations.	Geothermal energy projects should align with environmental stewardship by providing clean energy, reducing environmental impact, and preserving resources for future generations.	[7]
Preservation of Dignity (Hifz al-Ird)	Promoting social equity and justice.	The PPP model should ensure that benefits are equitably shared among all segments of society, with fair treatment of all stakeholders and transparency in transactions.	[1]

Source: Construct by authors.

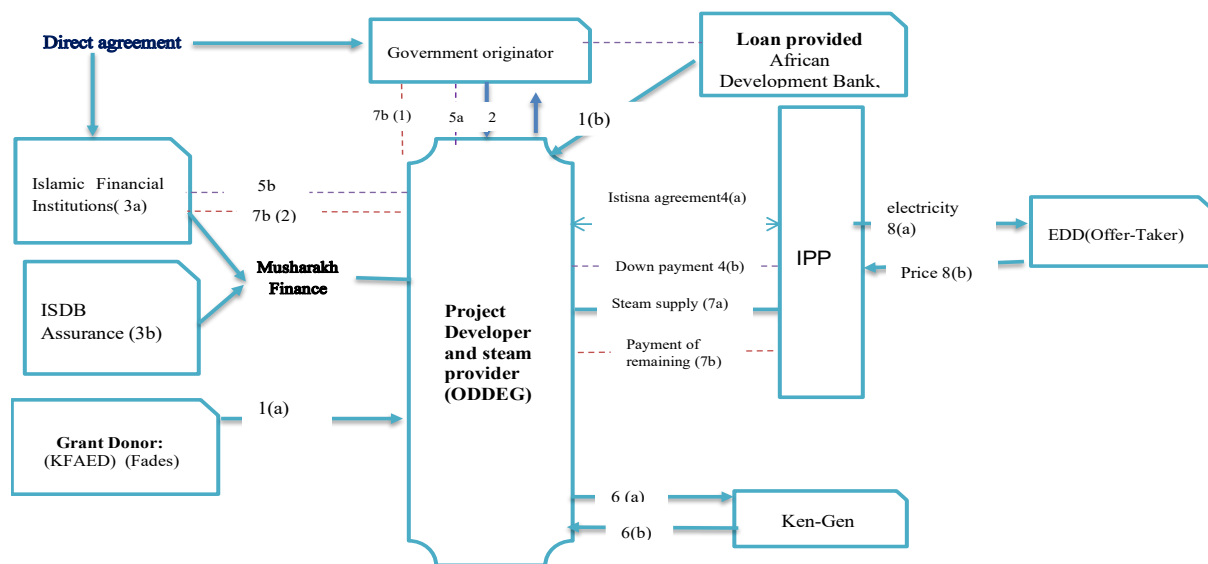


Fig. 3. Proposed Islamic PPP Model Integrating Musharakah and Istisna

Source: Developed by the Islamic finance theory

Illustrations of the Developed Model

- 1) AfDB provided a concessional loan to support the government of Djibouti in developing the Gale la Koma project. In line with this, the Kuwait Fund for Arab Economic Development (KFAED) and the Arab Fund for Economic and Social Development (AFES) provided grants.
- 2) The government of Djibouti remains the sole owner of the project; it has appointed ODDEG as the sponsor company or SPV responsible for managing the project's contracts and steam provision.
- 3) As indicated in Figure 3, the government of Djibouti and Islamic institutions can enter into a Musharakah contract. According to its PPP policy, IsDB can facilitate project implementation, including insurance and monitoring for the geothermal project. The participation of Isdb will encourage other private, as well as local and foreign Islamic banks, to invest in the project. Islamic financial institutions will derive both monetary and non-monetary benefits from their investment in this geothermal initiative. Investing in clean and sustainable energy aligns with the Islamic finance agenda to uphold the objectives of Shariah. As the global shift towards green projects continues, this presents an opportunity for Islamic banks and financial institutions to diversify their portfolios and increase returns. Profits and risks will be shared among the government, Islamic institutions, and private investors.
- 4) The project developer and steam provider will enter an Istisna agreement with the IPP. The IPP will make a down payment to purchase steam produced by ODDEG.
- 5) Payments made by the IPP will be shared between the government and Islamic financial institutions according to the agreed ratios. There is also the possibility that the government of Djibouti will meet its loan obligations and make payments to the African Development Bank.
- 6) The SPV signed a contract with Ken-Gen for drilling and constructing the wells.
- 7) Once steam is produced, ODDEG will transfer it to the IPP based on the agreed MGW. Consequently, the IPP will settle the remaining balance.
- 8) The IPPs will assume responsibility for O&M, producing electricity to be sold to the over-taker EDD under 20-year power purchase agreements (PPAS). The PPA policy aims to reduce credit risk for the purchaser and incentivise other IPPs to participate, thus aiding in providing affordable and sustainable geothermal energy for society.

6. Assessing the Feasibility of the Proposed Model

This study assesses the possible implementation of the proposed model from the perspective of Key stakeholders, namely, government representatives, project developers, and Islamic financial institutions. The stakeholders analyse the viability of the proposed model from diverse aspects, including regulatory framework, risk management, capacity building, economic viability, public acceptance and technical and logistical support.

I. Government Representatives

Government officials view the Islamic PPP model as aligning well with Djibouti's strategic goals for sustainable energy development. The model's emphasis on ethical financing and risk-sharing is admirable, as it resonates with the country's commitment to social welfare and economic growth, particularly among a predominantly Muslim population. While the model is promising, government representatives acknowledge the need to strengthen Djibouti's regulatory framework to accommodate Islamic finance principles fully. They are aware that contracts like Musharakah (partnership) and Istisna (manufacturing) need to be enforceable under local law, which may require legal reforms or the development of new regulatory guidelines. There is also a recognition that government agencies, regulatory bodies, and financial institutions may lack the necessary expertise to effectively manage and oversee Islamic PPPs. Therefore, investment in capacity building and training is seen as crucial for the successful implementation of the model. Government representatives are also concerned about ensuring that the broader population understands and supports the Islamic PPP model. Public education campaigns may be necessary to build trust and acceptance among stakeholders, particularly in rural or less informed communities.

II. Project Developers

Project developers are generally positive about the Islamic PPP model due to its potential to attract investment and share risks. The model is seen to reduce the financial burden on developers by leveraging Islamic finance principles, making projects more economically viable. Developers are particularly interested in the risk-sharing mechanisms inherent in Islamic finance, which can help mitigate the financial risks associated with geothermal projects. However, they emphasise the need for clear guidelines on how these risks will be managed and shared between the public and private sectors. Developers also stress the importance of having strong technical and logistical support from the government, particularly in terms of infrastructure and regulatory approvals. They believe that the success of the PPP model will depend heavily on efficient coordination between various stakeholders. Developers also stress the importance of having strong technical and logistical support from the government, particularly in terms of infrastructure and regulatory approvals. They believe that the success of the PPP model will depend heavily on efficient coordination between various stakeholders.

III. Islamic Financial Institutions

Financial Institutions perceive this model as an opportunity to expand their portfolio into the renewable energy sector, which is increasingly viewed as both ethical and profitable. Nevertheless, they highlight the need for robust risk management strategies, including sovereign guarantees, Takaful institutions and IsdB participation. IsdB, through its network and credibility, can attract private investors and developers interested in participation in geothermal projects, providing confidence through its involvement. Furthermore, they stress the importance of creating awareness and understanding of Islamic financial instruments among the public and potential investors.

IV. Community and Civil Society Perspectives

Communities view the Islamic PPP model favorably, particularly its emphasis on ethical investment and sustainable development. There is optimism that the model will lead to tangible benefits, such as job creation, improved infrastructure, and environmental protection. Additionally, the alignment of the model with Islamic principles increases trust among the local population, who see it as a more ethical and culturally appropriate approach to development.

The local communities express a strong desire for participation in the decision-making process and transparency in project implementation. They are concerned about the potential for land displacement and environmental degradation and seek assurances that these issues will be addressed through inclusive stakeholder engagement and strict adherence to environmental standards.

Table 5

Stakeholder perspectives on Islamic PPP feasibility

Stakeholder Type	Support for Islamic PPP	Key Concern
Government Officials	High	Legal harmonization
Private Developers	Moderate	Risk-sharing mechanisms
Islamic Banks	High	Shariah compliance
Local Community	High	Transparency, inclusive decision-making, land displacement, and environmental risks

Note. Data collected from semi-structured interviews and a qualitative survey conducted by the authors (2024)

7. Conclusion and Recommendation

This study proposed a hybrid Islamic Public-Private Partnership (PPP) financing model based on Musharakah and Istisna contracts to tackle the challenges of financing geothermal energy projects in Djibouti. The model aims to align with Islamic finance principles, especially risk-sharing, transparency, and asset backing, making it suitable for large-scale, capital-intensive projects in emerging economies. The research findings demonstrate that the Musharakah–Istisna framework promotes mutual trust among stakeholders by fairly distributing financial risks and returns between the public and private sectors. This structure offers an innovative alternative to conventional interest-based financing, which often faces compliance and affordability issues in Islamic contexts. Furthermore, the phased approach—from co-investment in early-stage development to structured payments during construction—improves project bankability and implementation efficiency. The practical relevance of the model is confirmed by stakeholder validation, including insights from government officials, Islamic financial institutions, and developers. These perspectives affirm both the feasibility and desirability of an Islamic PPP model tailored to the legal, financial, and socio-religious environment of Djibouti. Significantly, the proposed model supports the achievement of Sustainable Development Goal 7 (SDG 7) by promoting investment in clean, reliable, and affordable energy infrastructure. It also offers a replicable solution for other countries in the East African Rift System seeking Shariah-compliant pathways to energy security.

To enhance the development of geothermal energy projects in Djibouti, particularly through innovative financing mechanisms like Islamic PPPs based on Musharakah and Istisna, this study recommends the following: 1. Refining regulatory frameworks to facilitate Islamic finance in energy projects, including guidelines for Musharakah and Istisna contracts. 2. Providing incentives for local and foreign investors to participate in Islamic PPPs, such as tax breaks, subsidies, a grant Takaful scheme, and risk-sharing arrangements. 3. Collaborating with Islamic financial institutions (IFIs) and multilateral organisations like the Islamic Development Bank (IsDB) to develop tailored financing packages for geothermal projects. 4. Partnering with international organisations and educational institutions to offer training programmes on Islamic finance, PPP management, and geothermal technology. 5. Providing technical assistance and resources to local financial institutions to develop expertise in Islamic finance. Future work should explore policy mechanisms, capacity building, and regulatory enhancements needed to operationalise this model effectively. Additionally, pilot projects can serve to test and refine the model's implementation in real-world contexts.

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