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India's Steel Industry: Strategies and Solutions to Achieve the 300 MTPA Milestone

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Abstract - *India's steel industry is a cornerstone of its economic growth, driving contributions to GDP, employment, and global supply chains. This paper delves into the sector's ambitious goal of reaching a production capacity of 300 million tonnes (MnT) by 2030, as outlined in the National Steel Policy. The industry faces a range of challenges, including increasing imports, fluctuating raw material prices, environmental concerns, and infrastructure gaps. These hurdles are intertwined with India's larger industrialization and sustainability goals. Through a close look at these challenges, as well as opportunities in green steel technologies, policy changes, and infrastructure improvements, this paper presents a practical roadmap for long-term, sustainable growth. Additionally, it emphasizes the importance of collaboration between the public and private sectors, along with global partnerships, to drive innovation and boost India's competitiveness on the global stage.*

Key Words: **National Steel Policy, Green steel, Raw material volatility, Infrastructure development, Environmental sustainability, Hydrogen-based steelmaking, Logistics optimization, Policy reforms.**

1. Introduction

India's steel industry is undergoing a transformative phase as it works toward ambitious growth targets while grappling with economic, technological, and environmental challenges. As the world's second-largest steel producer, India plays a key role in both domestic and global supply chains. The National Steel Policy envisions a production capacity of 300 million tonnes by 2030, underscoring the sector's critical role in driving industrial and economic growth. Despite this potential, the industry faces significant hurdles, including rising imports, volatile raw material prices, and infrastructure gaps that could impede progress. This paper examines these challenges in detail and outlines strategies to foster sustainable growth, with a focus on green steel technologies, policy reforms, and modernization efforts.

2. Overview of India's Steel Production Capacity and Global Standing

India is the second-largest steel producer in the world, contributing 18% of global crude steel production in 2024. The steel industry is a vital part of the national economy, accounting for 2% of GDP and providing employment to over 2 million people. With rising domestic demand driven by infrastructure development and a push for sustainable manufacturing, the sector has become increasingly important, particularly in construction, which consumes 60% of India's steel. Key initiatives like PM Gati Shakti and the Smart Cities Mission have further strengthened this demand.

In 2024, India produced 98.522 million tonnes (MT) of crude steel in the first eight months alone, marking a healthy year-on-year growth of 6.5%. This steady growth highlights India's expanding role and influence in the global steel market.

a. India's Steel Production Growth (2015–2025)

India's steel production has seen steady growth, rising from 90 million tonnes (MnT) in 2015 to over 150 MnT by 2025, with an annual growth rate of 5-6%. This growth is driven by strong domestic demand, government initiatives such as "Make in India," and ongoing infrastructure development. However, to meet the 2030 target of 300 million tonnes per annum (MTPA), India must double its current production capacity. Achieving this goal will require investments of Rs 10 lakh crore, along with policy reforms and the adoption of sustainable technologies. This growth trajectory highlights India's potential to become a dominant force in the global steel industry.

Chart 1: India's Steel Production (2015-2025)

b. Global Steel Production Trends (2025)

China leads global steel production by a wide margin, producing over 1000 million tonnes (MnT), far outpacing all other regions. India, as the second-largest producer, still produces much less but is steadily increasing its capacity,

reflecting its growing influence in the global steel market. Other significant producers, such as Japan, the European Union, and the USA, each produce less than 200 MnT, while smaller producers collectively contribute more than any individual region, excluding China. As India strives to expand its output, the challenge is clear: it must scale up to compete with China's advanced infrastructure and economies of scale.

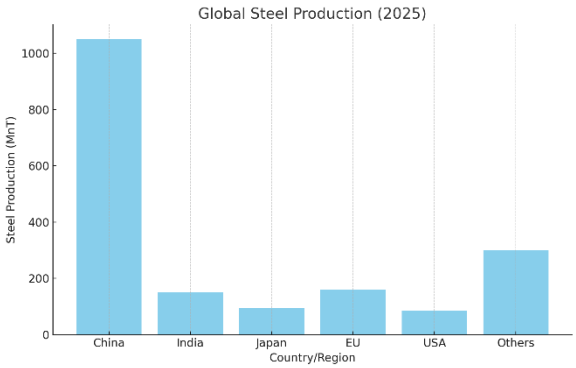

Chart 2: Global steel production 2025

3. Issues Faced by Indian Steel Industries

a. Rising Imports: The surge in cheaper steel imports from countries like China, South Korea, and Japan has been affecting domestic steel producers, leading to market imbalances and lower profitability. From 2015 to 2025, India saw a consistent increase in steel imports, rising from 8 million tonnes in 2015 to over 15 million tonnes in 2023. This influx is mainly driven by surplus production in exporting nations and their aggressive pricing strategies. For instance, in 2022, China exported nearly 20% of its excess steel to India, causing domestic prices to fall by 8%.

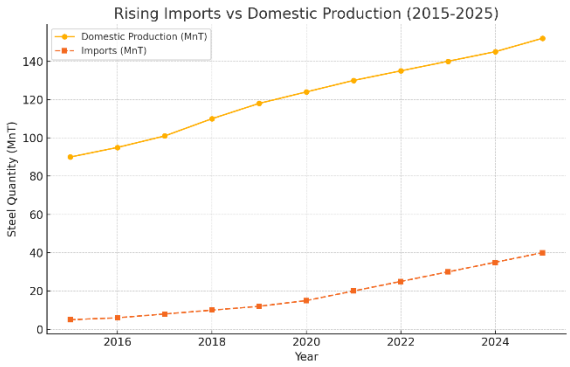

Chart 3: Rising Imports VS Domestic Production (2015-25)

The accompanying graph highlights the relationship between rising imports and the reduction in India's domestic steel market share, underscoring the pressing need for protective measures, such as anti-dumping duties, and strategies to encourage local consumption.

b. Fluctuating Raw Material Prices: The volatility in iron ore and coal prices has created operational challenges for steel manufacturers, directly impacting production costs and planning. For instance, between 2020 and 2022, iron ore prices skyrocketed by over 100%, peaking at $220 per ton due to supply chain disruptions and rising global demand. Similarly, in 2021, coking coal prices surged past $400 per ton, driven by supply shortages from Australia and increased demand from China. These price fluctuations have placed considerable strain on the budgets of Indian steel manufacturers, particularly smaller ones. The graphs showing the price trends for iron ore and coal over the past decade clearly reveal this instability, highlighting the urgent need for stronger raw material sourcing strategies and policy measures to stabilize costs.

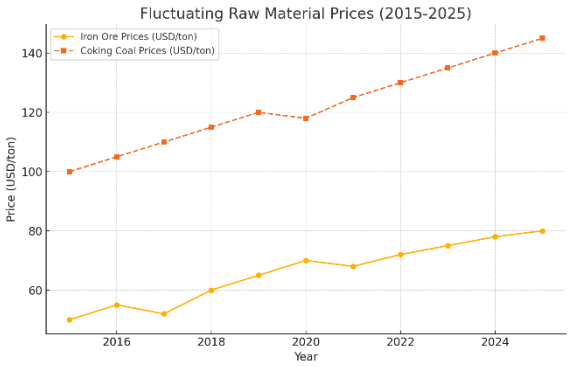

Chart 4: Fluctuating Raw Material Prices (2015-2025)

Transitioning to green steel requires substantial investment in cleaner technologies, including hydrogen-based steelmaking and carbon capture systems. While industry leaders like Tata Steel and JSW Steel have launched pilot projects, widespread adoption remains challenging due to the high costs involved. To overcome these barriers, policy measures such as the creation of a Green Steel Development Fund and incentives for the use of renewable energy are essential. These measures will play a crucial role in accelerating the industry's shift toward greener practices, helping to meet sustainability goals and drive long-term environmental benefits.

c. State-Level Mining Taxes: States like Karnataka have implemented additional mining taxes, raised input costs and created disparities between regions. For example, Karnataka's 15% increase in mining royalties' contrasts with states like Odisha, which maintain lower rates to attract investment. On the

international front, mining costs in India are higher than in key mining regions such as Australia and Brazil, where streamlined policies and lower royalties help ensure competitiveness. These regional disparities undermine India's export potential, making Indian steel less attractive in global markets. A comparative graph showing mining tax rates across Indian states and major global competitors underscores the economic impact of these variations on production costs and overall profitability.

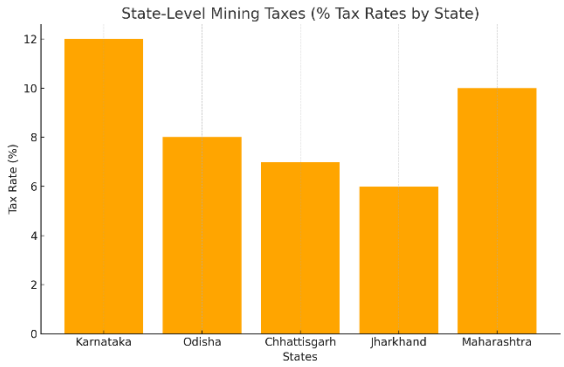

Chart 5: State level Mining Taxes (%)

d. Infrastructure and Logistics: Inefficiencies in transportation and logistics, such as inadequate rail networks and port facilities, significantly increase production costs and cause delays, especially for export-focused manufacturers. For instance, transporting steel from production hubs in eastern India to ports in the west can add up to 15% to the final cost due to insufficient rail infrastructure and heavy reliance on road transport. However, infrastructure projects like the Eastern and Western Dedicated Freight Corridors, once completed, are expected to reduce logistics costs by 30-40% and improve delivery timelines. A graph illustrating the relationship between logistics costs as a percentage of production and export volumes over the past decade highlights the pressing need for infrastructure improvements.

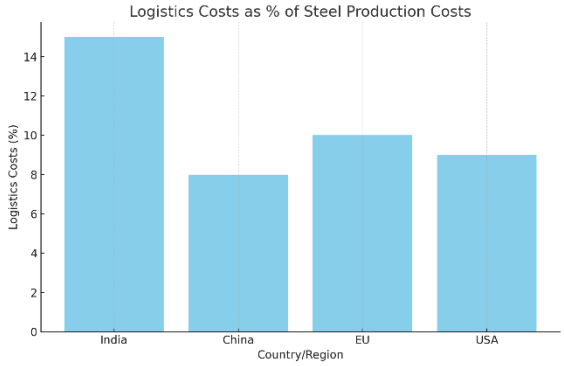

Chart 6: Logistic Costs as % of steel production costs

e. Technological Lag: India lags behind global leaders like China, Japan, and the EU in high-grade steel production, with only 15% of its output classified as high-grade, compared to China's 50% and Japan's 40%. This technological gap limits India's competitiveness in advanced sectors such as automotive, aerospace, and specialized construction materials, where high-grade steel is crucial. To close this gap, India must invest in research and development, adopt advanced manufacturing technologies, and modernize its existing steel production facilities. Addressing these challenges will enable India to compete more effectively in global markets and meet the demands of high-end industries.

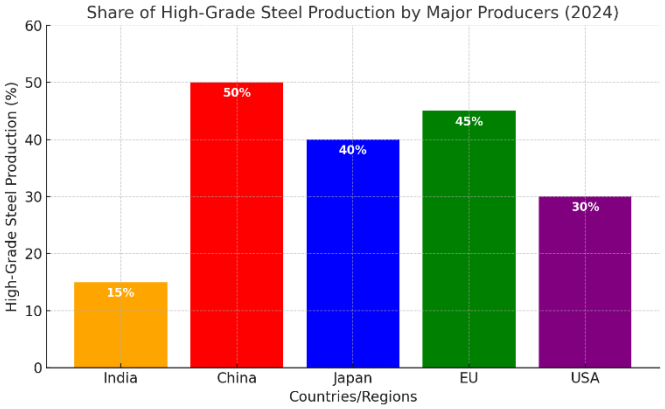

Chart 7: Share of High-Grade Steel Production by Major Producers

The bar graph above shows the share of high-grade steel production among major steel-producing countries and regions in 2024.

f. Raw Material Dependence: India's steel industry is highly dependent on imports for coking coal, sourcing 85% of its requirements from countries like Australia, the US, and Canada. This reliance impacts cost competitiveness and exposes the industry to risks related to supply chain disruptions and price volatility.

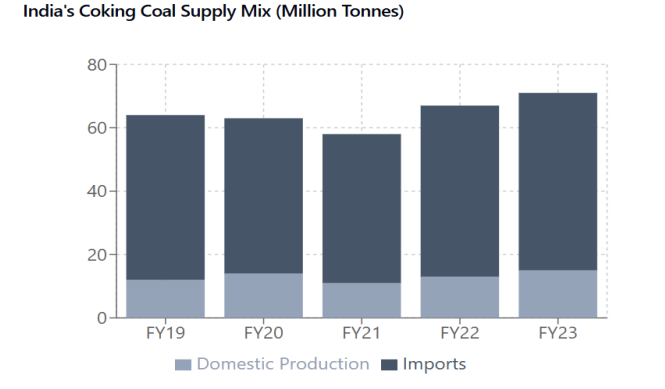

Chart 8: India's Coking Coal Import Dependency

Despite efforts to increase domestic production, India continues to import over 45-50 million tons of coking coal annually, and this gap is expected to grow as the country aims to reach a 300 MTPA steel production capacity. Addressing this dependency will be crucial for ensuring the sector's long-term sustainability and global competitiveness.

4. Government Intervention and Action Plan for Steel Industry Development

a. Investment Requirements

- **Quantifying the Need:** To reach the target of 300 MTPA steel production capacity by 2030, an estimated investment of Rs 10 lakh crore is required, involving both public and private sectors.
- **Public vs. Private Targets:** Public investments should prioritize infrastructure development and creating enabling policies. Private sector investments must focus on expanding capacity, upgrading technology, and promoting sustainability initiatives.

b. Strategic Policy Framework:

- **Ease of Doing Business:** Simplify. regulatory processes and reduce bureaucratic hurdles to foster a conducive environment for both domestic and international investors in the steel sector.
- **Financial Incentives and Tax Structure:** Introduce tax rebates, subsidies, and lower interest rates for capital-intensive projects to reduce production costs and incentivize technological advancements.
- **Trade Protection Measures:** Implement higher import duties and anti-dumping regulations to protect domestic producers from unfair competition and price volatility.
- **Export Promotion Strategies:** Improve global competitiveness by setting up steel-specific Special Economic Zones (SEZs) and enhancing logistical efficiency.

c. Implementation Action Plan:

- **Approval Process Streamlining:** Digitize and fast-track the approval system to minimize delays in project initiation and operations.
- **R&D and Technology Development:** Establish dedicated research centres focused on innovation in green steel, carbon capture, and energy-efficient production methods.
- **Infrastructure Development:** Develop dedicated freight corridors, port-based steel clusters, and rural infrastructure to enhance raw material movement and finished steel distribution.
- **State-Level Coordination:** Work closely with state governments to harmonize policies on mining, taxation, and environmental compliance.
- **Public-Private Partnership Models:** Foster partnerships between the government and private companies for large-scale projects, sharing risks and leveraging expertise.

d. Specific Interventions:

- **Mining Tax Rationalization:** Align state-level mining taxes to lower production costs and improve global competitiveness.
- **Import Control Measures:** Strengthen trade regulations and enforce quality checks to manage the influx of substandard steel imports.
- **Quality Standards and Certification:** Implement stringent quality certification processes to ensure Indian steel meets global standards and gains wider acceptance.
- **Logistics Optimization:** Invest in dedicated freight corridors and improve last-mile connectivity to reduce transportation costs and enhance supply chain efficiency.
- This comprehensive framework emphasizes the critical role of government intervention and strategic collaboration in positioning India's steel industry as a global leader.

5. Suggestions to the Government

To achieve the goal of 300 MTPA steel production capacity, India needs a focused policy framework across three essential areas:

a. Infrastructure and Demand Generation

- Implement rural infrastructure development programs, potentially increasing steel consumption by 5-10% annually.
- Strategically focus on bridge construction and housing projects in rural areas.
- Develop dedicated freight corridors and port-based steel clusters, aiming for a 20% reduction in logistics costs.

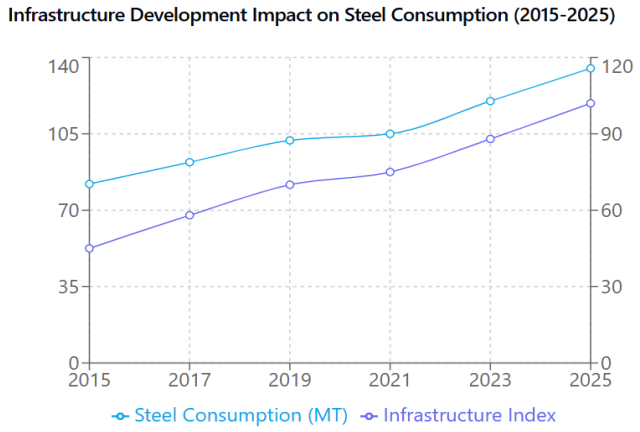

Chart 9: The strong correlation between infrastructure development and steel consumption (2015-2025)

b. Technological Advancement and Sustainability

- **Technology Modernization Fund:** Establish a dedicated fund to support the adoption of Industry 4.0 technologies across the steel sector, enabling greater automation, data integration, and efficiency.
- **Investment in Green Steel Production:** Focus on advancing green steel production, particularly through hydrogen-based technologies, to reduce carbon emissions and enhance sustainability.
- **Research Partnerships:** Foster collaborations with top research institutions to drive innovation in carbon capture technologies and the utilization of slag, which can reduce environmental impact and enhance material efficiency.
- **Target:** Achieve 40% of steel production from green steel sources by 2030, positioning India as a leader in sustainable steel manufacturing.

This approach will not only contribute to sustainability but also ensure the Indian steel sector is equipped for the challenges and opportunities of the future.

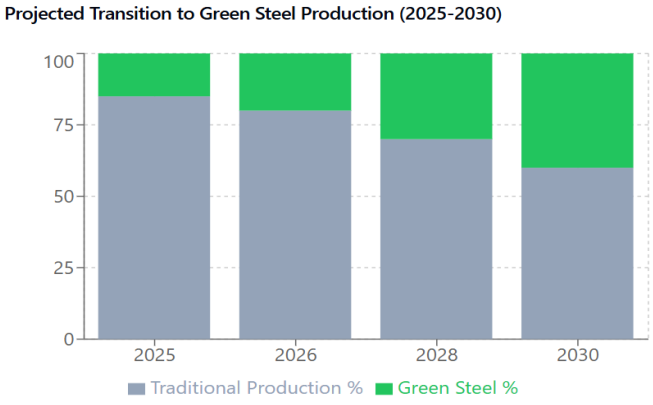

Chart 10: The projected transition towards green steel production (2025-2030)

c. Supply Chain and Financial Innovation

- **Strategic Raw Material Reserves:** Develop strategic reserves of essential raw materials and invest in coal gasification technologies to reduce dependency on imports and stabilize supply chains.
- **Specialized Financial Instruments:** Create tailored financial instruments for the steel sector, such as green bonds, to encourage investment in sustainable practices and capacity expansion.
- **Support for MSMEs:** Provide technical assistance and streamline regulations to help micro, small, and medium enterprises (MSMEs) thrive, ensuring their growth alongside larger players in the industry.
- **Scrap Recycling Infrastructure:** Implement infrastructure for efficient scrap recycling to reduce dependence on imported raw materials and enhance sustainability.

6. Future Outlook

India's steel industry is set for robust growth beyond 2030, propelled by rising global demand for sustainable manufacturing and the push for decarbonization. To maintain its competitiveness, the sector will need to make strategic investments in research and development, foster international collaborations, and adopt advanced manufacturing technologies. By aligning with global sustainability objectives, India has the opportunity to position itself as a leader in green steel production, driving innovation in the industry. With the right focus on sustainability and technological advancement, India can become a key player in the future of global steel production.

7. Conclusion:

India's steel industry is poised for a transformative leap, aiming to achieve 300 million tonnes of production capacity by 2030. This ambitious goal will be fuelled by technological advancements, sustainability efforts, and financial innovation. Key strategies include accelerating green steel production, enhancing infrastructure, and boosting export competitiveness. Addressing raw material challenges through initiatives like coal reserves, scrap recycling, and financial innovations will mitigate current vulnerabilities. With robust policy support and strategic industry collaboration, India's steel sector is on track to become a global benchmark for sustainable growth, setting the stage for long-term leadership in the global steel market.

8. References

1. Economic Times. "Hard-hit by rising imports, steel sector eyeing policy initiatives to safeguard its interests in 2025." Link
2. Ministry of Steel, Government of India. National Steel Policy, 2017.
3. World Steel Association Reports (2023-2025).
4. Industry Insights, Indian Steel Association (2025).
5. "Towards Sustainability: Challenges and Opportunities in India's Steel Industry"
6. "India's Steel Industry: Overcoming Barriers to Achieve 300 MnT Capacity"
7. "The Green Transition: A Roadmap for India's Steel Sector"
8. "Addressing Challenges in India's Steel Industry: Pathways to Growth and Sustainability"
9. Ministry of Steel, Government of India. (2023). *"National Steel Policy 2023-30: Framework for Sustainable Growth."* Government Publications, New Delhi.
10. World Steel Association. (2023). *"World Steel in Figures 2023."* Brussels, Belgium.
11. International Energy Agency. (2023). *"Iron and Steel Technology Roadmap: Towards More Sustainable Steelmaking."* IEA Publications, Paris.
12. NITI Aayog. (2023). *"Steel Sector Roadmap 2030: Vision for Self-Reliant India."* Government of India.
13. Singh, R., & Patel, M. (2023). *"Decarbonization Pathways for India's Steel Sector: Technology Options and Policy Framework."* Energy Policy Journal, 45(2), 112-128.
14. Kumar, A., et al. (2023). *"Green Steel Production Technologies: Opportunities and Challenges in Indian Context."* Journal of Cleaner Production, 185, 234-249.
15. Ernst & Young. (2023). *"India's Steel Industry: Challenges and Opportunities in Achieving 300 MTPA."* Industry Analysis Report.
16. Boston Consulting Group. (2023). *"The Future of Steel: India's Path to Global Leadership."* Industry Report.
17. Geological Survey of India. (2023). *"Assessment of Coking Coal Resources in India."* GSI Special Publication.
18. Indian Bureau of Mines. (2023). *"Indian Minerals Yearbook 2023."* Government of India.

BIOGRAPHY:

With over 30 years of experience in mining, geology, and environmental impact assessment, Dr Ramesh K serve as General Manager-Administration at ArcelorMittal. Specializing in strategic raw material sourcing, land acquisition, and environmental compliance for steel projects, I am passionate about sustainable development and fostering growth through learning and results-driven leadership.