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Challenges and Opportunities in Government Mining Policies: Towards a Sustainable Future

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Abstract

In order to promote sustainable mining practices, this research looks at the possibilities and challenges within India's government mining policy. Four hundred thirty-six people, including academics, citizens, and mining industry experts, filled out a structured questionnaire to provide us with this data. Policy lucidity, sustainability initiatives, implementation hurdles, mineral exploration efficacy, government incentives, and private sector engagement were some of the important factors explored in the research. The hypotheses were tested using statistical methods such as ANOVA and correlation analysis. There is a robust correlation between the difficulties in implementing regulations and the efficiency of exploration, and the findings show that government policies have a substantial influence on sustainable mining practices. The study also discovered that private sector involvement in mineral prospecting is greatly affected by government incentives. The results stress the need of community involvement, strong incentive systems, and persistent policy enforcement in promoting ethical mining. In order to ensure India's mining industry continues to be viable in the future, the report suggests that public and private entities work together more closely.

Keywords; Government policies, Sustainable mining, Policy challenges, Mineral exploration, Private sector participation.

INTRODUCTION

The mining industry has had a significant positive impact on the economy of various countries, including India. It is the source of critical basic materials for a variety of industries, including electricity generation, manufacturing, and construction (OXFAM India, 2012). The mining sector has enhanced employment possibilities, financed infrastructure projects, and increased national income throughout the years. (Chadha et al., 2023)

The growth of the mining industry does come with its share of drawbacks. The negative environmental impacts of mining include deforestation, soil erosion, water contamination, and biodiversity loss, among many others (Rao et al., 2024). Additionally, mining operations in certain locations have resulted in the evacuation of whole towns and the disruption of everyday life for many citizens.

Governments have responded to these worries by implementing a number of regulations and laws intended to regulate the mining sector (Ministry of Mines, 2008). These laws aim to establish a mining operation that emphasises commercial advantage while ensuring environmental conservation and social welfare are not compromised. Nonetheless, several challenges persist in achieving the proper execution of these principles, despite the existence of rules. (Charles W. Marwa, 2015)

As this unfolds, new opportunities are emerging to transform mining into a more environmentally friendly endeavour. A few elements that are playing a role in the positive change are the adoption of cleaner technology, increased community involvement, and partnerships between public and private organisations (Khanna, 2020; Kumar, 2025).

Still, research into the efficacy of present government policies and suggestions for reform are necessary to ensure mining's long-term viability.

Nature of mining industry in India

Mining holds significant value as an economic pursuit in India. India stands out as a major exporter of iron ore, chromite, bauxite, mica, and manganese, holding the fifth position among mineral-producing nations based on production volume. Although private companies have joined in mining activities, the government remains the most significant player in the domestic mining sector through its various public enterprises (Mishra & Ganguly, 2018). A significant portion of India's potential mineral resources remains to be thoroughly investigated. In the past, the emphasis of government policies and legislation was primarily on regulating mines and minerals, rather than on the exploration and development aspects. Recognising the standstill in the mineral industry, the Indian government has started various reforms to encourage more involvement from the private sector in exploring minerals, developing mines, and maintaining them. Nonetheless, there remains a great deal that requires attention (Raza & Dwivedi, 2018). A recent study by the Confederation of Indian Industry emphasised that to drive India's economic growth, policymakers should pay greater attention to the mining sector, making dedicated efforts to restore its 3 per cent share in GDP by 2025–2026. (Domínguez-Gomez & Gonzalez-Gomez, 2021)

Government Mining Policies in India

The mining industry is governed by regulations at both the central and state levels. According to the Indian Constitution, states possess the authority to oversee mines and the development of minerals. Nevertheless, this authority is bound by the overarching laws and regulations governing mining activities.

The National Mineral Inventory, managed by the Indian Bureau of Mines, has adhered to the UN Framework Classification for Fossil Energy and Mineral Resources (UNFC) since the year 2000. This is a widely acknowledged system that offers a way to standardise for regulatory and statistical needs (Dubey, 2017). The alternative global framework for classification, known as the Committee for Mineral Reserves International Reporting Standards (CRIRSCO), which encompasses the Canadian Institute of Mining Standards, the Australian Joint Ore Reserves Committee (JORC) Code, and the South African Code for the Reporting of Exploration Results, Mineral Resources, and Mineral Reserves (SAMREC) Code, is primarily designed for public disclosure by companies to inform investors. (Sethi & Chinara, 2024)

The UNFC classification, in contrast, proves to be more advantageous for governmental reporting of mineral resource estimates and forecasts, aiming to draw in investment and exploration efforts. Indian companies must report to the government using the UNFC format, yet they lack a defined system for their quarterly or annual reports, memoranda, or press releases (Debbarma & Yadav, 2024). The key definitions and terminology utilised for reporting mineral resources in these two classification systems have been harmonised. In contrast to the CRIRSCO system, which requires reasonable prospects for the eventual economic extraction of mineral resources, the UNFC classification also accounts for undiscovered or uneconomic mineral reserves. (O'Callaghan & Vivoda, 2015)

Table 1 Institutions and Policies Governing Mineral Exploration in India

Institution / Policy	Role and Functions
National Mineral Inventory (Indian Bureau of Mines)	Provides a comprehensive mineral-wise and state-wise record of exploration, development, and mining. Includes details like location, geology, infrastructure, lease status, etc.
Geological Survey of India (GSI)	Conducts geological mapping and geoscience data collection across India. Shares this data with other exploration agencies to speed up mineral exploration.
National Mineral Exploration Policy (2016)	Mandates GSI to provide pre-competitive baseline geoscience data free of cost to promote exploration.
State Directorates of Geology and Mines	Carry out mineral exploration at the state level. Maintain and update exploration-related databases.
Mineral Exploration Corporation Limited (MECL)	A government-owned company engaged in detailed mineral exploration and database management.
National Mineral Exploration Trust (NMET)	A newly formed body responsible for funding and carrying out both regional and detailed mineral exploration activities.
Indian Bureau of Mines (IBM)	Maintains data on active mines and mineral quality. Some data is available at a cost or via restricted access at IBM offices.
Reporting Requirements	Mineral concession holders must share geophysical and mining data with the GSI and state governments. All mines must submit mandatory returns to IBM.
Non-Exclusive Reconnaissance Permits (NREP)	Issued to private players for initial exploration. NREP holders may be offered a share in future revenues from the mineral blocks they help discover.

Table 2 Major Mining Policies in India

Policy / Act	Year	Key Features / Objectives
Mines and Minerals (Development and Regulation) Act (MMDR Act)	1957	Regulates mining activities in India. Provides framework for the grant of mineral concessions. Amended several times for modernization and transparency.
National Mineral Policy (NMP)	1993	First comprehensive mining policy focusing on private participation, technology use, and investment promotion.
National Mineral Policy (NMP)	2008	Revised version emphasizing sustainable mining, environmental protection, and improved regulatory mechanisms.
National Mineral Policy (NMP)	2019	Latest update aiming for exploration, ease of doing business, transparency in allocation, and ensuring socio-economic development of mining areas.
National Mineral Exploration Policy (NMEP)	2016	Focuses on attracting private sector participation in exploration. Provides free baseline geoscience data from GSI and incentivizes exploration activities.
Mining Tenement System (MTS)	Ongoing	A digital platform for managing mineral concessions, improving transparency and tracking of leases.
District Mineral Foundation (DMF)	2015	Established to work for the benefit of people affected by mining operations. Funded through contributions from mining companies.
Star Rating of Mines Scheme	2016	Encourages mining leaseholders to adopt sustainable practices through a self-assessment and rating system based on environmental and social parameters.
Mineral Laws (Amendment) Act	2020	Allows seamless transfer of mining leases and removal of restrictions on end-use of minerals. Opens coal mining to commercial players.

OBJECTIVES OF THE STUDY

- To examine the key features of current government mining policies in India.
- To identify the major challenges faced in the implementation of mining policies.
- To explore the opportunities within the existing policy framework for promoting sustainable mining.
- To analyze the role of government institutions and private players in mineral exploration and development.
- To suggest policy recommendations for making mining practices more responsible and future-ready.

HYPOTHESES OF THE STUDY

H01: "There is no significant impact of government mining policies on the promotion of sustainable mining practices in India."

H02: "There is no significant relationship between policy implementation challenges and the effectiveness of mineral exploration activities."

H03: "There is no significant impact of government incentives on private sector participation in mineral exploration."

RESEARCH METHODOLOGY

The study analysed the benefits and drawbacks of government mining policy using a survey research strategy. We used just closed-ended questions to ensure that our data collecting remained focused and consistent. The questions were designed using a 5-point Likert scale so that participants could indicate how much they agreed or disagreed with the assertions. Basic demographic information, including age, employment, location, and stakeholder group, was also gathered in the survey. People with ties to the mining industry, either directly or indirectly, were the ones who received the questionnaire. Staff members from public agencies, commercial mining companies, neighbourhood groups, and environmental advocacy groups were among them. There were a total of 75 valid replies. After that, we used some basic statistical methods to sort the data and look for trends that would shed light on mining policy and sustainable development.

Table 3 Overview of Research Methodology

Component	Description
Research Design	Descriptive survey
Total Respondents	75 individuals
Data Collection Tool	Structured questionnaire
Question Type	Closed-ended only
Scale Used	5-point Likert scale (Strongly agree to Strongly Disagree)
Demographic Data Collected	Age, gender, occupation, location, stakeholder type
Sampling Method	Purposive sampling (targeted mining-related stakeholders)
Data Analysis Techniques	Basic descriptive statistics (percentages, frequencies, mean scores, etc.)
Respondent Categories	Government officials, mining professionals, local residents, private players

DATA ANALYSIS AND INTERPRETATION

Table 4 Age Group

Age Group					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18 years to 25 years	12	16.0	16.0	16.0
	26 years to 35 years	25	33.3	33.3	49.3
	36 years to 45 years	16	21.3	21.3	70.7
	46 years and above	22	29.3	29.3	100.0
	Total	75	100.0	100.0	

The age-wise distribution of respondents reveals that the largest proportion belonged to the 26 to 35 years age group, accounting for 33.3% of the total sample (25 out of 75 respondents). This was followed by the 46 years and above group, comprising 29.3% (22 respondents), and the 36 to 45 years group, which made up 21.3% (16 respondents). The youngest group, aged 18 to 25 years, constituted the smallest segment at 16% (12 respondents). These figures indicate that the majority of participants were middle-aged or older, suggesting a sample with relatively more professional and life experience relevant to mining policy and its impacts.

Table 5 Gender

Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	59	78.7	78.7	78.7
	Female	16	21.3	21.3	100.0
	Total	75	100.0	100.0	

The gender distribution of the respondents shows a significant skew toward male participants, who made up 78.7% of the total sample (59 out of 75 respondents). In contrast, female respondents accounted for only 21.3% (16 respondents).

Table 6 Occupation

Occupation					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Government Official	6	8.0	8.0	8.0
	Mining professional	37	49.3	49.3	57.3
	Local Resident of a mining area	31	41.3	41.3	98.7
	Researcher	1	1.3	1.3	100.0
	Total	75	100.0	100.0	

The occupational profile of the respondents indicates that mining professionals formed the largest group, comprising 49.3% of the total sample (37 out of 75 respondents). This was followed closely by local residents of mining areas, who accounted for 41.3% (31 respondents), reflecting a strong representation of community perspectives directly affected by mining activities. Government officials constituted 8% (6 respondents), while researchers made up the smallest segment at 1.3% (1 respondent). This distribution ensures that the study captures both industry and community viewpoints, with a predominant focus on those directly engaged in or impacted by mining operations.

Table 7 Views of the respondents

Questions/statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Current mining policies are clearly communicated to all stakeholders.	18	41	11	2	3
Government mining regulations ensure transparency in operations.	14	38	14	7	2
There is regular updating of mining laws to suit current industry needs.	11	45	14	3	2
Policy decisions reflect input from local communities and experts.	14	34	15	8	4
Government mining policies support long-term resource management.	10	35	26	3	1
Environmental protection is well-integrated into current mining practices.	10	36	26	2	1
Policies promote the use of eco-friendly technologies in mining.	20	35	19	1	0
Awareness about sustainable mining is increasing among stakeholders.	15	41	16	1	2
Rehabilitation of mined areas is treated as a priority.	30	24	17	3	1
There is a balance between mineral extraction and environmental conservation.	22	35	17	0	1
Delays in approval processes affect mining operations.	23	41	9	2	0
Coordination between central and state authorities is often lacking.	21	42	10	2	0
Policy enforcement is inconsistent across regions.	13	41	17	3	1
Legal loopholes make implementation less effective.	20	33	12	8	2
Lack of trained personnel affects ground-level execution of policies.	23	38	9	3	2

Exploration efforts are supported by up-to-date scientific data.	11	34	21	7	2
There is adequate funding for mineral exploration projects.	13	35	17	9	1
Exploration activities cover both known and potential mineral zones.	13	33	17	11	1
Modern technologies are being used for efficient exploration.	27	37	6	5	0
Government and private efforts are aligned in exploration initiatives.	30	35	7	2	1
The government provides attractive incentives for mineral exploration.	35	30	7	1	2
Subsidies and tax benefits help boost mining-related activities.	20	29	13	12	1
Incentive schemes are easy to access and well-publicized.	17	28	17	12	1
Incentives are linked to environmentally responsible practices.	27	28	17	3	0
Government support encourages innovation in the mining sector.	23	27	14	11	0
Current policies encourage private investment in mineral exploration.	19	29	7	18	2
Private players face fewer bureaucratic hurdles today than before.	28	15	17	13	2
Collaboration between public and private sectors has increased.	20	21	8	11	15
Profit-sharing and licensing terms are favorable for private entities.	12	41	18	3	1
Private firms contribute significantly to advanced exploration techniques.	38	19	14	2	2

The survey responses reveal varied perceptions about current mining policies among stakeholders. A majority of respondents either strongly agreed or agreed with most of the positive statements, particularly regarding areas such as the promotion of eco-friendly technologies (73.3%), the alignment of government and private exploration efforts (86.7%), and incentives for mineral exploration (86.7%). Notably, 72% believed that rehabilitation of mined areas is prioritized, while 76% felt there is a balance between extraction and conservation. Concerns also emerged: for example, 53.3% acknowledged that legal loopholes reduce policy effectiveness, and 65.3% felt that lack of trained personnel hampers implementation. Statements reflecting bureaucratic or coordination issues, like delays and inconsistent enforcement, saw strong agreement from over 80% of respondents. Overall, the data reflects a cautiously optimistic view of government mining policies, acknowledging progress in sustainable practices while also highlighting systemic challenges.

Hypotheses testing

H01: There is no significant impact of government mining policies on the promotion of sustainable mining practices in India.

Table 8 Hypothesis 1

ANOVA					
Promotion of Sustainable Mining Practices in India					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	178.886	9	19.876	4.662	.000
Within Groups	277.114	65	4.263		
Total	456.000	74			

The ANOVA test result shows an F-value of 4.662 with a significance (p-value) of 0.000. Since the p-value is less than 0.05, we reject the null hypothesis (H_{01}). This indicates that there is a statistically significant impact of government mining policies on the promotion of sustainable mining practices in India. The variance between groups (Mean Square = 19.876) is notably higher than the variance within groups (Mean Square = 4.263), further supporting the conclusion that different groups perceived the impact of policies differently and meaningfully.

H02: There is no significant relationship between policy implementation challenges and the effectiveness of mineral exploration activities.

Table 9 Hypothesis 2

Correlations			
		Policy Implementation Challenges	Effectiveness of Mineral Exploration Activities
Policy Implementation Challenges	Pearson Correlation	1	.784**
	Sig. (2-tailed)		.000
	N	75	75
Effectiveness of Mineral Exploration Activities	Pearson Correlation	.784**	1
	Sig. (2-tailed)	.000	
	N	75	75
**. Correlation is significant at the 0.01 level (2-tailed).			

The Pearson correlation coefficient between policy implementation challenges and the effectiveness of mineral exploration activities is 0.784, with a p-value of 0.000. This indicates a strong positive correlation between the two

variables. Since the p-value is less than 0.05, we reject the null hypothesis (H_{02}). This means that there is a statistically significant relationship between policy implementation challenges and the effectiveness of mineral exploration. In practical terms, as challenges in policy implementation increase, the effectiveness of exploration activities tends to be negatively impacted, suggesting that efficient policy execution is crucial for successful mineral exploration.

H03: There is no significant impact of government incentives on private sector participation in mineral exploration.

Table 10 Hypothesis 3

ANOVA					
Private Sector Participation in Mineral Exploration					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	222.803	11	20.255	4.026	.000
Within Groups	316.984	63	5.031		
Total	539.787	74			

The ANOVA test result shows an F-value of 4.026 with a significance (p-value) of 0.000. Since the p-value is less than 0.05, we reject the null hypothesis (H_{03}). This indicates that there is a statistically significant impact of government incentives on private sector participation in mineral exploration. The variance between groups (Mean Square = 20.255) is significantly higher than the variance within groups (Mean Square = 5.031), suggesting that government incentives play a substantial role in encouraging private sector involvement in mineral exploration.

CONCLUSION

Exploration efficacy, government incentives, sustainable practices, policy implementation hurdles, and private sector involvement in India's mining industry were all part of the complex web of relationships examined in this research. The results, based on the opinions of 75 respondents, show that policy frameworks have a significant impact on how the country's mining industry is shaped to be both sustainable and responsible. Findings support the idea that transparent, up-to-date, and inclusive regulatory frameworks may improve mining operations' environmental responsibility by influencing the promotion of sustainable mining practices.

In addition, the research discovered a significant correlation between the efficacy of mineral exploration efforts and the difficulties in putting policies into action. This suggests that difficulties like poor infrastructure, poor coordination, and lax regulation might directly impact the effectiveness of exploratory endeavours. Finally, the research demonstrated that mineral exploration participation in the private sector is substantially affected by incentives offered by the government. Attractive and easily available incentives encourage the adoption of cutting-edge technology and best practices while also motivating private investment.

Finally, an effective and sustainable mining industry in India requires better policy communication, filled implementation gaps, and steady backing from private entities. The government's strategy may provide the groundwork for sustainable mineral resource development in the long run if it is transparent and works in tandem.

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