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THE ROLE OF JHARKHAND'S COAL IN POWERING INDIA'S ECONOMY: NAVIGATING IMPORT DEPENDENCIES

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ABSTRACT

Coal continues to be a vital component of India's industrial and energy sectors, supporting important sectors like cement and steel and producing more than 70% of the country's electricity. With its plentiful coal deposits, Jharkhand has continuously increased the country's coal production, which increased from 131.76 million tonnes in 2019–20 to 191.16 million tonnes in 2023–24. However, because of quality differences and the need for high-grade coal from nations like South Africa, Russia, and Indonesia, India still depends largely on coal imports, which increased to 264.9 million tons in 2023–24.

The contribution of Jharkhand to the coal economy is examined in this paper, with particular attention paid to production trends, the causes of coal imports, and the effects of these trends on India's energy security. In addition, it looks at problems including land acquisition and environmental concerns, as well as how renewable energy can eventually lessen the need on coal. This paper sheds light on the opportunities and difficulties faced by Jharkhand's coal sector, which plays a crucial role in India's energy landscape, by providing a five-year review of production and import trends.

KEYWORDS: *Jharkhand coal production, India's coal imports, coal and economic growth, coal mining sustainability, energy transition in India.*

INTRODUCTION

In India, coal is much more than just a fossil fuel, a commodity. In *The Coal Nation* (Lahiri-Dutt, 2014a) Coal is one of the most significant natural resources for India, forming the backbone of its energy and industrial sectors. Coal has wider social, cultural, and political connotations which link it to economic development, nationalism, and nation-building, allowing coal extraction to symbolise a moral endeavour, both historically and in the present (Lahiri-Dutt, 2016; Shutzer, 2020). It generates more than 70% of the country's electricity and is an essential component of steel, cement, and aluminium industries.

Rich in natural resources, Jharkhand is one of India's major coal-producing states. Major coalfields like Jharia, Bokaro, and North Karanpura, which are located in the state, greatly increase India's overall coal production. Jharkhand is an essential component of the nation's coal ecology due to its advantageous location and large deposits. With a notable increase from 131.76 million tonnes in 2019–20 to 191.16 million tonnes in 2023–24, the state demonstrated its increasing significance in the national energy framework.

Although India is the second-largest producer of coal in the world, 264.9 million tonnes of coal were imported in 2023–2024, according to NITI Aayog. The need for high-grade coal, which domestic production frequently cannot supply, as well as logistical and infrastructure issues, are the main causes of this dependency on imports. Russia, South Africa, Indonesia, and other nations are vital in providing India with the premium coal it needs to meet its energy and industrial demands.

In order to lessen its reliance on fossil fuels and fulfil its obligations under the global climate treaty, India has set aggressive targets to increase its capacity for renewable energy. The coal sector in Jharkhand faces both opportunities and challenges as a result of this shift, having to deal with changing energy regulations, technological improvements, and environmental concerns. By examining production trends, import drivers, and the difficulties posed by coal dependency, this essay seeks to analyse Jharkhand's crucial contribution to India's coal economy. It also assesses the long-term viability of renewable energy as a coal substitute, offering insights into Jharkhand's coal industry's future in a constantly evolving energy environment.

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RESEARCH METHODOLOGY

The types of data used in this research paper are secondary which are obtained from government reports, trade journals, and research articles. The analysis focuses on Jharkhand's contribution to India's coal industry, looking at import patterns of India, coal production statistics, and economic effects between 2019 and 2024.

Important Data Sources Include

- National coal production and supply data from the Indian government's Ministry of Coal.
- CEIC Data: Information on coal output in Jharkhand throughout the previous five years.
- NITI Aayog: India's coal import statistics.
- Statista: Information on India's share of coal imports by nation.
- Press Information Bureau (PIB): Coal production support programs from the government.
- Academic Research Papers: Numerous scholarly works and investigations about coal extraction, energy regulations, and economic consequences

With an emphasis on notable shifts in 2023–2024, the data was examined to find patterns in both the national and Jharkhand coal production.

To identify the causes of India's reliance on foreign coal and the nations that supply it, import data was analysed. Through a qualitative study of the papers, issues like land acquisition, environmental concerns, and policy gaps were examined.

Government activities and industry data were used to evaluate growth opportunities, such as modernizing mining operations and integrating renewable energy.

Coal's Economic Contribution to India

India's industrial and energy sectors rely heavily on coal, which is essential for job development, economic expansion, and energy security. The core of this contribution is Jharkhand, a state that produces a lot of coal. More than 300,000 people in India are directly employed by the coal business, and many more gain indirect benefits from associated industries like equipment production and transportation. A large percentage of this labour is employed in Jharkhand, which is home to important coalfields like Jharia and Bokaro.

In addition to providing jobs, the coal industry boosts India's GDP by sustaining sectors like cement, steel, and electricity. Coalfields in Jharkhand provide the raw resources for various sectors, promoting investment and industrial expansion.

However, after mining, the corporations that run the mines typically leave the area or move to areas with more potential for extraction, which results in employment losses. Therefore, the likelihood of coal mining creating long-term jobs is low.

Energy Security

More than 70% of India's electricity is produced from coal, making it a vital source of energy for the nation. By supplying coal to power plants all over India, Jharkhand contributes significantly to meeting this demand. Coal is essential for keeping industries operating and the lights on in millions of households, and the state's abundant reserves and close proximity to industrial centres guarantee a consistent and dependable supply.

Industrial Development

For sectors like steel and cement, which are essential to the construction of infrastructure, coal is a vital raw ingredient. Some of the biggest industrial facilities in the nation, including the Bokaro Steel Plant and several cement mills, rely on coal from Jharkhand's mines. Coal from Jharkhand is used by these sectors to produce goods that serve as the cornerstone of buildings, bridges, and roads throughout India. The fact that Jharkhand contributes to these areas shows how important it is to the state's economy as well as the larger national economy.

Coal Production Data and Trends

Jharkhand plays a major role in India's coal production, which ranks among the biggest in the world. The nation's energy and industrial demands are largely met by the state's substantial reserves and ongoing mining activities.

Jharkhand’s Reserves and Production

About 80 billion tonnes of coal, or about 25% of India's total reserves, are found in Jharkhand. The state is home to important coalfields like Jharia, Bokaro, and Rajmahal. Power plants and industrial needs are served by the many grades of coal produced in these coalfields. About 113 million tonnes (MT) of coal were produced in

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Jharkhand in 2022–2023, making up almost 20% of India's total coal production. Notwithstanding this remarkable production, obstacles such as problems with land acquisition, environmental concerns, and antiquated mining technologies have prevented the state from realizing its full potential.

National Production Trends

India has steadily increased its coal production throughout the years, reaching 892.21 MT in the fiscal year 2022–2023. Coal India Limited (CIL) and its subsidiaries, many of which are based in Jharkhand, are major contributors to this production. There is still a discrepancy between supply and demand despite this output rise. India's expanding population and energy-intensive industries demand more coal than is currently produced.

National Coal Production Trends

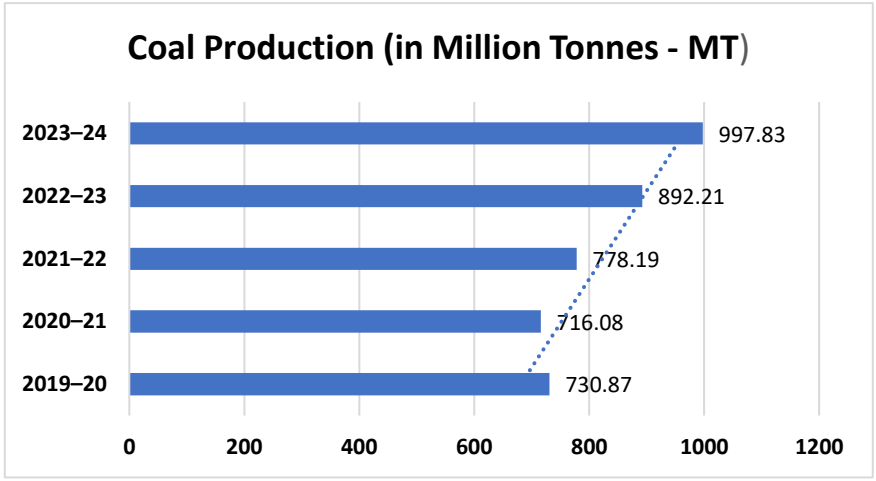
Over the past five years, India's coal production has increased significantly, which is indicative of the government's emphasis on boosting energy production independence. Coal production in the country rose substantially, reaching a record level in 2023–2024.

India's total coal production during the previous five years is displayed in the table below:

Table: 1

Year	Coal Production (in Million Tonnes - MT)
2019–20	730.87
2020–21	716.08
2021–22	778.19
2022–23	892.21
2023–24	997.26

Increased mining efficiency, government programs, and strategic investments in the industry helped India reach a historic output milestone of 997.83 MT in 2023–2024. This impressive expansion demonstrates India's will to meet its energy needs while lowering its reliance on coal imports.



(**Graph 1: Five-Year National Coal Production Trends)**

As India strives for energy independence, the graph shows a steady rise in coal production, which reached a record 997.83 million tonnes in 2023–2024.

Jharkhand's Role in National Supply

Jharkhand is a vital coal supplier because of its advantageous location close to important industrial centres in both eastern and northern India. Coal is supplied by the state to cement industries, steel mills, and power plants, guaranteeing their continuous operation. However, the effective transportation of coal from Jharkhand to other regions of the nation is frequently hampered by logistical issues like insufficient rail and road networks. To optimize Jharkhand's contribution to India's coal supply, these problems must be resolved. With a significant portion of the country's coal production, Jharkhand remains a vital component of India's coal industry. Over the previous five years, the state's output has likewise increased steadily, with 2023–2024 seeing a particularly notable spike.

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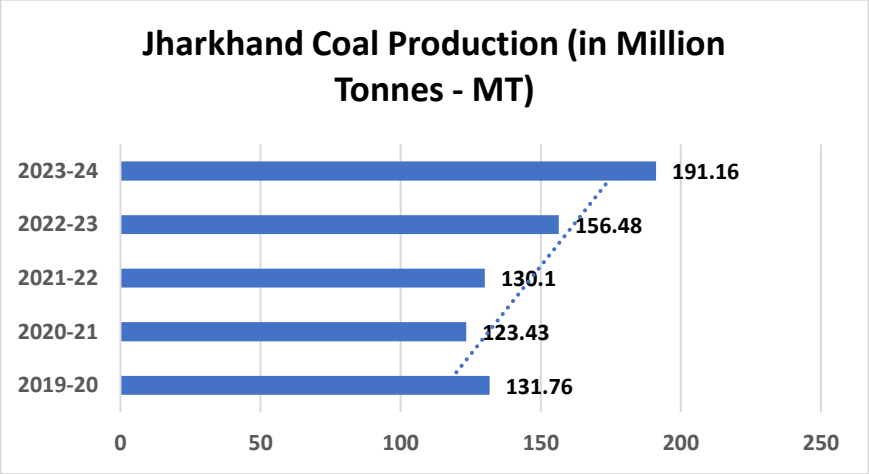
The coal production in Jharkhand during this time is shown in the table below:

Table: 2

Year	Jharkhand Coal Production (in Million Tonnes - MT)
2019-20	131.76
2020-21	123.43
2021-22	130.10
2022-23	156.48
2023-24	191.16

In 2023–2024, Jharkhand produced 191.16 MT of coal, a 22% increase over the previous year. The state's emphasis on expanding mining operations and enhancing transportation infrastructure is responsible for this expansion.



(Graph 2: Jharkhand Coal Production Trends Over Five Years)

From 131.76 million tonnes in 2019–20 to 191.16 million tonnes in 2023–24, Jharkhand's coal production increased steadily, demonstrating its increasing contribution to India's energy requirements.

Why India Imports Coal

India imports a large amount of coal annually even though it is one of the world's top producers. Considering the nation's enormous reserves, this may come as a surprise, yet a number of causes lead to this dependence on imports.

Quality Issues

The high ash content of Indian coal, which includes a large portion of Jharkhand coal, lowers its burning efficiency. Because imported coal has a higher calorific value and generates more energy per unit, many companies, particularly those that need high-grade coal, prefer it. For example, in order to suit their specialized needs, steel factories and power stations frequently select coal from Australia and Indonesia.

Demand-Supply Gap

India generates a lot of coal, yet it is still unable to supply the nation's expanding need. More coal is used by homes, businesses, and power plants than is produced domestically. India is forced to rely on imports to sustain industrial output and energy security due to this supply and demand imbalance.

Logistics and Infrastructure

Coal transportation within India is quite difficult. Large amounts of coal are produced in Jharkhand, but it is challenging to move this coal effectively to other regions of the nation due to inadequate rail and road infrastructure. Importing coal from abroad is frequently quicker and more dependable for enterprises close to ports than shipping coal from inland areas like Jharkhand.

Economic Factors

Although native coal is less expensive, some companies may find that imported coal is more cost-effective due to its efficiency. For instance, imported coal lowers overall operating costs because it burns more efficiently and produces less waste. Furthermore, direct coal imports are frequently less expensive for coastal areas than long-distance domestic coal transportation.

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These elements work together to make India dependent on coal imports. Improving local coal quality, expanding production capacity, and making investments in improved transportation infrastructure would all be necessary to meet these problems.

India's Coal Imports

India imports vast amounts of coal annually, even though it is one of the world's top producers. The demand-supply mismatch, variations in quality, and logistical difficulties are some of the causes of this dilemma.

Coal Imports into India During the Past Five Years (2019–20 to 2023–24)

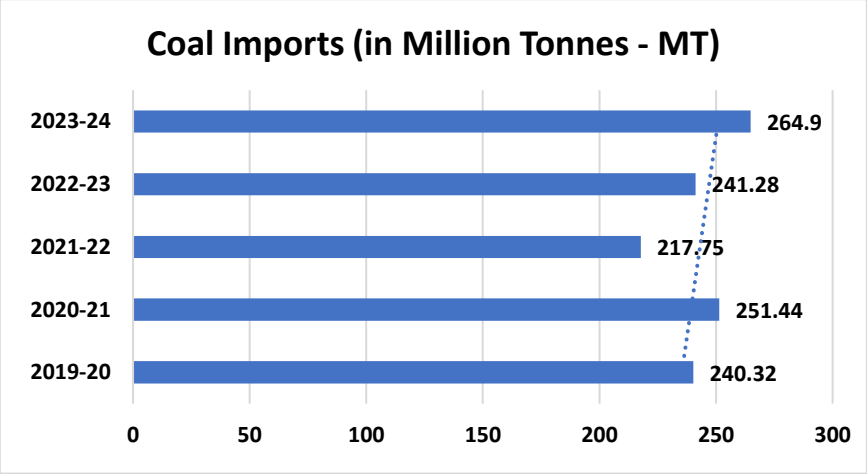
Due to changes in local output and demand, India's coal imports have fluctuated during the past five years.

Below is a summary of the imported coal, expressed in million tonnes (MT):

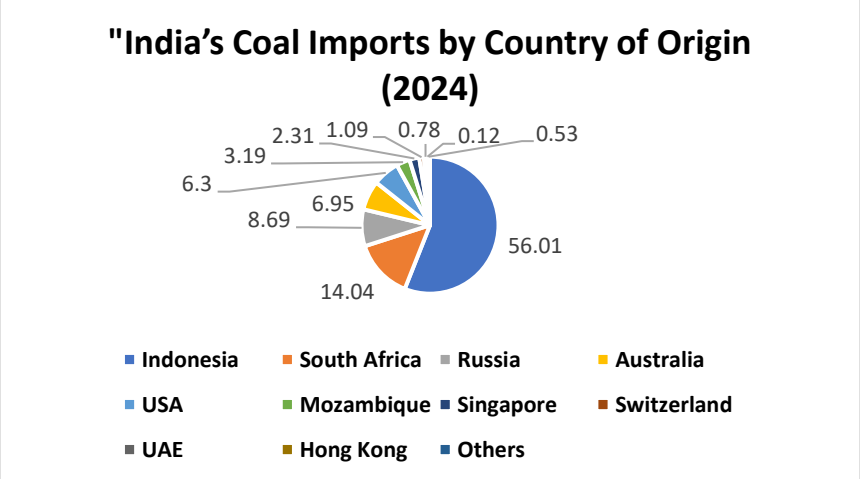
Table: 3

Year	Coal Imports (in Million Tonnes - MT)
2019-20	240.32
2020-21	251.44
2021-22	217.75
2022-23	241.28
2023-24	264.9

India imported 264.9 million tonnes of coal in 2023–2024, the most in the previous five years. This increase is a result of the growing demand for high-grade coal, especially from sectors that significantly depend on imported coal for its superior quality, such as steel and cement.



(Graph 3: India's Coal Imports Trends Over Five Years)



Graph: 4 India's Coal Imports by Country of Origin

Due to rising energy demand, the graph indicates a consistent increase in coal imports over the course of five years, reaching a peak of 264.9 million tonnes in 2023–2024.

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According to the pie chart Indonesia accounted for 56.01% of India's coal imports in 2024, with South Africa (14.04%) and Russia (8.69%) following closely behind, with lower contributions from other nations.

Renewable Energy vs. Coal

The type of energy resource used by India has substantial implications for economic growth and sustainability. India mostly meets its energy demand by conventional energy sources i.e., coal and oil (Singh & Jana, 2024). However, as part of its efforts to lower carbon emissions and advance sustainable development, India is progressively moving toward renewable energy. But replacing coal, which is the foundation of India's energy system, is not without its difficulties.

Growing Focus on Renewable Energy

India has made significant investments in renewable energy sources like hydropower, wind, and solar in recent years. In order to reach 500 GW of non-fossil fuel capacity by 2030, the government has set high goals. Particularly, solar energy has grown significantly as a result of falling prices and the nation's plentiful sunshine.

Challenges in Replacing Coal

Despite its rapid growth, renewable energy cannot yet completely replace coal for a number of reasons.

• Energy Demand: Coal now accounts for more than 70% of India's electrical generation, despite the country's enormous energy needs. Despite their growth, renewables are not yet able to supply this demand.

• Storage Limitation: Depending on the weather, solar and wind energy are sporadic sources. Reliability depends on battery storage technology, which is still costly and undeveloped in India.

• Infrastructure Gaps: In order to support a large-scale shift, renewable energy necessitates a substantial investment in new infrastructure, such as transmission lines and grid systems, which are not yet prepared.

Complementary Role of Coal and Renewables

For the time being, coal and renewable energy sources must cooperate to meet India's energy needs. For both homes and businesses, coal offers a steady and uninterrupted supply of electricity. Renewable energy is also assisting in lowering greenhouse gas emissions and reducing reliance on coal. Renewable technology's proportion of the energy mix is anticipated to rise in the future as it gets more sophisticated and reasonably priced. In the short to medium term, coal will still be a significant source of energy for India, particularly for regions like Jharkhand whose economies are heavily dependent on coal extraction.

Challenges in Coal Utilization

The coal industry has a number of obstacles that restrict its sustainability and efficiency, despite its significance to the Indian economy. Both production and consumption are impacted by these issues, especially in coal-rich states like Jharkhand.

Environmental Issues

- **Air Pollution**: Toxic gases are released from coal-fired plants like oxides of sulphur, nitrogen, carbon and other particulate matters and heavy metals which increase air pollution and result in smog, acid rain, and toxins in the environment (Baig, 2017; Liu et al., 2008; Pandey et al., 2018; Schreiber, 2009; Thitakamol, 2007).
- **Land Degradation**: Open-pit mining, which is widespread in Jharkhand, causes deforestation, biodiversity loss, and soil erosion.
- **Water Contamination**: Local water sources are frequently tainted by mining operations, rendering them unsuitable for cultivation and drinking.

Land Acquisition and Community Displacement

Large tracts of land are frequently needed for coal mining projects in Jharkhand, which forces local communities including tribal populations to relocate. Projects are delayed and expenses rise because of social conflicts and resistance. It is still difficult to provide rehabilitation and just compensation.

Outdated Mining Technologies

Many Indian coal mines continue to use antiquated techniques and machinery, which lowers output and raises the possibility of mishaps. These problems affect Jharkhand's mines, some of which are among the nation's oldest. Modernizing mining operations is essential for increasing productivity and security.

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Inefficient Transportation
Due to inadequate road infrastructure and limited train capacity, moving coal from mines to industries is extremely difficult. Transportation delays result in increased expenses and waste, which reduces the competitiveness of domestic coal in comparison to imports.

Policy and Regulatory Hurdles
Due to strict regulations, production may be slowed by delays in approving new mining operations or expansions. Furthermore, it is difficult for legislators to strike a balance between industrial needs and environmental rules. To guarantee the sustainable and effective use of coal resources, addressing these issues would necessitate concerted efforts by the government, industry stakeholders, and local people.

Opportunities and Future Directions
Notwithstanding the difficulties, there are plenty of chances for the coal sector to expand and modernize, particularly in Jharkhand. Jharkhand can maintain its vital role in India's industrial and energy environment while moving toward sustainability by tackling present problems and capitalizing on its advantages.

Improving Coal Quality and Technology
The quality of Indian coal can be raised by technological investments. By lowering the ash content, technologies like coal washing and beneficiation can increase the efficiency of domestic coal for industrial and power generation. Advanced mining technology can also be implemented in Jharkhand to boost output and protect workers.

Expanding Infrastructure
Coal transportation delays and expenses can be greatly decreased by building better transportation infrastructure, such as expanded rail networks and dedicated freight lanes. Jharkhand's coal will be more competitive with imported coal thanks to improved logistics that will enable it to reach the industry more effectively.

Sustainable Mining Methods
The detrimental effects of coal extraction can be lessened by implementing ecologically friendly mining techniques. Initiatives like water management, soil restoration, and reforestation can lessen environmental harm and increase mining projects' social acceptability.

Diversification and Renewable Integration
In addition to coal, Jharkhand can diversify its economy by investing in renewable energy. Opportunities for the development of solar and wind power plants are presented by the state's plentiful sunshine and wind resources. This two-pronged strategy can help India achieve its renewable energy objectives while lowering the state's reliance on coal.

Policy Reforms and Incentives
By streamlining regulatory procedures, offering financial incentives for mine modernization, and promoting private sector involvement in coal and renewable energy projects, the government can play a significant role. Investment and innovation in the industry will be stimulated by clear and consistent policies.

Skill Development and Employment Opportunities
Mining, logistics, and renewable energy will all need new skills as a result of modernization and diversification. The workforce in Jharkhand may be prepared for these prospects through training programs, guaranteeing job stability and economic growth in the area. Jharkhand can take the lead in developing a sustainable and balanced energy future for India by seizing these chances.

CONCLUSION

With 191.16 million tonnes produced in 2023–2024 and supporting important industries like cement, steel, and power, Jharkhand's coal industry continues to play a significant role in India's energy and industrial environment. Notwithstanding its noteworthy achievements, issues like land displacement, environmental deterioration, and a lack of long-term job possibilities still exist. Restoring abandoned areas for the benefit of nearby populations, implementing sustainable mining methods, and enhancing the quality of domestic coal are all necessary to meet these problems. In order to prepare the workforce for future prospects in renewable energy and other areas, reskilling them is also essential. Through these initiatives, Jharkhand may contribute to a sustainable and diverse energy future while simultaneously maintaining its position as a significant coal producer.

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