

International Journal of **Supply Chain and Logistics**


(IJSCL)

**Supply Chain Strategy and Infrastructure Overcapacity in the
Bangladesh Power Sector**



**CARI
Journals**

Supply Chain Strategy and Infrastructure Overcapacity in the Bangladesh Power Sector

 ^{1,2}Muhammad Arafin Khan

¹Department of Business Administration, University of Chittagong, Chittagong, Bangladesh

²Department of Electrical and Computer Engineering, University of Alabama at Birmingham, USA



<https://orcid.org/0009-0004-2526-5854>

Accepted: 3rd September 2025; Received in Revised Form: 27th September 2025; Published: 3rd October 2025

Abstract

Purpose: This paper examines the gap between supply chain strategy and infrastructure planning in Bangladesh's power sector. It explores how rapid, government-led capacity expansion has resulted in overcapacity, financial inefficiency, and underutilization of power plants.

Methodology: The study applies a qualitative and descriptive approach using secondary data sources, including government reports, financial statements, energy policy documents, and international agency publications. A SWOT analysis identifies internal and external sectoral factors, while a comparative review of India's energy model highlights alternative approaches to planning, coordination, and renewable integration.

Findings: The analysis reveals systemic inefficiencies driven by poor demand forecasting, overreliance on imported fuels, centralized governance, and slow renewable adoption. Although Bangladesh has improved electricity access and invested heavily in generation, many plants operate below capacity, creating high financial burdens through capacity payments and subsidies. In contrast, India's decentralized and flexible planning framework demonstrates better utilization, resilience, and integration of renewables.

Unique Contribution to Theory, Practice and Policy: This paper contributes to supply chain and infrastructure literature in emerging economies by showing how strategic misalignment can undermine long-term energy security. It recommends a shift toward demand-driven planning, fuel diversification with greater renewable integration, decentralized governance with empowered local utilities, smart pricing systems, and grid modernization with transparency in data sharing. These recommendations offer policymakers a roadmap for building a more resilient, cost-efficient, and sustainable power supply chain in Bangladesh.

Keywords: *Supply chain strategy, Infrastructure overcapacity, Power sector planning, Bangladesh energy policy, public sector decision-making, Energy infrastructure, Emerging economies.*

Introduction

Strategic supply chain planning is very important in sectors like power generation. Large investments and long-term operations require good forecasting, risk control, and strong coordination (Croxtton, García-Dastugue, Lambert, & Rogers, 2001). In many developing countries, however, growth is often led by centralized government decisions. These decisions focus more on adding capacity than on supply chain efficiency. As a result, countries often face overcapacity, financial stress, and unused assets (Nicholas & Ahmed, 2020; IEEFA, 2023).

Bangladesh has expanded its power generation capacity very quickly in the last decade. Capacity increased from about 10,000 MW in 2013 to over 25,000 MW in 2023 (Ministry of Power, Energy and Mineral Resources, 2018). These projects were meant to fix long-standing power shortages. But in reality, they went beyond actual demand. This created large overcapacity and higher capacity payment costs for the Bangladesh Power Development Board (Financial Express, 2019). The situation is worse because of high dependence on imported fossil fuels, delays in grid expansion, and slow progress in renewable energy (IEEFA, 2023; Azad et al., 2024).

This gap between capacity growth and system needs shows a failure in supply chain strategy. The power sector faces upstream problems with fuel supply, midstream limits in the grid, and downstream issues in demand planning and pricing. Together, these weaknesses have built a fragile and costly supply chain that threatens long-term energy security.

This paper studies these problems through a supply chain view. It focuses on the weak link between infrastructure planning and system-wide coordination in Bangladesh's power sector. A SWOT analysis is used to show both internal and external challenges. A comparison with India provides lessons on more flexible planning (IEA, 2022; Central Electricity Authority [CEA], 2023). The study adds to research on infrastructure in developing countries by suggesting that public-sector decisions must follow supply chain principles. This will help improve efficiency, resilience, and sustainability.

Literature Review

Supply chain management (SCM) usually deals with coordinating material, financial, and information flows across organizations to improve value creation and delivery (Croxtton et al., 2001). In sectors like power generation, SCM also covers long-term planning, stakeholder coordination, and risk management. When infrastructure growth is not linked with supply chain strategy, the result can be overcapacity, wasted resources, and financial pressure on public utilities. This problem is clear in Bangladesh's power sector, where government-led investments have gone far beyond demand, creating serious imbalances (IEEFA, 2023).

Nicholas and Ahmed (2020) explain that politically motivated expansion in Bangladesh, without proper coordination in demand forecasting and grid development, has led to excess generation and rising capacity payments to private producers. Since these payments are made even when plants

are unused, the financial burden on the Bangladesh Power Development Board (BPDB) has grown. On top of that, Bangladesh's dependence on imported fuels like LNG and coal makes it vulnerable to global price shifts and supply chain disruptions (Azad et al., 2024). The result is a weak and financially unstable system where fuel procurement, grid development, and power delivery are poorly aligned.

The 2016 Power System Master Plan aimed for more than 60,000 MW of power capacity by 2041 (Ministry of Power, Energy and Mineral Resources, 2018). Critics argue that this plan ignored supply chain principles such as logistics, cost-risk analysis, and flexibility (IEEFA, 2023; Nicholas & Ahmed, 2020). Because of this, the system now suffers from unused capacity, grid bottlenecks, and slow adoption of renewables.

Research also shows that the issue goes beyond generation. Azad et al. (2024) note poor coordination between procurement, transmission, and demand centers, which reduces efficiency. Financial reports highlight BPDB's growing losses due to high capacity payments and fuel subsidies (Financial Express, 2019).

India provides a helpful comparison. Its National Electricity Plan links generation with grid expansion, renewable targets, and flexible policies (CEA, 2023). The International Energy Agency (2022) reports that India's use of dynamic pricing, decentralized planning, and private sector involvement has boosted efficiency and reduced financial strain. These lessons are valuable for Bangladesh, where the sector remains centralized and misaligned.

While SCM research is well established, little work applies it to infrastructure or public-sector planning in developing countries. Most studies focus on technical or policy issues, not supply chain strategy. This paper helps fill that gap by analyzing Bangladesh's power sector through an SCM perspective, using SWOT analysis and a comparison with India to suggest reforms.

Methodology

In this study, a qualitative and descriptive research approach is employed to explore the mismatch between supply chain planning and infrastructure growth in Bangladesh's power sector. The method is based on secondary data sources, including government reports, power sector master plans, financial statements, international energy reviews, and academic work published between 2018 and 2024. Key sources include the Revisited Power System Master Plan (2016), financial summaries from the Bangladesh Power Development Board (BPDB), and publications from the International Energy Agency (IEA) and the Institute for Energy Economics and Financial Analysis (IEEFA).

The study also applies structured tools to guide the analysis. A SWOT framework is utilized to identify internal strengths and weaknesses of the sector, as well as external opportunities and threats. This approach provides a clear view of the factors influencing sector performance. In addition, the research compares Bangladesh with India to highlight differences in planning, supply

chain coordination, and infrastructure use. The comparison draws on India's National Electricity Plan, capacity data, and planning models from the Central Electricity Authority and the IEA.

Instead of relying on econometric or simulation models, the study focuses on interpretation and policy review. The objective is to demonstrate the outcomes of poor alignment between infrastructures and supply chain planning. By combining qualitative sources with structured analysis, the research identifies systemic inefficiencies and establishes a basis for practical recommendations suited to Bangladesh.

Findings and Analysis

The analysis reveals several critical issues that come from the misalignment between infrastructure expansion and supply chain strategy in the Bangladesh power sector. Key findings are categorized through a structured SWOT framework (Table 1) to illustrate internal inefficiencies and external challenges. In parallel, a comparative review of India's energy planning model highlights alternative approaches that offer insights for policy realignment.

Table 1. SWOT analysis of Bangladesh's power sector

Strengths	Weaknesses
Government investment commitment	Overcapacity and low utilization of generation assets
Expanding electricity coverage and access	High reliance on imported fossil fuels
Skilled technical workforce in key agencies	Poor coordination between generation, transmission, and demand
	Inadequate demand forecasting and capacity planning
Opportunities	Threats
Declining global costs of solar and wind technologies	Volatility in international LNG and coal markets
Potential for regional renewable energy trade with India	Rising financial losses from capacity payments and subsidies
Technological innovation in smart grid and storage systems	Lack of flexible pricing and weak regulatory adaptation

Source: Compiled by the author based on Nicholas & Ahmed (2020); Financial Express (2019); IEEFA (2023).

Bangladesh's power sector has some clear strengths, especially in expanding electricity access and building more generation capacity. Strong government support has led to big investments in new power plants and grid projects. Skilled technical staff in public institutions have also helped keep operations stable in many areas.

However, these strengths are weakened by major problems in supply chain coordination. Demand has often been overestimated, and weak forecasting models have created overcapacity, leaving many plants running below their best level. Payments to idle power producers have added to BPDB's financial stress, while poor links between fuel supply, transmission, and demand centers have slowed the use of new infrastructure (Nicholas & Ahmed, 2020; Financial Express, 2019).

There are a lot of opportunities, such as falling global renewable energy costs, the chance for regional energy trade with India, and the growing use of smart grid technology. But to benefit, Bangladesh must reform its institutions and improve procurement and planning strategies. At the same time, risks remain from global fuel price swings, growing debt repayments, and limited pricing flexibility, all of which reduce the system's resilience (IEEFA, 2023).

Table 2. Comparative power sector indicators: Bangladesh vs. India (2023)

Dimension	Bangladesh	India
Installed Capacity (2023)	~25 GW	~428 GW
Energy Mix	Fossil fuel-dominant	Diverse (thermal, hydro, solar, wind)
Capacity Utilization	<50% in many plants	>65% average
Planning Model	Centralized (BPDB-led)	Decentralized (DISCOMs, state-level)
Renewable Integration	Minimal (~3–4%)	Substantial (~25%+)
Pricing Mechanism	Fixed tariff, limited dynamic pricing	Time-of-use pricing and power exchanges

Source: Compiled by the author from Central Electricity Authority (CEA, 2023); International Energy Agency (IEA, 2022).

A comparison with India highlights these gaps (Table 2). India's National Electricity Plan links generation targets with transmission, renewable integration, and real-time pricing (CEA, 2023; IEA, 2022). Unlike Bangladesh's centralized approach with a limited private sector role, India supports regional DISCOMs and multiple procurement options. It also has a more balanced fuel mix and stronger integration of solar and wind power. These strategies have led to better capacity use and stronger system resilience.

The findings show that Bangladesh's power overcapacity is not just from building too many plants but comes from deeper problems in its supply chain strategy. Weak demand forecasting, poor procurement choices, and a lack of coordination in planning make the sector financially unstable.

If these issues are not fixed, future investments could make the situation worse. India's case shows how strong policies, better regulations, and market-based systems can work together to build a more flexible and efficient power supply chain.

Discussion

The results of this study show a clear gap between power plant expansion and supply chain planning in Bangladesh's energy sector. Although the country has increased its power generation capacity, it has not made equal progress in grid integration, demand forecasting, or fuel sourcing. This imbalance has caused excess capacity, higher financial costs, and idle assets. These are not just operational problems but deeper strategic issues caused by weak decision-making.

These results support earlier research, which noted that Bangladesh's energy planning is highly centralized and reactive, often driven by short-term political interests instead of long-term system needs (Nicholas & Ahmed, 2020; Ministry of Power, Energy and Mineral Resources, 2018). The SWOT analysis presented here confirms this diagnosis, highlighting strengths such as investment momentum and technical capacity, but also revealing persistent weaknesses in coordination, risk management, and integration across the supply chain.

From a supply chain strategy perspective, the overcapacity problem is not simply a matter of excessive building; it is a result of failing to manage end-to-end supply chain processes. As Croxton et al. (2001) suggest, effective SCM requires synchronization across sourcing, transformation, and delivery functions. In Bangladesh's case, upstream fuel sourcing is import-dependent and price-volatile, midstream grid infrastructure is uneven, and downstream demand centers remain poorly integrated into planning processes. These disconnected nodes increase vulnerability and reduce the agility of the entire system.

If we see comparative insights from India that reinforce this interpretation. India's National Electricity Plan and decentralized DISCOM structure allow for more adaptive energy planning and diversified procurement, leading to improved utilization and fiscal efficiency (CEA, 2023; IEA, 2022). While India still faces challenges of its own, its ability to embed supply chain flexibility, market-driven pricing, and renewable integration into its national strategy contrasts sharply with Bangladesh's top-down, capacity-driven model.

Importantly, the results of this study highlight that strategic failures in public infrastructure are often systemic rather than incidental. Decision-makers in Bangladesh's energy sector operate within institutional frameworks that incentivize generation growth but lack the mechanisms to ensure downstream utilization, cost efficiency, or market responsiveness. Unless these structural issues are addressed through governance reform and strategic supply chain alignment, further investments risk exacerbating existing inefficiencies.

These findings also carry broader implications for infrastructure development in other emerging economies. Countries pursuing rapid capacity expansion without integrating supply chain

considerations may face similar consequences—idle assets, mounting debt, and operational rigidity. Thus, the analysis presented here contributes to a growing body of literature emphasizing the importance of decision-centric, integrated planning approaches for sustainable infrastructure development.

Recommendations

The study recommends several measures to address the challenges of overcapacity and inefficiency in Bangladesh's power sector through a supply chain-oriented approach. Energy planning should be demand-driven and integrated across the supply chain, using improved forecasting models that consider seasonal consumption, industrial growth, and local demand. Fuel supply diversification is critical, with greater reliance on renewable sources such as solar and wind, alongside investments in flexible projects rather than oversized plants. Institutional reforms are needed to decentralize decision-making, empowering local utilities and companies while strengthening accountability through digital tools and performance standards. Pricing reforms, including time-based rates and smart metering, can encourage more efficient energy use, with lessons drawn from India's adoption of market-based systems. Additionally, modernizing the grid with smart technologies and ensuring transparent access to operational data will improve resilience and attract investment. Overall, the study emphasizes that aligning power sector decisions with supply chain principles can foster a more efficient, sustainable, and financially stable energy system.

Conclusion

The study examined the mismatch between supply chain planning and infrastructure growth in Bangladesh's power sector. Through SWOT analysis and a comparison with India, it demonstrated that Bangladesh's rapid expansion of power generation, while intended to address shortages, has instead resulted in overcapacity, rising costs, and inefficiencies. The findings indicate that these challenges stem from centralized decision-making that overlooked essential supply chain tools such as demand forecasting, fuel diversification, and coordinated system-wide planning. The analysis further revealed that overcapacity is not merely a technical problem but a consequence of weak governance and poor supply chain coordination. India's more flexible and decentralized model highlights how supply chain principles can enhance energy planning, in contrast to Bangladesh's centralized approach. Although Bangladesh has improved electricity access, ineffective planning, wasted resources, and low utilization continue to undermine progress. The study emphasizes that Bangladesh must adopt a supply chain approach to energy planning, aligning generation with actual demand, integrating more renewable energy into the mix, and reforming institutions to strengthen accountability and transparency. These lessons extend beyond Bangladesh, offering guidance for other developing countries facing similar planning and governance challenges. By placing supply chain strategy at the core of energy policy, countries can reduce costs, improve reliability, and build more resilient and sustainable power systems.

References

- Azad, A. M. A. S., Oishi, Z. T., Haque, M. A., Das, P., Uday, S. A., & Bhuiya, K. M. S. (2024). An integrated framework for assessing renewable-energy supply chains using multicriteria decision-making: A study on Bangladesh. *Clean Energy*, 8(3), 1–19.
- Central Electricity Authority (CEA). (2023). National electricity plan (Volume I): Generation. Ministry of New and Renewable Energy, Government of India.
- Croxton, K. L., García-Dastugue, S. J., Lambert, D. M., & Rogers, D. S. (2001). The supply chain management processes. *The International Journal of Logistics Management*, 12(2), 13–36.
- Financial Express. (2019, October 23). BPDB seeks rise in bulk power tariff or subsidy. *The Financial Express*.
- IEEFA. (2023). Sustainable energy transition in Bangladesh: Opportunities and challenges. Institute for Energy Economics and Financial Analysis.
- International Energy Agency (IEA). (2022). World energy outlook 2022.
- Ministry of Power, Energy and Mineral Resources. (2018). Revisiting Power System Master Plan 2016. Government of Bangladesh.
- Nicholas, S., & Ahmed, S. J. (2020). Bangladesh power review: Overcapacity, capacity payments, subsidies, and tariffs are set to rise. Institute for Energy Economics and Financial Analysis.
- Prothom Alo. (2020, April 17). Power sector braces for huge loss due to coronavirus. *Prothom Alo*.



©2025 by the Authors. This Article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>)