

Challenges to Environmental Management Practices in Indian Mining Industries

Akhilesh Barve¹, Kamalakanta Muduli²

¹ Asst. Prof., Indian Institute of Technology, Bhubaneswar, Orissa, India,

² Research Scholar, Indian Institute of Technology, Bhubaneswar, Orissa, India,

Abstract. Mining has been and continues to be a major contributor to the economic growth of most of the developed and developing countries. India ranks among top five global players in terms of production of several important minerals. A high environmental cost which has been associated with years of unregulated mining and mineral-processing activity made it realised to strike a balance between mineral developments on the one hand and the greening of the environment on the other. Gracefully many technologies to reduce the environmental burden and greening the supply chain in mining sector have been developed. Yet implementation of these technologies is not free from challenges. Attempt has been made in this paper to identify these challenges in the context of Indian mining industries.

Keywords: Mining Sector, Green Supply Chains, Challenges to Environmental Management.

1. Introduction

Environmental problems associated with waste and emissions produced from various supply chain activities have forced organizations, facing competitive, regulatory and community pressures, to move towards greening their supply chains. However, most of the adopted green solutions, especially in developing countries, remain to be the traditional command-and-control or “end-of-the-pipe” solutions. The end-of –the-pipe approach does not eliminate pollutants, but merely transforms them from one medium to another [14]. Unlike the traditional environmental management, the concept of green supply chain assumes full responsibility of a firm towards its products from the extraction or acquisition of raw materials up to final use and disposal of products [15].

All stages of a product’s life cycle will influence a supply chain’s environmental burden, from resource extraction, to manufacturing, use and reuse, final recycling, or disposal. Various environmental management practices such as, ISO 14001 certification and cleaner production have been implemented by various industries. As a more systematic and integrated strategy, green supply chain management (GSCM) has emerged as an important new innovation that helps organizations develop ‘win- win’ strategies that achieve profit and market share objectives by lowering their environmental risks and impacts, while raising their ecological efficiency[16]. Nearly every industry has been hit by green fever. The mining industry is no exception.

Mining industries perform various activities such as extraction of minerals, processing of minerals and transportation of these minerals to market place. Years of unregulated mining and mineral processing activities like drilling, blasting, crushing and other associated activities have not come without high environmental costs. In comparison with other sectors, the potential social and environmental issues associated with mining and mineral processing operations are both significant and complex to manage. The discovery, extraction and processing of mineral resources is widely regarded as one of the most environmentally and socially disruptive activities undertaken by business [1]. As it is associated with low investment capacity and poor working conditions, which enforces use of traditional technologies and unskilled manpower, which ultimately negatively affects productivity and maintenance of equipment [17]. This results in consumption of more energy and generation of more waste making it most polluting sector. The negative impact of mining on health, land, water, air, plants and animals, and other aspects of society can be reduced by careful planning and implementation of mining activities. It is essential to strike a balance between mineral developments on the one hand and the restoration of the environment on the other.

¹ 1 akhileshbarve@yahoo.com 2 kamalakantam@gmail.com

2. Mining in India

Minerals are the basic raw materials which contribute to the growth of both industrialized and industrializing countries, Judicious utilization of mineral resources promotes the economic development of a nation and its people. India is rich with various mineral resources, which include fossil fuels, ferrous and non-ferrous ores and industrial minerals. Globally, India ranks among the top five players in terms of production of several important minerals. Since 1947, India's mining industry has shown rapid growth. In the pre-plan period prior to 1950, India produced 24 types of minerals with a total value of US\$23 million[2]. Today, it produces 90 minerals, with a projected total value to touch over \$30 billion (about Rs. 1,27,662 crore) accounting for about 2.5% of the GDP in the next four years[3]. Public sector mines comprise 91 percent of the nation's total mineral value, even though 80 percent of mines are privately owned. By 1996-97, India had 3,488 mines. Of these, 563 were coal, 654 were metals and 2,271 were non-metals[2]. The growth in Indian mining industries due to suitable policy and investment climate supported by favourable market demand has intensified the adverse impacts on environment.

3. Impact on Environment by Mining

A lack of appropriate technology, primitive extraction techniques, a reluctance to plan and a disregard towards environmental issues of mining industries have led to wasteful mining, poor mineral recovery, the generation of mass mine waste, seasonal scarcity of ground water, drastic damage to landscapes, alterations to drainage patterns and a number of environmental threats including

3.1. Air

Methane, a green house gas released from many coal mines. Smelter operations with inadequate safeguard have the potential to pollute the air with heavy metals sulphur dioxide and other pollutants, besides that Dust produced from blasting operation in surface mines and from movements of heavy vehicle on haul roads also contribute to air pollution.

3.2. Water Quality

The major impacts are water pollution due to erosion, oil and grease, contamination of water bodies due to discharge of mine water, pollution from domestic and sewage effluents, sedimentation of river and other stored water bodies, leachates from wash-off from dumps, solid waste disposal sites, broken rocks, toxic wastes, salinity from mine fires, acid mine drainage etc.

3.3. Noise and Vibration

A cumulative effect of the mining activities like, drilling, blasting, crushing and material transportation , produces huge noise and vibrations in the mining area leading which results in hearing loss, other health related problems and loss of performance.

3.4. Impact of Mining on Ecology

As a result of mining, significant areas of land are degraded and existing ecosystems are replaced by undesirable wastes. The mineral extraction process drastically alters the physical and biological nature of a mined area. Strip-mining, commonly practiced to recover coal reserves, destroys vegetation, causes extensive soil damage and destruction and alters microbial communities. In the process of removing desired mineral material, the original vegetation is inevitably destroyed and soil is lost or buried by waste [3].

4. Challenges to Green Management Practices in Mining Industry

Gracefully many possibilities to reduce the environmental burden of mining activities exist. For example; optimization of the environmental performance through good housekeeping and total quality management, appropriate end-of-pipe techniques, recycling of waste and non-renewable products, substitution of, or a ban on the use of environmentally unfriendly products, or by incremental and more radical technological innovations[5]. However implementation of these technologies faces lot of challenges. Following challenges from literature survey and expert opinion have been identified.

4.1. Size of firm

Small-Scale mine owners of industrializing countries like India lack the technical or financial capabilities for proper exploitation, mining development, mineral extraction, or processing. They also often lack sufficient mechanical equipment and adequate maintenance facilities which reduces output per unit input and increases waste production. Small scale mines are not subjected to regulation under mines act [6], and as much of small scale mining activities are carried out illegally, is thus difficult to monitor and control [10]. Indian small scale mines particularly the very small ones, normally do not bother about eco-friendly operations. They not only destroy inadvertently the vegetation and the trees, particularly at and near the area of mining operation, but also do not take any step to regenerate environmental status or create greeneries [11].

4.2. Society Pressure

Local people object to proposals for increased mechanization, contending that it would reduce employment opportunities at resident mines. Because operations are therefore highly rudimentary, unhealthy and unsafe practices, and negligence towards environmental degradation prevails throughout the area [6]. There is a lack of strong environmental conservation or citizen groups in India. Unless there is a counterbalance on the conservation side there will be pressure to adopt measures that seek only short-term gains [9].

4.3. Poor Legislation

The Indian mining sector though was closed to foreign investors till 1994, after that, taking steps to liberalise the sector to attract higher volumes of FDI. It is alleged that in the search for new sources of capital labour and raw materials, TNCs(transnational companies) relocate their firms where environmental regulations are lax[13]. A frequently changing regulatory climate of India, obstructs long-term environmental plans, and discourages a mine from implementing greener management practices. For smaller mines, which already have limited resources, from a business management and economics standpoint, rather than wasting time, energy, capital, and resources to re-establish proactive corporate environmental "position", it makes more sense to simply operate in line with the standard set by the environmental legislation, and to change operations only when necessary[4]. Corruption and a lack of political will also play its role in non-performance of these and related pollution control measures [10]. Enforcement is a key drawback with regulatory arrangements in the sector. It is better enforcement, rather than more regulations that can begin to remedy the ills plaguing the sector today [20].

4.4. Lack of Direct Incentives

In the minerals industry, regulatory costs cannot be passed on to consumers because international metal prices are determined in terminal auction markets and cannot be controlled by the producers. The policy of requiring firms to reduce pollution at source, which necessarily involves changing their production technology and organization, overlooks the possibility that firms might already be searching for new ways to improve metal recovery, reagent use, energy efficiency, water conservation, and so on as part of their corporate strategies to increase competitiveness[12]. ISO standards are increasingly proving to be an integral marketing tool in the manufacturing sector because of escalated demands for green consumerism , The management of a mining company, on the other hand, is largely unconcerned with ISO certification of sites because it does not provide anywhere near the competitive edge[8].

4.5. Financial Constraints

Study reveals that environmental management practices need high levels of funding. Specifically, some companies spend over 20% of their total revenue in adopting environmental measures, employee environmental training and appropriate equipment [7]. Changes to conventional technologies could make workers and managers obsolete, and would require investment by companies in training programs, an added difficulty for a firm with a limited budget [4]. High staff turnover needs frequent conduction of training programs increasing the amount of fund requirements.

4.6. Technical Barriers

Many mines in India are either not aware of current version of technologies or fail to identify the areas where these advanced technologies could be utilized. And in the event that possibilities for the advanced technologies have been identified, at some of the mines, shortage of expertise is experienced. Unfortunately, international standards, which are designed generically and, hence, only provide general guidance, lend little in the way of methods to implement practical industry-specific environmental management practices [8]. Fixed location of the mineralized zone of interest imposes a constraint on all aspects of mining development including the method of mining, requirement for new infrastructure and services, and the suitability of waste management or, disposal methods [20].

4.7. Lack of Management Commitment

Top management in most of the mining companies is less concerned over environmental issues and reluctant to allocate adequate financial, technological and human resources to implement the green management practices. There is also an inevitable amount of hesitancy by top management towards implementation of green management practices as it involves huge amount of documentation work and a serious non-compliance uncovered during environmental auditing process might lead to social outcry or, even legal action[18].

4.8. Lack of Employee Commitment

Mining companies do not have proper performance evaluation system, they also do not have proper rewarding scheme for the employees to motivate them to be held responsible for protecting the environment. The roles, responsibilities and authority of the staff are neither properly defined nor communicated to all organizational members. This leads to confusion among staffs regarding their responsibilities and poor motivation towards environmental protection practices

4.9. Lack of Awareness

Poor awareness regarding environment among the politicians, citizens, and bureaucracy is compounded by the low levels of literacy and the poor mass media concern [9]. Regulators at all levels are severely limited by lack of adequate and usable information as also clarity and definition on several aspects pertaining to mining operations. This creates the necessary gaps for illegal operations to function and flourish unchecked [20]. Another serious problem in this regard is the veil of secrecy maintained by the Government departments and the general non-availability of information on environmentally sensitive issues [10]. Workers and trade union leaders are generally not aware of occupational health problems. Managements also are unaware of opportunities for cost savings in the areas of waste reduction or elimination of pollution, energy efficiency and prevention and mitigation of accidents.

4.10. Inappropriate Approach to Implementation

Many enterprises mistakenly begin implementation immediately following an initial environmental diagnosis without critically reviewing objectives and policies [19]. Top management often ignores refining pertinent environmental objectives and actions, and conduction of multiple environmental reviews before implementing the environmental management practices. Indian mining sectors lack effective monitoring system, whose primary purpose is to assess the mine's actual environmental performance against the stated environmental policies, objectives and targets. Administrative delays, apathy and inadequate personnel training and lack of inter-departmental co-ordination during implementation prevent environmental protection and improvement. Short term focus is another contributing factor in failing to achieve the desired environmental culture [18].

5. Conclusion

This study identifies various challenges to the implementation of green management practices in Indian mining industries. Identification of potential barriers can help a manager develop strategies to minimize the impact of those barriers. The barriers that have been identified and discussed earlier can help managers evaluate the degree to which these barriers are present in their organization. Furthermore, it is reasonable to consider that all barriers may not be equally applicable to each and every organization. Managers may also review the barrier that may be appropriate to their organization so that they can pay more attention to this as

compared to others on the list. At present mines in India confronted by these barriers remain heavy polluters, or, at best, stagnant in terms of environmental performance. Regional governments must play an expanded role in disseminating valuable information and technology to mines. Governments has also an important role to play in providing training opportunities and in ensuring that safety and health regulations are appropriate and are observed.

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