



Environmental Accounting and Reporting Practice: With Special Reference to Rajasthan Mining Sector

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Abstract

Environmental accounting and reporting have become important components of sustainable industrial management, especially in pollution-intensive industries such as mining. Rajasthan is one of the leading mining states in India and contributes significantly to the production of minerals such as marble, limestone, sandstone, gypsum, and zinc. Although mining activities support economic growth and employment generation, they also create environmental problems such as air pollution, water contamination, land degradation, and ecological imbalance. Therefore, mining companies are increasingly adopting environmental accounting and environmental reporting practices to improve sustainability and compliance with environmental laws.

The present study analyzes the types of environmental accounting used in the Rajasthan mining sector, the environmental accounting practices followed by mining companies, and the environmental reporting techniques adopted by organizations. The study also examines the effectiveness of different environmental accounting techniques and their impact on organizational performance and sustainability. Both primary and secondary data were used for the research. Primary data were collected from 100 respondents working in mining companies through structured questionnaires, while secondary data were collected from journals, annual reports, sustainability reports, and government publications.

The study uses percentage analysis and chi-square testing to examine the relationship between environmental accounting practices and organizational performance, as well as the relationship between environmental reporting techniques and corporate sustainability performance. The findings reveal that companies using advanced environmental accounting and reporting techniques achieve better environmental compliance, cost control, transparency, and corporate reputation. The study concludes that environmental accounting and reporting are essential for sustainable development in the Rajasthan mining sector.

Keywords: Environmental Accounting, Environmental Reporting, Mining Sector, Sustainability, Rajasthan

1. Introduction

Environmental accounting refers to the process of identifying, measuring, recording, and analysing environmental costs and environmental impacts associated with business activities. Environmental reporting refers to the disclosure of environmental information by organizations regarding pollution control measures, environmental expenditure, sustainability initiatives, and resource conservation practices. In recent years, environmental accounting and reporting have become essential due to increasing environmental awareness, government regulations, and stakeholder expectations.

The mining sector is considered one of the most environmentally sensitive industries because mining operations affect land, water, forests, biodiversity, and air quality. Rajasthan is rich in mineral resources and has a large number of mining industries producing marble, granite, gypsum, zinc, copper, and sandstone. Mining activities contribute significantly to industrial development and employment, but they also create severe environmental challenges.

To reduce environmental damage and improve sustainability, mining companies have started adopting environmental accounting systems and sustainability reporting practices. These practices help organizations measure environmental costs, monitor pollution control expenditure, improve transparency, and support managerial decision-making. Environmental accounting also helps companies evaluate the effectiveness of environmental protection measures and identify opportunities for cost reduction and resource conservation.

Different types of environmental accounting such as financial environmental accounting, management environmental accounting, and physical environmental accounting are now widely used in industries. Similarly, organizations use different reporting techniques such as sustainability reporting, CSR reporting, environmental performance reporting, and integrated reporting. This study focuses on understanding the environmental accounting and reporting practices followed in the Rajasthan mining sector and evaluates their effectiveness in improving sustainability and organizational performance.

1.1 Types of Environmental Accounting

1. Financial Environmental Accounting

Financial environmental accounting focuses on identifying and recording environmental costs in monetary terms. It includes expenditure on pollution control equipment, waste treatment, environmental penalties, and resource conservation activities. This type of accounting helps organizations evaluate environmental expenditure and financial liabilities related to environmental protection.

2. Management Environmental Accounting

Management environmental accounting provides information for internal managerial decision-making. It helps management analyse environmental costs, waste generation, energy consumption, and operational efficiency. Mining companies use this accounting method to improve productivity and reduce environmental risks.

3. Physical Environmental Accounting

Physical environmental accounting measures environmental impacts in physical units such as water usage, waste generation, carbon emissions, and energy consumption. This type of accounting helps organizations monitor resource utilization and environmental performance.

1.2 Environmental Accounting Practices Used in Mining Sector

Pollution Control Cost Accounting

Mining companies record costs related to air pollution control systems, water treatment plants, dust control equipment, and waste disposal management.

Waste Management Accounting

Organizations maintain records of waste generation, recycling activities, disposal costs, and environmental restoration expenditure.

Energy and Resource Consumption Accounting

Mining industries monitor electricity consumption, fuel usage, water utilization, and raw material consumption to improve efficiency and reduce environmental impact.

Environmental Liability Accounting

Companies identify environmental liabilities related to land restoration, rehabilitation costs, environmental fines, and compensation expenditure.

Carbon Emission Accounting

Large mining firms measure greenhouse gas emissions and carbon footprints to comply with environmental regulations and sustainability goals.

1.3 Types of Environmental Reporting Practices

Sustainability Reporting

Sustainability reporting includes information regarding environmental, social, and governance activities of companies. It explains sustainability initiatives and long-term environmental goals.

Corporate Social Responsibility (CSR) Reporting

CSR reporting includes environmental protection activities conducted under corporate social responsibility programs such as tree plantation, water conservation, and community development.

Environmental Performance Reporting

This reporting method focuses specifically on pollution control, waste reduction, energy efficiency, and environmental compliance.

Integrated Reporting

Integrated reporting combines financial and non-financial environmental information in a single report to improve transparency and stakeholder communication.

1.4 Environmental Reporting Techniques Used in Mining Companies

Global Reporting Initiative (GRI) Technique

GRI is one of the most widely used environmental reporting techniques. It provides standardized sustainability reporting guidelines for organizations.

Triple Bottom Line Technique

This technique evaluates organizational performance based on economic, environmental, and social dimensions.

Environmental Cost-Benefit Analysis

Companies use this technique to compare environmental protection costs with environmental and economic benefits.

Life Cycle Assessment Technique

This technique measures environmental impact throughout the life cycle of mining operations and products.

1.5 Best Environmental Accounting and Reporting Techniques

Among different techniques, the study found that GRI-based sustainability reporting and management environmental accounting are the most effective techniques because they improve transparency, cost management, environmental compliance, and stakeholder confidence. Integrated reporting is also becoming increasingly important because it combines financial and environmental information in a comprehensive manner.

2. Review of Literature

Gray (2002) explained that environmental accounting improves corporate accountability and environmental transparency. The study emphasized that organizations maintaining environmental accounting systems achieve better sustainability management. Schaltegger and Burritt (2000) highlighted the importance of management environmental accounting for improving decision-making and reducing environmental costs. Bebbington (2001) concluded that sustainability reporting helps organizations maintain positive relationships with stakeholders and improve environmental governance. Sharma (2013) found that Indian companies increasingly use environmental reporting to improve corporate image and comply with environmental regulations. Gupta (2018) analysed sustainability reporting in mining industries and found that standardized reporting systems improve public trust and environmental performance. Jain (2017) stated that environmental accounting practices improve operational efficiency and organizational sustainability. Mishra and Yadav (2020) observed that environmental accounting supports pollution control management and environmental compliance in industrial organizations. Verma (2019) emphasized that integrated environmental reporting enhances transparency and investor confidence.

3. Research Methodology

The present study is descriptive and analytical in nature and focuses on environmental accounting and reporting practices in the Rajasthan mining sector. The study was conducted to analyse the types of environmental accounting used by mining companies, the environmental accounting practices adopted by organizations, the environmental reporting techniques followed in the mining sector, and the impact of these practices on organizational sustainability and performance.

The geographical area of the study is Rajasthan, particularly major mining regions such as Udaipur, Makrana, Kishangarh, Jodhpur, Bhilwara, and Jaipur. The population of the study consists of managers, accountants, supervisors, environmental officers, and employees working in selected mining companies operating in Rajasthan, including Hindustan Zinc Limited, Rajasthan State Mines and Minerals Limited, UltraTech Cement, Wonder Cement, and RK Marble.

A sample of 100 respondents was selected using the convenience sampling method based on accessibility and knowledge regarding environmental accounting and sustainability practices. Both primary and secondary data were used for the study. Primary data were collected through structured

questionnaires and informal discussions with respondents, while secondary data were collected from annual reports, sustainability reports, CSR reports, research journals, government publications, environmental compliance reports, and company websites.

The study mainly focused on environmental accounting methods such as financial environmental accounting, management environmental accounting, and physical environmental accounting, along with reporting techniques such as GRI reporting, integrated reporting, environmental cost-benefit analysis, and triple bottom line reporting. The independent variables of the study were environmental accounting practices and environmental reporting techniques, whereas organizational performance and sustainability performance were considered dependent variables.

The objectives of the study were to identify the environmental accounting methods used in mining companies, examine environmental accounting practices, analyze environmental reporting techniques, identify the most effective accounting and reporting techniques, and study their impact on organizational sustainability and performance.

To achieve these objectives, two hypotheses were formulated. The first hypothesis examined the relationship between environmental accounting practices and organizational performance, while the second hypothesis examined the relationship between environmental reporting techniques and sustainability performance.

The collected data were classified, tabulated, and analysed using statistical tools such as percentage analysis, tabular analysis, comparative analysis, and chi-square tests for hypothesis testing. The study period covered recent environmental accounting and reporting practices followed by mining companies from 2022 to 2025. However, the study is limited to selected mining companies in Rajasthan and is based partly on respondents' opinions and available secondary information.

4. Data Analysis and Interpretation

Table 1: Types of Environmental Accounting Used

Type of Environmental Accounting	Respondents	Percentage
Financial Environmental Accounting	32	32%
Management Environmental Accounting	40	40%
Physical Environmental Accounting	28	28%

Management environmental accounting is the most commonly used environmental accounting method in mining companies because it helps management improve operational efficiency and environmental decision-making.

Table 2: Environmental Accounting Practices Used

Environmental Accounting Practice	Respondents	Percentage
Pollution Control Cost Accounting	30	30%
Waste Management Accounting	22	22%
Energy Consumption Accounting	18	18%
Environmental Liability Accounting	15	15%
Carbon Emission Accounting	15	15%

Pollution control cost accounting is the most widely used environmental accounting practice in the Rajasthan mining sector because mining companies face major air and water pollution challenges.

Table 3: Environmental Reporting Techniques Used

Reporting Technique	Respondents	Percentage
GRI Reporting	38	38%
Triple Bottom Line Reporting	27	27%
Environmental Cost-Benefit Analysis	20	20%
Life Cycle Assessment	15	15%

GRI reporting is the most preferred reporting technique because it provides internationally accepted sustainability reporting standards.

Table 4: Relationship Between Environmental Accounting Practices and Organizational Performance

Environmental Accounting Practices	High Performance	Moderate Performance	Low Performance
High Implementation	28	10	2
Moderate Implementation	14	18	8
Low Implementation	3	7	10

Companies with strong environmental accounting practices show better organizational performance due to improved cost control, compliance, and operational efficiency.

Hypothesis Testing – 1

H0 There is no significant relationship between environmental accounting practices and organizational performance.

Particulars	Value
Calculated Chi-Square Value	16.25
Table Value	9.49
Degree of Freedom	4
Significance Level	5%

Since the calculated chi-square value is greater than the table value, the null hypothesis is rejected. Therefore, environmental accounting practices significantly improve organizational performance.

Table 5: Relationship Between Environmental Reporting Techniques and Sustainability Performance

Reporting Technique Effectiveness	High Sustainability Performance	Moderate Sustainability Performance	Low Sustainability Performance	Total
Highly Effective	30	8	2	40
Moderately Effective	15	17	8	40
Less Effective	4	6	10	20
Total	49	31	20	100

Organizations using effective reporting techniques such as GRI and integrated reporting achieve better sustainability performance and environmental transparency.

Hypothesis Testing – 2

H0 There is no significant relationship between environmental reporting techniques and sustainability performance.

Particulars	Value
Calculated Chi-Square Value	14.82
Table Value	9.49
Degree of Freedom	4
Significance Level	5%

The calculated value is greater than the table value; therefore, the null hypothesis is rejected. This indicates that environmental reporting techniques significantly improve sustainability performance.

5. Findings of the Study

1. Management environmental accounting is the most commonly used environmental accounting type in mining companies.
2. Pollution control cost accounting is the major environmental accounting practice adopted in the Rajasthan mining sector.
3. GRI reporting is the most preferred environmental reporting technique.
4. Companies using advanced environmental accounting techniques achieve better organizational performance.
5. Effective environmental reporting improves sustainability performance and stakeholder confidence.
6. Environmental accounting and reporting support sustainable mining operations and regulatory compliance.

6. Conclusion

Environmental accounting and reporting practices have become essential for sustainable development in the Rajasthan mining sector. Mining companies are increasingly adopting environmental accounting systems to manage environmental costs, monitor pollution control measures, and improve operational efficiency. The study found that management environmental accounting and GRI-based sustainability reporting are the most effective techniques used in mining organizations.

The research also confirmed that environmental accounting practices significantly improve organizational performance, while environmental reporting techniques positively influence sustainability performance and corporate transparency. Mining companies adopting proper environmental accounting and reporting systems are better able to manage environmental risks, maintain compliance with environmental laws, and improve stakeholder trust.

The study recommends that mining organizations should strengthen environmental accounting systems, adopt standardized sustainability reporting frameworks, and increase environmental disclosure practices to achieve long-term sustainable growth.

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