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Aid Effectiveness in Afghanistan Power Sector Development from 2002 to 2022

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Abstract

This paper evaluates the effectiveness of international development aid in Afghanistan's power sector from 2002 to 2022. Despite significant investment, the power sector, in particular, has suffered from inefficiencies, with a large portion of the population still lacking access to reliable electricity. The reliability and stability of the national and regional grids remain poor. Hundreds of kilometers of 110 kV, 220 kV, and 500 kV transmission lines, along with thousands of kilometers of distribution networks have been extended. However, development in the generation sector has been negligible, resulting in over than 80% of the country's electricity being imported.
Various organizations and individual researchers have assessed aid effectiveness, either generally or from project management and implementation perspectives. This study uses secondary data to evaluate the effectiveness of aid received for power sector development in Afghanistan from 2002 to 2022. The findings reveal inefficient use of development aid in the power sector. Drawing on the experiences of other countries, particularly in the education and health sectors, the study suggests that the sector-wide approach (SWAp) could improve the effective use of development aid. Further research into SWAp implementation is recommended for the transparent and effective use of development aid in Afghanistan's power sector.

Keywords: Afghanistan Water Bodies, Evaporation Reduction, Floating Photovoltaics (FPV), GIS-Based Analysis, Renewable Energy

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1. Introduction

Official development assistance (ODA) refers to government aid aimed at promoting the economic development and welfare of developing countries [1].

In 2019, Turkey funding 16% ($7.868 billion) and Saudi Arabia funding 4% ($2.013 billion) ranked first and tenth respectively among the top 10 aid-providing countries. Among Asian countries, Syria received the most aid ($10.129 billion) with Afghanistan ranking third after Bangladesh [2].

Figure 1, based on data from the World Bank website [3] shows that Afghanistan received the largest share of development assistance in the region during the years 2002-2020.

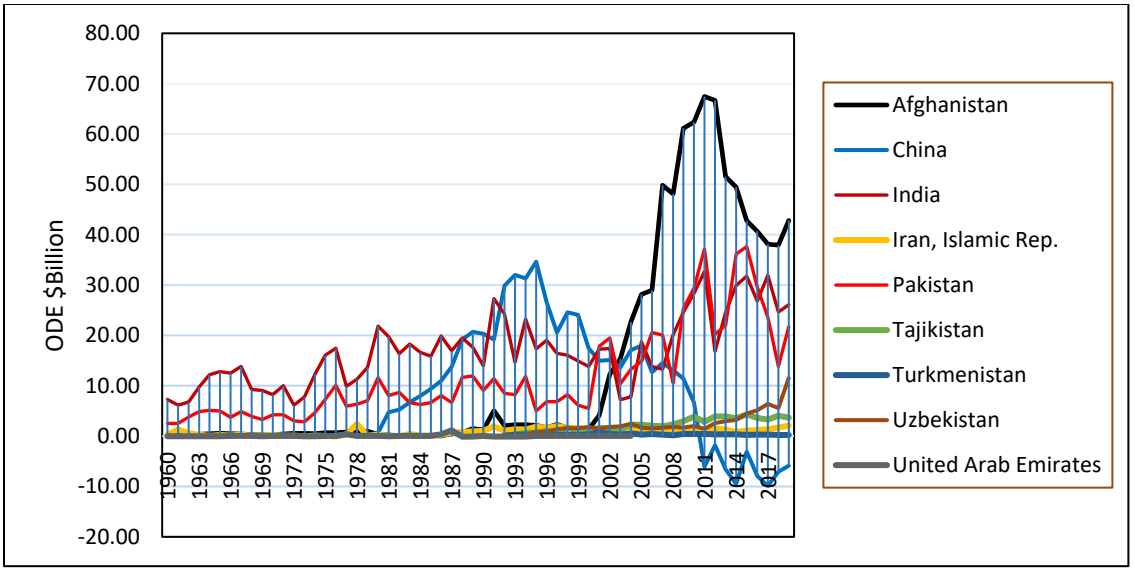


Fig. 1. Afghanistan and its neighboring countries ODA receiving trend from 1960 to 2020 [3]

Afghanistan has a long history of relying on foreign aids, dating back to the time of Ahmad Shah Durrani. Since the regime change in 2001, the country has received substantial aid from international donors. However, the effectiveness of this aid has been questionable, with widespread corruption and mismanagement hindering development efforts.

From 2002 to 2022, the international community has spent more than 4 billion USD in Afghanistan's power sector. Despite this, access to electricity has remained low at 30-34% with only 11% in rural areas [4].

Figure 1 shows that Afghanistan had the lowest share of ODA among the neighboring countries from 1960 until 2000, but later this amount increased significantly thereafter. Notably, China a major global economy transitioned from an ODA recipient to a donor country by 2011. This paper focuses on development aid in Afghanistan's power sector. Previous studies have generally assessed ODA effectiveness for the country as a whole.

The ineffective and non-transparent use of ODA leading to widespread corruption, prompted the Paris Declaration in 2005. This declaration states that while aid volumes must increase to achieve the Millennium Development Goals, aid effectiveness must also

improve to support governance and development performance [5]. Amin (2020), among other related issues, has critically evaluated the implementation quality of three projects in the power sector of Afghanistan as case studies. He has found that the overall quality of work in these three projects has been low. He has subsequently listed the reasons for poor project management. Meier (2018) evaluated the sustainability of micro hydropower plants in Badakhshan province and Foster (2015) assessed the 1MW solar power project in Bamyan province [8,24]. The project cost $14.1 million and faces challenges in achieving long-term financial sustainability due to high operational costs, especially for diesel fuel. The current tariff structure covers operational costs but not full depreciation. The solar power project of Kandahar provinc and the 105MW Tarakhel thermal power plant project in Kabul were evaluated in [7]. In both cases, it has been found that the initial price of the projects was much higher than the usual price. In the master plan of 2005, it was anticipated that the Bagh-e-Dara Hydro Power Station, which is a crucial power station for supplying electricity to Kabul city, would be integrated into the network by 2013. However, practical efforts in constructing this station have not progressed beyond the stage of re-feasibility studies [5]. The United States Inspector General (SIGAR) (2019) and (2018) have also inspected a large number of projects funded in the power sector, especially transmission line projects. Aid effectiveness has been analyzed in [9], and Afghanistan's situation in moving away from development aid has been analyzed in [10].

Tessema (2014) has studied SWAp with a focus on the sustainability of the power sector in Ethiopia. The author found that a shift from short-term project-based approaches to a process-based approach is necessary. The implementation of SWAp has been studied by [11] and the guide for SWAp has been given for the statistics and health sectors in [12].

The paper is structured as follows: Section 2 outlines the research methodology, while Section 3 explains Afghanistan and its ODA across various technical and non-technical sectors. Section 4 focuses on the sector-wide approach to attracting development aid in the power sector. Finally, sections 5 and 6 present the conclusion and recommendation, respectively.

2. Research Methodology

This study adapts an analytic and descriptive approach to assess the development aid effectiveness in Afghanistan's power sector between 2002 and 2022. It relies exclusively on secondary gathered from a variety of reliable sources including reports of international agencies such as the World Bank, USAID, and Special Inspector General for Afghanistan Reconstruction (SIGAR), as well as government publications. Additionally, data is drawn from key strategic and policy documents such as Afghanistan’s National Development Strategy (ANDS) and the Afghanistan National Peace and Development Framework (ANPDF). Databases like the World Development Indicators and relevant academic articles further supplement the collection. The study focuses on key indicators, including the volume of aid received, improvements in power generation transmission, and distribution, cost overruns in high-value projects, and regulatory and institutional reforms. Furthermore, a qualitative analysis examines the progress of the regulatory framework achieved through development assistance and its implementation.

3. Afghanistan and official development aid

According to the definition, Afghanistan is classified as one of the 47 least-developed countries [13]. Notably, none of Afghanistan's neighboring countries are included in this list, which qualifies Afghanistan for receiving Official Development Assistance (ODA).

3.1 Development aid in the technical sector

3.1.1 Generation

Electricity generation from renewable sources has been implemented under programs such as National Solidarity Program featuring off-grid rooftop PV plants, Mini and Micro hydropower stations. Mini and micro hydropower stations, especially in cases where the turbines are constructed using basic local technology, have generally not shown good sustainability The results of a sustainability survey of about 600 micro hydropower plants (from 5kW to 500kW) show that 17% of these power plants are non-operational. This study was conducted based on four sustainability factors: design and planning; quality of components and construction; management, maintenance, and repair; risks from natural disasters, and the use of electricity generated by these stations and their profitability [14]. In the construction of hydropower plants higher than 10MW, only the Salma hydropower plant and upgrading the second phase of the Kajaki power plant are notable. Most existing hydropower plants have undergone reconstruction and rehabilitation rather than new construction. The completion of the steam section of the Khair Khana combined cycle power plant remains unresolved. Hud Khel gas turbine, destroyed in 1370, remains in ruins, and the gas turbine donated by Iran near the Khair Khana facility has likely never been connected to the grid. Both gas turbine power plants only occupy valuable lands without providing any benefits. Following the construction of the Tarakhel thermal power plant which has a lower operational cost, the Khair Khana gas turbine power plant is rarely utilized.

3.1.1.1 Tarakhel Thermal Power Plant

The 105MW Tarakhel Thermal power plant was constructed at a cost of $335 million, with United States funding in 2009 has been a controversial project. A similar 200MW power plant by Wartsila company in Pakistan cost $180 million [6]. The Tarakhail power plant is very inappropriate in terms of the initial cost and the operational cost. Annual expenses of $280 million are required for the sustainable operation of this power plant [16]. The cost per kilowatt hour generated in this plant was 22 cents, compared to 6 cents for imported power. Between 2010 and 2013, the plant operated at only 2.2% capacity [7]. The $335 Million and some contributions from other donors could have been used to construct the Baghdara hydropower plant, with a capacity of 200MW.

3.1.1.2 Kajaki Hydro Power Plant

Since 2004, $775 million has been spent to increase the capacity of this power plant by 51.5MW, short-term supply Diesel fuel for diesel for Deisel power plants, and improve

distribution systems in Helmand and Kandahar provinces. Six projects mainly focused on the reconstruction of the Kajaki hydropower plant, and eleven projects included the reconstruction of transmission lines and substations in Helmand and Kandahar. Furthermore, Capacity building projects were also launched. However, spending this huge amount could not ensure the stability of the power supply to this region.

3.1.1.3 Kandahar and Helmand Diesel power plants

Kandahar and Helmand diesel power plants have similar fates to the Tara Khel thermal power plant. These power plants operated only as long as the fuel was supplied by American aid. In the construction of these power plants, has not been considered long-term sustainability.

3.1.1.4 Bamyan Solar Power Plant

Commissioned in 2013, the Bamyan Solar Power Plant, was one of Afghanistan's first off-grid solar power plants. Despite its innovative hybrid (PV+3x275=750kVA diesel generators) design, it faces challenges due to high operational costs and low economic viability.

The power plant along with its distribution network cost $14.5 million. Electricity tariffs were initially set at 0.25 USD/kWh for residential consumers and 0.7 USD/kWh for commercial users, later reduced [8]. The plant's future is uncertain with the extension of the 220kV transmission line and connection to the national grid through the 220/20 kV substation and 20kV primary distribution network. Table 1 depicts the completed and under-construction power plant projects in Afghanistan.

Table 1. Completed and under construction Afghanistan's power plant projects [9]

Category	Power Plant Project	Location	Type	Capacity (MW)	Status	Expected Operational Period
Completed	Naghlu Hydropower Plant	Kabul Province	Hydropower	100	Completed & Operational	1970s - 2012 (Rehabilitation in 2018)
	Mahipar Hydropower Plant	Kabul Province	Hydropower	20	Completed & Operational	1960s - Present
	Bayat Power Plant	Jowzjan Province	Thermal	105	Completed & Operational	2019 - Present
Under Construction	CASA-1000 Project	Multiple Locations	Transmission	300	Under Construction	2025 - 2026
	TAPI Gas Pipeline	Multiple Locations	Transmission	N/A	Under Construction	2025 - 2026
	Shahtoot Dam Hydropower Project	Kabul Province	Hydropower	40	Under Construction	2026 (Planned)

Planned/Other Important Projects	Kajaki Hydropower Plant Expansion	Helmand Province	Hydropower	100	Planned	2025 - Planned
	HPP Shibar	Bamyan Province	Hydropower	40	Planned	2027 - Planned

3.1.2 Transmission

Before 2002, Afghanistan had a rudimentary transmission system. Since then, the length of transmission lines has increased from 2,261 to 6,907 kilometers, still estimated at 2841 km with 110 kV, 2667 km with 220 kV, and 1393 km with 500 kV operating voltages in Plan [10].

During the design and implementation period, the long transmission line projects were divided into several parts and each part was funded by one of the donors. The 220kV line was supposed to supply Kabul and Mazar-e-Sharif. The selected voltage of 220kV to transmit 300MW to Kabul city is technically inappropriate. The construction of two 220kV transmission lines, one for $35 million from Uzbekistan and the other for $28 million from Tajikistan started in 2005. These transmission lines partially solved the problem of power deficiency in Kabul city and several other provinces in the short term, but caused more dependency and lack of attention to deployment of rich domestic sources. Another major transmission line project is the 500kV line, which has been partially completed and is supposed to connect Afghanistan to the national grid of Turkmenistan. This transmission line will transmit electricity generated from natural gas which is independent of climate conditions and seasonal changes. Therefore, it can contribute to the improvement of power security. Currently, more than 80% of electricity is imported from neighboring countries. The amount paid to neighboring countries has increased from $16 million in 2007 to $270 million in 2019 (sixteen times more).

3.2 Development aid in non-technical sectors

3.2.1 Regulatory framework development

A robust regulatory framework is essential for power sector development. However, Afghanistan has struggled to create and implement effective laws and policies. Many of the existing regulations were developed with the assistance of foreign consultants or national experts through international funding, but their implementation has been weak, leading to inefficiencies and corruption.

Table 2. List of rules, regulations, plans, and policies developed in the power sector

Laws	
Power Services Regulation Act (2015)	Energy Services Management Law
Nuclear Energy Law (2015)	Law of Corporations and Limited Liabilities
Environment Law (2007)	Public Private Partnerships Law 5th October 2016
Regulations	
Regulation for Electricity Regulatory Authority of Afghanistan (2019)	National Electricity Codes
Fuel Consumption Regulations (2010)	Regulations for Terms and Conditions for Determination of Tariff from Energy Generation Sources
Regulation for Net Metering of Rooftop Solar PV Grid Interactive Systems	Regulations for Licensing Process for Generation, Transmission, Distribution, Import & Export of Electricity
Afghanistan Energy Efficiency Code for Building (2015)	
Plans	
Afghanistan National Development Strategy ANDS	Energy Sector Strategy (2007–2011)
Afghanistan National Peace and Development Framework (2017)	Power Sector Master Plan (2013-2032)
Renewable Energy Roadmap	
Policies	
Renewable Energy Policy (2015)	Afghanistan National Integrated Energy Policy, Final Draft: 2016
National Energy Policy (draft)	"Power selling" and other services policy of DABS

3.2.2 Capacity building and institutional reform

Capacity building has been a key focus of international aid in Afghanistan. However, despite significant investments, the results have been disappointing. From 2009 onwards, the USA spent $88 million to achieve self-sufficiency of DABS* the power utility of Afghanistan [4]. This project could not meet the goals of the project until 2013, and as a result, a further $157 million was allocated. Most of this amount was spent on the high salaries of foreign consultants, travel expenses, and their security affairs. Moreover, USAID had previously carried out the AEAP† and AECBP‡ capacity-building programs with tens of millions of dollars. SIGAR admits that despite all the exorbitant expenses of DABS, it cannot independently carry out its duty in the fields of policy-making, legislation, and implementation of projects [7].

3.3 Evaluation of provided international aid

In the previous regime, the National Development Strategy Document (ANDS) and the National Peace and Development Framework Document (ANPDF) for the years 2017 to 2019 were designed to achieve self-sufficiency and improve people's comfort [9]. The ANPDF document was included in the National Priority Plans (NPPs). Donors consulted

* *Da Afghanistan Breshna Shirkat*

† *Afghanistan Energy Assistance Project*

‡ *Afghan Energy Capacity Building Program*

with the government for planning in major cities and used these documents as a tool. Some donors were more demand-oriented and necessarily accountable only to their own countries. As a result, the level of ownership of the Afghan government would change according to the interest of the donors. The lack of development ownership and poor coordination between donors made aid ineffective [21]. Since 2010, despite the progress in developing an effective framework for the more efficient use of ODA, a mechanism that can hold both the government and donor agencies accountable for their actions, was not been created. Documents such as self-sufficiency through the mutual accountability framework of SMAF created a suitable platform for accountability relations, but it failed to provide a mechanism that obliges both parties to deal with the issue as a contractual agreement. Still, the party could avoid answering and not share the results with everyone.

4. Sector-wide approach for effective attraction of development aid in the power sector

The Sector-Wide Approach (SWAp) was first proposed in 1995 as a way to overcome the weaknesses of traditional aid projects. The approach emphasizes comprehensive sectoral planning and coordination between donors and the government. In the context of Afghanistan's power sector, SWAp could help improve aid effectiveness by ensuring that all stakeholders are aligned and that resources are used efficiently.

The Paris Declaration further institutionalized interest in Swap [22]. In SWAp, the policy and expenditures of a sector are comprehensively under the leadership of the government. In SWAp, attention is paid to the capacity of the authorities involved on both sides. First, this capacity is created through courses for different levels of government, donors, and even politicians. In SWAp, the ultimate goal is not effective aid, but effective development. A SWAp program works to make country systems more consistent [23].

5. Conclusion

The evaluation of development assistance in the Afghan power sector between 2002 and 2022 portrays significant inefficiencies and obstacles in development assistance utilization. Despite an inflow of over $4 billion in development financing in the sector, access to electricity for the general populace is low, with access for 30-34% of the urban, and a mere 11% in rural areas. National grid and regional grid dependability and steadiness are yet poor, and the country continues to depend mostly on imported electricity, which constitutes over 80% of its consumption. The analysis of individual projects, such as the Tarakhel Thermal Power Plant, Kajaki Hydro Power Plant, micro and mini hydropower, and Bamyan Solar Power Plant, identifies a recurring theme of excessive cost, poor administration, and unviability. Most of the projects were initiated with no consideration for long-term viability, and many of them have, therefore, been underutilized and have run at a loss. Besides, many of the projects have been constructed in terms of donors' requirements, not in terms of Afghan citizens' actual requirements, and have, therefore, been a misallocation of funds.

The non-technical aspects of aid, including the development of a regulatory environment and capacity development, were no less challenging. Despite laws and policies having

been developed, these have not been effectively executed, and corrupt actions have weakened efforts toward creating a strong and independent power sector. Inadequacies in coordination between donors and an improper accountability mechanism compounded ineffectiveness in utilizing aid. The Sector-Wide Approach (SWAp) presents itself as a solution for such impediments. With a long-term view towards planning in the overall sector, coordination, and development of capacities, SWAp can contribute towards effective and transparent use and use of aid. SWAp can, however, function effectively only with high political will, strengthened governance, and commitment toward long-term development aims.

In summary, global support for the Afghan power sector has yielded limited results, significantly hampered by inefficiency, mismanagement, and a lack of coordination. For real and sustained development, a wiser and more participatory path in utilizing development assistance must be pursued, with a view towards creating native capacity, strengthening governance, and ensuring development programs address real Afghanistan community needs. Only through such measures can Afghanistan hope to overcome its energy challenges and achieve widespread access to reliable and affordable electricity.

6. Recommendations

- The Islamic Emirate should assess the current regulatory framework for the power sector and implement necessary reforms to enhance its effectiveness.
- The National Development Strategies should be revised to better address the challenges in the power sector.
- Training programs on the Sector-Wide Approach should be conducted for all relevant stakeholders to ensure effective coordination and implementation of aid projects.
- Efforts should be made to increase local capacity to manage and attract development aid. Without the necessary capacity, aid will continue to be used inefficiently.
- Development aid should be used by the government to solve the identified challenges based on SWAp.
- Both short-term and long-term plans should be developed to address the immediate and future challenges in the power sector.
- The government must review the developed regulatory environment for the power sector and revise it, when and wherever necessary, to improve its effectiveness.
- The National Development Strategies must be updated in a manner that addresses effectively the issues of the country’s power sector.
- Sector-wide approach trainings have to be conducted for all concerned parties to achieve effective coordination and administration of development programs.

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