

A STUDY ON MARBLE INDUSTRY WITH SPECIAL REFERENCE TO RAJASTHAN

Sharmila Chouhan*

ABSTRACT

Marble is one of the most beautiful stones on the planet. The term "marble" evokes awe and demands respect for its majesty. It's no wonder that the 'Taj Mahal,' which was built entirely of pure marble, has captivated the globe for centuries. Marble stone is highly valued in India and signifies the exquisite grandeur of any structure. Aside from reflecting the family's sovereignty in marble, the stone also reflects the rich tradition that India has been drenched with for millennia. In the minerals division, after iron metal, marble is the second-biggest foreign trade contributor in India. With current data, this study analyses the state of marble, particularly in Rajasthan. Additionally, by evaluating many written works and including a few ideas to overcome these difficulties, an attempt is made to identify the concerns with various aspects and so on. As a case study, this article looks at the economics, environment, technology, and difficulties faced by the marble sector in Rajasthan.

KEYWORDS: *Marble, Global Market, Types of Marbles, Productivity Analysis.*

Introduction

Mining is an essential activity for the national and economic growth of any area. In locations where agriculture is not a main vocation, mining is critical to a state's overall economic and social development. Marble production is the major source of income in the state of Rajasthan, which contributes to a major portion of the gross national income since it is the mining hub of the India. Marble refers to any kind of limestone or dolomite that can be polished to a high shine and is otherwise suitable for use as a building or ornamental stone. Some varieties of marbles, such as travertine, have varying shades of red, yellow, pink, green, or buff; these colours are formed by impurities and add to the stone's beauty when it is cut and polished. Marble is utilised in sculptures and monuments, as well as pillars, colonnades, panelling, wainscoting, and floor tiles, as well as as a face stone in buildings and dwellings. It, like other limestones, corrodes when exposed to water and acid gases, unsuitable for locations that are exposed and huge cities. Its durability is harmed by the presence of certain contaminants.

It uses traditional names to classify distinct marble deposits found in Rajasthan's surrounding region. Rajasthan, which is one of the most important states for stone and marble manufacturing, disposes of a big amount of marble debris, which is wreaking havoc on the environment. To make optimal use of this discarded waste, a comprehensive study of life cycle assessment according to ISO standards for the marble stone extraction process must be conducted in order to identify waste reduction options and potentials. The types of tools used in machining were determined by conducting a survey of numerous industries. Inserts and segments made in the area were catalogued. When it comes to cutting

* Former Research Scholar, Department of ABST, University of Rajasthan, Jaipur & Presently, Lecturer in Commerce, Education Department, Government of Rajasthan, Jaipur, Rajasthan, India.

different types of stone and marble, what are the ideal compositions for inserts and segments? (of varied hardness numbers)? The slurry formed when cutting marble blocks is disposed in two distinct methods, as seen in the previous energy audit done in enterprises to better find out the power usage. Marble is a crystalline, compact form of metamorphosed limestone made mostly of calcine (CaCO_3), dolomite ($\text{CaMg}(\text{CO}_3)_2$), or a mixture of the two and more minerals under the mining process as generally. Dimensional stones such as marble have been highly popular since time immemorial, being used on facades and interiors of houses and buildings.

The Parthenon and other notable structures were built of white Pentelic marble from Mt. Pentelicos in Attica, and the best sculptures, such as the Venus de' Medici, were carved from the extraordinarily glossy Parian marble from Paros in the Cyclades. Later on, the Romans exploited these same quarries. The Carrara and Siena marbles of Tuscany, which were employed by the Romans and Renaissance Italian artists, are among Italy's most renowned marbles. Marble may be found in quarries all around the globe. Vermont produces the best marbles in the United States, and it produces a lot of them. Massachusetts, Maryland, Tennessee, Alabama, Georgia, Missouri, California, Colorado, and Arizona are all notable marble producers.

Review of Literature

Shrivastav et al., (2018) In Jabalpur, I conducted study on the incidence of symptoms of occupational lung disorders among marble cutters. They observed that occupational lung diseases are a major health problem in developing countries like India due to lack of safe working environment and awareness regarding hazards of working in such condition without adopting protective measures.

Oyeleke et al., (2017) In Plateau State, researchers looked at the bacteriological and physicochemical quality of water from mining ponds in the Bassa and Jos South Local Government Areas. Seasonal effects on the physicochemical parameters of the ponds were detected, with the greatest impact happening during the rainy season, from August to October. Lead, cadmium, and arsenic were found in the tin mining ponds as heavy metal pollutants.

Sati (2015) In the Shivpuri area of Madhya Pradesh, researchers looked at the socioeconomic and environmental effects of stone mining. He concluded that stone mining has a vital role in the economy and employment of rural people in Shivpuri area. The population were heavily reliant on stone mining and its associated activities – cutting, polishing, and exporting of stones – due to a lack of agricultural methods (only 11% of land is arable).

Yadav et al., (2014) In the Rajasthan area of Chittorgarh, researchers looked at the effects of mining on human health and the environment. They discovered that mining operations had an influence on soil erosion, land subsidence, air, water, and noise pollution, biodiversity loss, land degradation, dust impact, and human health issues such as lung ailments and skin disorders in the mining region.

Argent (2013) In Australia's mining and energy resources boom, the core and periphery have been redrawn. Australia, he argues, has a rising public understanding of the ramifications that mineral extraction may have on the economy, the environment and the social fabric. "Slippery spaces" have been used to characterise the Pilbara and other resource peripheries where money, commodities and labour move fast, but where the surplus from local extraction and processing is held by the "sticky spots."

Objective & Methodology of the Paper

To discuss the state of marble, particularly in Rajasthan according to the theoretical data of marble industry are used and paper also attempts to explain the Production of marble, main deposits of marble of Rajasthan and regulation for marble mining in Rajasthan.

Resources of Marble in Rajasthan

Many states, including Rajasthan, Gujarat, Haryana, Andhra Pradesh, Madhya Pradesh, Jammu & Kashmir, Maharashtra, Sikkim, Uttar Pradesh, and West Bengal, have documented marble occurrences. Marble reserves of economic significance may be found in Rajasthan, Gujarat, Haryana, and Madhya Pradesh, among the states mentioned above. Kishangarh in Rajasthan, formerly recognised as Asia's biggest marble market, now looks to be a ghost town. On the roads lined with marble processing plants and industrial shutters, there isn't a single person to be seen.

Rajasthan has the highest concentration of high-quality marble deposits in India. Twenty of the 33 districts contain marble in some form or another. In Rajasthan, the following are notable marble occurrences/regions/deposits:

Important Deposits of Marble in Rajasthan

Sl.No.	Name of deposit	District
i)	Agaria, Amet, Kelwa, Morwad, Kotri, Parvati, Morchana, Vani, Talai, Saprav Ka Guda, Thodi Nijharana, Umti, Jhanjer, Arna.	Rajsamand
ii)	Makrana, Borawad (White), Chausira, Dungri, Paharkuan (pink) Kumari, Ulodi, Pink Range, Kala Nada Talab.	Nagaur
iii)	Rikhabdeo, Odwas, Darauli, Tidi, Jaspura, Masaron Ki Obri (Green), Paduna, Babarmal, Devimata (Pink), Sarvadi, Manpur, Lohagarh, Kela Kuan (Black) Modi Chipala (White)	Udaipur
iv)	Tripura Sundari, Bhimkund, Khema-Talai, Bhanwaria-Talai, Kotharia, Vithaldeo, Prithvipura, Paloda, Oda-Bassi.	Banswara
v)	Andhi, Bhainslana, Todi-ka-Bas, Kotputli, Raisala, Nimla	Jaipur
vi)	Jhiri, Rajgarh, Badampur, Moti-Dungri, Dadhikar, Kho, Baldegarh, Malana, Goverdhanpura.	Alwar
vii)	Selwara, Ideria, Perwa-Serwa, Khandra, Deri, Morthala, Ajari.	Sirohi
viii)	Jahajpur, Manohargarh, Asind, Banera, Shahpura, Sarankhera, Kanti, Munjras, Panchanpura, Malola, Pansel.	Bhilwara
ix)	Narwar, Sardhana, Sursura, Kali-Dungari, Torka, Ladpura, Roopnagar, Kekri, Umara, Sawar, Ganeshnagar.	Ajmer
x)	Patan, Kela-Dungari (Maonda)	Sikar
xi)	Dagota	Dausa
xii)	Umar, Pagara	Bundi
xiii)	Sabla, Nandli-dad, Peeth, Manpur, Dachki, Mal Surata (Green Serpentic)	Dungarpur
xiv)	Mandal Deh	Chittorgarh
xv)	Pachori Chadi, Moriya-Munjar, Au, Indolai ki Dhani.	Jodhpur
xvi)	Bar-Sendra Sarangwa, Kundal, Dujara, Diyana, Khiwandi, Kantatiya.	Pali
xvii)	Dunkar, Bidasar, Charla.	Churu
xviii)	Moolsagar, Amarsagar, Habur, Narpia, Sipla, Badabag, Jethwai.	Jaisalmer

Rajasthan marbles come in a variety of colours and tints. Pure white crystalline marble is renowned in the Makrana region. Albata, Adanga, Dongri Pink, and other types are also found in the Makrana region. The marble from the Rajsamand region is widely mined. It's off-white to greyish-white in colour. Rikhabdeo-Kesariaji, 60 kilometres from Udaipur, produces the highly famous green marble species. Green marble with white and black network and spots in varying colours of green. Babarmal's marble is pink, and it's known as Indian Pink. It's a black and white banded fine-grained hard marble. Marble with black and white stripes, ranging from white to off-white, is known as bhilwara marble. White to off-white dolomitic marble, Banswara marble is pliable and easy to work with. Cladding is a common use for this material. Trade names for the white to greyish-white marbles found in the Jaipur area include Andhi Pista, a white marble with green serpentine laths, onyx, Indo-Italian, and Black Marble. Bhainslana marble is a dark black stone.

Rajasthan possesses 95 percent of the country's processing capacity. There are many gang saws in operation, as well as several automated tiling units. Makrana, Jaipur, Alwar, Ajmer, Udaipur, Nathdwara, Rajsamand, Abu Road Banswara, Chittorgarh, and Kishangarh are important processing centres in the state. The state's marble slab manufacturing capacity is roughly 1,000 million square feet per year, and its polished tile production capacity is 3,000 million square feet per year.

Additional types of marble have also been classified, especially since new mining sites have been established. The following are the key new categories that aren't categorised by BIS:

- Yellow marble from Jaisalmer.
- Pista marble (amphibolite variety) from Andhi-Jhiri belt, Jaipur, Alwar and Dausa districts, Rajasthan.
- Brown green and golden ultramafics from Dunkar, Churu district, Rajasthan.
- Chocolate-brown and English teak wood marble from Jodhpur district, Rajasthan.
- Parrot green marble from Jhilo in Sikar district, Rajasthan.
- Chocolate-brown or wood-finish marble from Mandaldeh, Chittorgarh district, Rajasthan.
- Purple marble from Tripura Sundari in Banswara district, Rajasthan.
- Blue marble from Desuri in Pali district, Rajasthan.

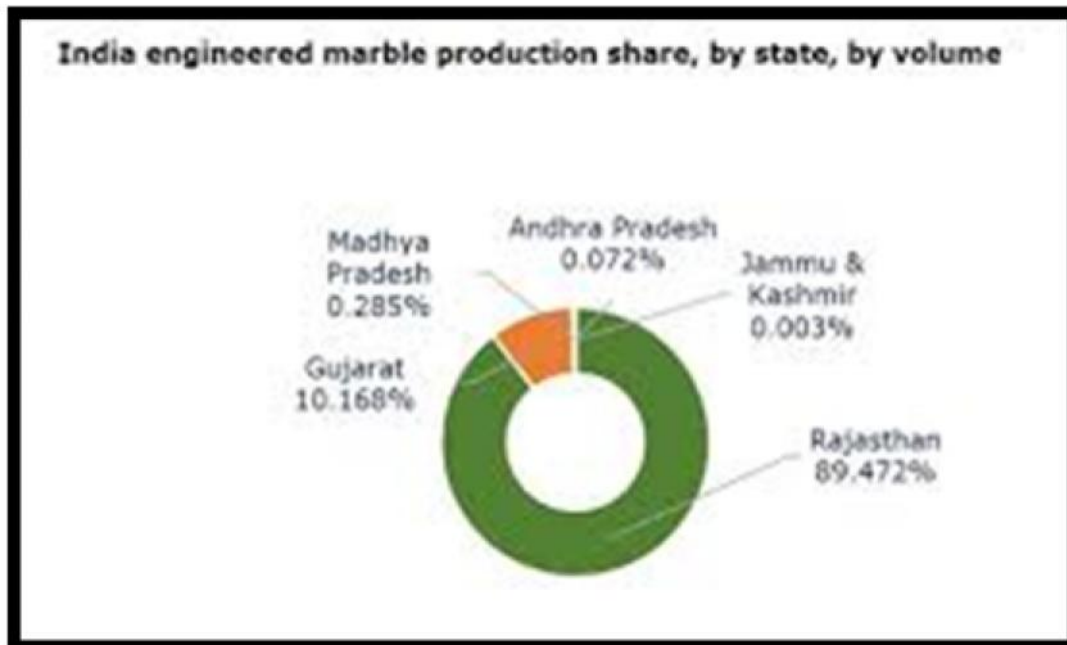
The total resources of marble in all grades are estimated to be 1,931 million tonnes. While just 276 million tonnes (14 percent) are classified as reserves, 1655 million tonnes (86 percent) are classified as residual resources. Approximately 27% of all materials are classed as "unclassified" or "unknown," while 55% are "offcolor," and 17% are "white." According to the current statistics on marble resources, Rajasthan has 64 percent while Jammu and Kashmir has 21 percent.

Marble Production & Regulation

Marble goes through numerous phases of manufacturing. The following are the primary steps that are demonstrated:

- Quarry site exploration and identification, followed by
- Getting marble out of the quarries,

A "minor mineral" is defined under Section 3 of the 1957 Mines and Minerals (Development and Regulation) Act. Latin Marmor is derived from the Greek term Marmorous, which means "shining stone," and the Latin word "marble" originates from that. In addition to its silky feel, it is known for its appealing colours, smooth and uniform texture, moderate hardness, and ability to be mined into huge blocks. Because of its aesthetic appeal, marble stands out among the various dimension stones.



India marble market is anticipated to witness significant growth in the coming years on account of growing utilization of marble for interior decoration of structures in hotels, temples, churches, among others. Nowadays, consumer preference for marble is witnessing an increase across the country. Marble is a rock formed by the metamorphism of calcite with other impurities such as quartz, graphite, mica, clay, among others. India is among the world's top ten producers of marble with yellow marble being most prevalent in the country. Implementation of new liberalization policies in 2016 has reduced several norms and restrictions on setting up marble factory as well as on importing marble in the country, which is positively impacting the market.

Marble market can be segregated based on type, form, color, source, application and region. In terms of application, market can be segmented into construction, architecture, industrial, among others. Construction segment dominated the marble market and the trend is expected to continue during the forecast period on account of increasing construction activities and growing use of marble in applications such as flooring, stairs, platforms, pavements, among others. Based on form, market can be bifurcated into slab and powder. Slab is the leading segment in the marble market as it is used for making blocks and tiles.

It is a metamorphosed limestone created by recrystallization during thermal and regional metamorphism, according to geological definition. Commercially, marbles include any calcareous rock that can be polished. In addition, serpentine rocks with low calcium or magnesium carbonates are classified as marbles if they are beautiful and polish well. Onyx, travertine, and certain limestone are calcareous stones that have been classified as marbles. Marble, unlike dimension stone and granite, is not a popular export item. Its internal demand has always been strong, and the majority of output, even with the current surge in imports, is consumed domestically. Marble is the most often used dimension stone in India. The bulk of the marble industry's units are small-scale.

The Marble Development and Conservation Rules, 2002 (notified on 15.5.2002) Standards for the conservation, development, and scientific mining of marble were established by the Central Government. The longest time for which a lease may be given is thirty years, while the lowest length is twenty years. A mining plan must be approved by the State Government or a representative authorised to act in that role by the State Government before a lease may be given. Only 4 hectares should be the greatest size for a lease to be granted, and 50 hectares is the minimum. Exported blocks and slabs of unpolished marble or travertine with apparent sp.gr. more than 2.5, as well as ecaussian or calcium carbonate monumental or building stone, are restricted under the Export-Import Policy, 2015-20 and the Foreign Trade Policy, as stated below. The import of rough marble blocks will be subject to the requirements set out in Ministry of Commerce and Industry Notification No.99 dated November 20, 2014. Marble and travertine imports are subject to import licencing processes. The following criteria will be used to determine whether units are eligible for an import licence:

- It is necessary to install the marble gang saw machine no later than March 30th, 2014. Except for 100% EOU and SEZ units, which are 100% EOU.
 - If you're applying for a gang saw, you must register the machine in your own name.
 - A three-year cumulative turnover of at least 5 crore, i.e. from 2011-12 to 2013-14, is required for a unit that has been in operation for at least five years as of the 31st of March, 2014.
 - The Central Excise Authority must be notified.
- The licence will have a floor price of US\$325 per metric tonne and an import limit of 8 lakh metric tonnes for the licencing year 2014-15.

Alabaster imports are permitted under category No. 2515. A combined annual limit of 10 lakh square feet applies to Bhutanese marble imports classified under chapters 25 and 68. (5,882 tonnes). Since it was implemented immediately, and will be applied year-to-year, the limit has been met. Bhutan's government would be in charge of quota allocation and monitoring.

The National Mineral Policy of 2008 also emphasised the importance of mining as part of a long-term development strategy. Natural resources such as land, water, air, and forest are all impacted by mineral extraction, according to paragraphs 7.10 and 7.12. After the economically mining extraction process is over, a scientific mine closure is required, which will not only restore ecosystem and regenerate biomass, but will also consider socio-economic factors.

Conclusion

Marble mining also causes microbial growth. During the study the amount and distribution of microbes was not similar at all sampling sites. Microorganisms' influence on their environment may be useful or destructive, and they may or may not be visible to humans. Additional fallow land should be accessible for the dumping and processing of slurry that is generated in big quantities. There is need to develop more dumping yards and proper slurry management system which should be at a distance from the residential sites. To evaluate mining sustainability mining industry should follow sustainable development principles which are exploration, possibility, planning, construction, operations, controlling, closure and then implementation of such planning. Every miner with a prospecting licence or a mining lease shall complete progressive restoration, reclamation, and rehabilitation of areas damaged by mining activities before the end of such operations and the abandonment of the prospect or mine. This is also topic of concern that how many mine owners are following proper guidelines. Proper mine closure plans need to developed by authorities. It should be mandatory for all mines. It is necessary to have a reasonable royalty rate in all states in order to encourage the dimension stone sector throughout the nation.

References

1. "Granite - Indian Minerals year book - 2010" (PDF). Indian Bureau of Mines. Archived from the original (PDF) on 3 September 2013. Retrieved 11 July 2013.
2. Oliver, M.A. and Gregory, P.J. (2015). Soil, food security and human health: a review. *European Journal of Soil Science*, 66:257 – 276.
3. Prasad, Giri, R. and Arundhati, S. (2013). Social and environmental impacts of mining In India. *Mining Engineers Journal*. 14(8).
4. Sati, V.P. (2015). Socio-economic and Environmental Impacts of Stone Mining in Shivpuri District, Madhya Pradesh, India. *Journal of Scientific Research & Reports*. 4(1): 47-54.
5. Shrivastav, K.L. (2009). *Economic Mineralization*. Scientific publishers Jodhpur.
6. Shrivastava, A., Tomar, S.P., and Patel, M. (2018). Prevalence of symptoms of occupational lung diseases in marble cutting workers. *International Journal of Community Medicine and Public Health*, 5(8):3368-71.
7. Tripathy, D.P. (2014). Strategies for prevention of illegal mining in India. *Mining Engineer's Journal*. 15(9): 17-20.
8. Yadav, K.R., Kumawat, S., and Verma, D. (2014). Impact of Mining on Human Health and Environment in Chittorgarh District, Rajasthan: A Case Study. *Research Journal of Chemical and Environmental Sciences*, 2 (3): 75-78.

