

India's Rare Earth Industry and its impact on International Market

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Abstract:

The study explores India's rare earth industry and its evolving role in the international market, emphasizing the strategic importance of "rare earth elements" (REEs) in sectors like defense, electronics, renewable energy, and digital infrastructure. Despite possessing the fifth-largest global reserves of REEs, India subsidizes less than 1% to global production due to limited downstream infrastructure, regulatory restrictions, and technological constraints. The study adopts a quantitative research methodology with a descriptive and analytical research design. Secondary data was utilized, and statistical tools such as MS Excel and SPSS were employed for data analysis, using techniques like mean, standard deviation, correlation, and trend analysis. The findings indicate that although India has significant geological potential—particularly in monazite-rich coastal sands—policy and infrastructural limitations hinder its competitiveness in the global market. The study suggests that a combination of public-private collaboration, technological investment, and regulatory reform is essential for transforming India's rare earth sector into a globally competitive industry. The study contributes to strategic resource planning by identifying pathways for India to reduce dependence on imports and emerge as a key player in the international rare earth supply chain.

Key Words: Rare earth elements, India, Mineral, Industry, Reserves.

1. INTRODUCTION

The "rare earth elements" are exclusively metallic and are commonly designated as "rare earth metals." These metals possess numerous analogous properties, frequently resulting in their co-occurrence in geological deposits. They are commonly known as "rare earth oxides" due to the fact that many are usually marketed as oxide compounds. The designation "rare earths," originating in the late 18th century when chemists referred to earths as refractory oxides insoluble in water, is somewhat inaccurate, as the concentration of these metals in the earth's crust ranges from 60 ppm for cerium to approximately 0.5 ppm for thulium and lutetium (Charalampides et al., 2016). In summary, nearly all of them are located in the Earth's crust in quantities exceeding that of silver, while the four most prevalent elements (yttrium, lanthanum, cerium, and neodymium) are found in proportions surpassing those of lead. Promethium, with the atomic number 61, is the sole genuinely rare metal in this group; it is radioactive, with a very brief half-life, and occurs in nature in minuscule quantities (Hazra, G 2020).

The REE's, commonly constitute a group of 17 elements on the periodic table. "Scandium, Yttrium, and the Lanthanides", comprising 15 elements in the periodic table with atomic numbers 57 to 71, are as follows: "Lanthanum (La), Cerium (Ce), Praseodymium (Pr), Neodymium (Nd), Promethium (Pm), Samarium (Sm), Europium (Eu), Gadolinium (Gd), Terbium (Tb), Dysprosium (Dy), Holmium (Ho), Erbium (Er), Thulium (Tm), Ytterbium (Yb), and Lutetium (Lu)". The lanthanide elements are categorised into two groups: light rare earth elements and heavy rare earth elements. The light rare earth elements encompass atomic numbers 57 to 63 "(La, Ce, Pr, Nd, Pm, Sm, and Eu)", whereas the heavy rare earth elements include "atomic numbers" 64 to 71 "(Gd, Tb, Dy, Ho, Er, Tm, Yb, and Lu)". These elements are defined by the sequential filling of the 4f shell and are hence referred to as 4f elements. There are 12 materials "(antimony, beryllium, cobalt, fluorspar, gallium, germanium, graphite, indium, magnesium, niobium, tantalum and tungsten)" and

two groups of other elements: PGMs “(platinum group metals, which include iridium, osmium, palladium, platinum, rhodium and ruthenium)” and rare earths (REs) group (Massari & Ruberti 2013).

The occurrence of these elements in the “Earth's crust” is comparable to that of certain prominent and widespread elements including silver, tin, tungsten, and mercury. Therefore, these substances are expected to play a crucial role in our current and future lives (Giovani et al., 2019). Rare Earth Elements (REE) hold a unique place in the periodic table, and their integration into alloys, ceramics, glass compounds, and oxides bestows distinctive material qualities, making them essential for advanced technological applications. The demand for rare earth elements (REE) is escalating swiftly, as they are vital for manufacturing important intermediates employed in green energy goods, including hybrid automobiles, wind turbines, fuel cells, and energy-efficient lighting (Zhang et al., 2022).

The global commerce of REE has consistently captivated scholars' attention. For instance, the allocation of trading nations and the principal countries and communities inside the network predicated on international RE trade (Charalampides et al., 2016). The analysis use the global multiregional input-output paradigm and the RE flow network to examine the outflow trajectory of RE resources. Moreover, as the disparity between resource supply and demand has intensified, several scholars have commenced investigations into the competitive dynamics of resources. Countries establish a network for analysing competition in iron ore imports, revealing a shift in the global competitiveness pattern from a core-peripheral structure to a network structure (Guo & You 2023). Nevertheless, limited academics have examined the competitive dynamics of renewable energy in the present intense contest for renewable energy supplies. Moreover, researcher has concentrated solely on a singular product of renewable energy, neglecting the competitive heterogeneity across many goods within the business chain (Guo & Mai 2022).

1.1 Impact on International Market

Rare earth industry is a great player in worldwide economy that drives the major technologies running modern life, defense, and green energy change. REEs—a group of 17 metallic elements including “neodymium, lanthanum, and dysprosium”—are essential parts in several high-tech products, for example, “smartphones, electric vehicles (EVs), wind turbines, lasers, and missiles” equipped with guidance systems. Although they have been involved in a variety of products, these materials are not electrically conductive, and they are not evenly distributed in the globe, with China monopolizing both their mining and processing. By so doing, this control has transformed REEs into a strategic resource influencing the power structure in the exchange of goods among countries and the area of technological competition (Arienzo et al., 2022).

• Strategic Market Dominance and Trade Dependency

REE's are important in many industrial areas such as “consumer electronics, wind turbines, electric cars, and defense”. The Chinese “rare earth supply chain”, responsible for more than 60% of the world's production and about 85% of the refining capacity, represents a clear geopolitical and economic imbalance. The supply concentration has resulted in supply-chain susceptibilities for those countries, which relied on imports, like the “United States, Japan, and some EU” member countries. The global markets have been exposed to the export policies and political tensions of China. As an illustration, limitations or quotas set by China could trigger a sudden increase in prices and cause disturbances to the global production, especially in the semiconductors, magnets, and batteries sectors. Thus, the governments have dealt with the issue by looking for other suppliers and establishing new rare earth exploration and processing infrastructure to be more resilient to the risks such as crisis and conflicts (Guo & Wang 2024).

• Price Volatility and Market Speculation

The rare earth market is known to be volatile because there are limited supply sources coupled with complex extraction processes that are required to meet the growing demand of high-tech industries. The prices of the main elements like neodymium, dysprosium, and terbium are to a large extent dependent on market behavior, government policies, export restrictions, and geopolitical instability. An example of this occurred during the 2010 China-Japan diplomatic dispute, when the export bans imposed by the Chinese government caused a massive surge in rare earth prices worldwide, thus being the reason for the interruption of the electronics and renewable sectors. Such unpredictability of prices in international trade has largely negative impacts through the increase in production costs, the delay in manufacturing, and the creation of investment uncertainty. In addition, the speculative trading that took place in the rare earth materials was, without doubt, another contributing factor to the fluctuation of the prices, as the investors were following

the mining permits, the environmental policies, and the technological advancements in recycling and substitution. (Priso, A. M., & Doumbia2024)

• Shaping Global Industrial Policies and Investments

Global rare earth industry serves as a new frontrunner in global industrial strategy, which signifies the importance of governments as strategic allies or financiers of local mining and materials extraction companies, and developers of robust supply chains. The USA, Australia, Canada, India, and the EU have been cooperating with each other in various initiatives to reduce their reliance on China by making efforts towards developing new mining sites and refining technologies. Global energy shift and EV revolution that have taken place recently have raised the demand for rare earth perpetual magnets that are used in various industries, hence the probable growth in international investments. Moreover, the on-going industrial transformations to clean energy and the increase in electric vehicle applications have been the key drivers leading to worldwide investments (Bergman, 2021).

1.2 India’s Rare Earth Industry

Rare earth minerals are essential for India to alleviate its energy burden. It is a crucial element in the production of “hybrid vehicles, mobile phones, computers, digital networks, optical fibre cables, and other technologies that support our Digital India Programme”. India's Rare Earth resources are considered to be the fifth greatest globally. “U.S. Geological Survey, 2019-2021”. The discovery of “rare earth elements” (REE) in India commenced in the 1950s, leading to the identification of several REE resources across various geological contexts; yet, its status as a significant participant in the international market remains minimal (Singh Yamuna, 2020). In India, the abstraction and processing of rare earth metals are exclusively conducted by IREL, which operates under the “Department of Atomic Energy” (DAE). IREL has established a “Rare Earth extraction facility in OSCOM, Odisha”, for the manufacture of mixed rare earth chloride, tri-sodium phosphate, and other compounds utilised in the manufacture of high-purity rare earth oxides. In recent years, IREL has been actively establishing green field processes in several regions of Tamil Nadu and Odisha. The company intends to inaugurate a unit for the production of rare earth permanent magnets in Visakhapatnam in 2023 (Indian Mineral Yearbook, 2021).

1.2 Resource and development

REE do not occur as intuitive metals in nature, unlike “copper, silver, and gold”. They are present in several minerals as either principal or secondary components. The primary sources of REE are “bastnäsite, xenotime, loparite”, which is found in alkaline igneous rock, and monazite. More than 250 minerals incorporate rare-earth elements as significant components in their chemical formulas and crystal structures (Dostal 2017). Table 1 delineates a compilation of significant minerals that contain rare earth elements (Dostal, 2017).

Table 1: Formula and name of some important REE associated with rare earth deposits

Minerals	Formula
Allanite	(Y, Ln, Ca) (Al, Fe ⁺³) ₃ (SiO ₄) ₃ (OH)
Apatite	(Ca, Ln) ₅ (PO ₄) ₃ (F, Cl, OH)
Bastnasite	(Ln, Y) (CO ₃)F
Fergusonite	(Ln, Y) NbO ₄
Gittinsite	Ca Zr Si ₂ O ₇
Limorite	Y ₂ (SiO ₄) (CO ₃)
Loparite	(Ln, Na, Ca) (Ti, Nb) O ₃
Monazite	(Ln, Th) PO ₄
Parisite	Ca (Ln) ₂ (CO ₃) ₃ F ₂
Xenotime	YPO ₄
Zircon	(Zr, Ln) SiO ₄

Source: pubs.usgs.gov

The global reserves of rare earth oxide by leading nations are assessed to be 120 million tonnes. China possesses 36.67% of global resources, followed by Vietnam and Brazil, each with 18.3%, and Russia with 10%, while India holds around 5.75% of the “world's rare earth reserves”. United States Geological Survey; 2019-2021

Table 2: World Reserves of Rare-earthSource: world-nuclear.org.com

Country	2019		2020		2021	
		%share		%share		%share
World Total(rounded)	120000		120000		120000	
China	44000	36.67	44000	36.67	44000	36.67
Vietnam	22000	18.33	22000	18.33	22000	18.33
Brazil	22000	18.33	22000	18.33	21000	17.50
Russia	12000	10	12000	10	12000	10
India	6900	5.75	6900	5.75	6900	5.75
Australia	3400	2.83	3300	2.83	4100	3.42
Greenland	--	--	1500	1.25	1500	1.25
USA	1400	1.17	1400	1.17	1500	1.25
Tanzania	--	--	890	0.74	890	0.74
South Africa	--	--	790	0.66	790	0.66
Canada	--	--	830	0.69	830	0.70
Malawi	--	--	--	--	--	--
Malaysia	30	0.03	--	0.03	--	--
Other Countries	310	0.26	310	0.26	280	0.23

1.4 Uses and consumption

Rare earth elements have become integral to contemporary life due to their widespread usage across various technologies (Gwenzi et al., 2018). Table 4 encapsulates the diverse utilisation of rare earth elements across several domains.

Table 4: Application of rare earth in different areas

Areas	Application
Electronics	“Television screen, computers, cell phones, silicon chips, monitor display, long life rechargeable battery, camera lens, LEDs, Compact fluorescent lamps (CFLs), marinepropulsion system”.
Manufacturing	“High strength magnets, metal alloys, stress gauges ceramic pigments, colorants, plastic, creations as additives for strengthening other metals”.
Medical science	“Portable X-ray machine, X-ray tubes, magnetic resources imagery (MRI), Cancertreatment, genetic screening test and dental laser”.
Technology	“Lasers, Optical glans, Fiber optics, Masers, Radar-detection, nuclear fuel rods, mercury-vapour lamps, computer memory, high temperature superconductors”.
Renewable Energy	“Hybrid automobiles, wind turbines, next generation rechargeable batteries, bi fuelcatalysts”.

Source: www.materion.com

2. LITERATURE REVIEW

Guo, Q., & You, W. (2023) assessed the global competitiveness of strategic minerals in “China, Australia, Russia, and India”. This study employed the projection pursuit method and an enhanced “TOPSIS (Technique for Order Preference by Similarity to an Ideal Solution)” model to analytically assess the effectiveness of the “rare earth industries” in four countries, establishing a novel multidimensional estimate index for the global competitiveness of their exported rare earth resources. The findings indicated that China exhibited the highest competitiveness in rare earths, Australia demonstrated the most rapid growth in competitiveness, while “Russia and India” were comparatively less competitive; there were variations in the elements of rare earths effectiveness across the nations.

Zhang, H., Wang, X., Tang, J., & Guo, Y. (2022) analysed the effects of worldwide competitiveness in the “rare earth trade” on the enhancement of “global value chains” from an industrial chain viewpoint. This study utilised the multifaceted network methodology to examine the progression of international renewable energy competition patterns from an industrial chain viewpoint and assessed the influence of renewable energy competition on global value chain status through a panel regression model. The data indicated that rivalry across several phases had intensified, with downstream competition being the most vigorous, featuring almost 140 companies. China and Germany had exceptional competitiveness in downstream products. This study indicated that nations could enhance their GVC by advancing technology and fostering stable international ties with key trading partners.

Guo, Q., & Mai, Z. (2022) assessed and contrasted the export competitiveness of rare-earth items from “China, the United States, Russia, and India” from 2006 to 2020 utilising the “CMS model and the WRCA index”. The findings indicated that the competitiveness of rare-earth items among the four countries had varied distinctly. The competitiveness of rare-earth products from China, the US, and India had diminished, while that of “Russia's rare-earth products” had risen. In China and India, market and product factors prevailed; in the United States, overall market share was predominant; while in Russia, market factors were significant. The competitiveness of rare-earth products had significantly differed among the four nations.

Shuai, J., et al., (2022) assessed the global competitiveness of “China's rare earth products”. In past decades, China's RE items had held a significant place in the worldwide market. This study introduced a “novel revealed comparative advantage” (NRCA) method that utilised “projection pursuit modelling” and employed the “constant market share” (CMS) model to assess the long-term dynamic patterns of China's “rare earth element” (REE) export competitiveness. The findings indicated that the international competitiveness of China's REE products had significantly diminished over the past decade, with a recent resurgence; the comparative advantages within China's “REE industrial chain” were markedly disparate, as mid- and downstream products exhibited substantial comparative advantages, whereas upstream products lacked competitive strength.

Verma, S., et al., (2022) centred on evaluating the primary minerals, REE's, and critical metals used to make wind turbines. One way to generate electricity that doesn't rely on fossil fuels is through wind power. The wind turbine was used to collect energy from the wind. Foreign countries had been the sole providers of the resources. Predicting the amount and cost of the minerals and metals was crucial in the past to avoid problems with the supply of these commodities in India. “Steel, aluminium, copper, cast iron, fibreglass reinforced with epoxy resin, and ceramic/glass were the main components”. The study calculated the expected future costs of producing 100% wind energy in India, as well as the need for minerals and rare earth elements.

Hankoon, I. M. S. K., et al., (2022) focused on the diversification of REE supply. “Rare earth elements” (REEs) were essential for achieving global renewable energy objectives, including electric vehicles and wind energy. This had led to price fluctuations, supply chain instabilities, and renewable energy trade conflicts. The study identified 13 issues that hindered the development of rare earth supply chains outside of China, which were evaluated by prominent rare earth enterprises and industry experts beyond China. The findings derived from specialists in the rare earth (RE) business underwent statistical analysis to identify the principal elements that influenced the establishment of independent RE supply chains beyond China.

Lee, Y., & Dacass, T. (2022) focused on mitigating the United States' vulnerabilities associated with reliance on China in the rare earth market. “Rare earth elements” (REE) were essential for facilitating various sectors through innovative technologies. This study utilised “supply and demand models” to assess the impact of the U.S. government's suggested methods aimed at mitigating supply concerns linked to prospective export restrictions from China. The study indicated that various measures existed to alleviate the effects of China's market dominance by reducing price escalations and supply deficiencies, with the magnitude of those changes being contingent upon the “price elasticity of demand and supply for REOs”. Furthermore, each approach yielded differing levels of welfare benefits.

Filho, W. L., et al., (2023) concentrated on the availability, petition, and sustainability (both environmental and economic) of REE's, as a category of essential raw commodities. The surge in technological advancements in recent decades resulted in heightened demand for REEs, also referred to as rare earth metals, across diverse industries with “extensive industrial applications, including the clean energy sector”, albeit accompanied by certain environmental, economic, and social impact concerns. The study concluded

that meticulously calibrated lifecycle sustainability assessments were essential for evaluating the various aspects of “extraction, processing, and reuse or recovery methods” for diverse sources and supplies of rare earth elements to satisfy present and future demands.

Xu, J., Li, J., et al., (2024) analysed the development of the RET network. Rare earth elements served as a “global strategic reserve resource” and were extensively utilised in critical industries, including military equipment and biomedicine. This study utilised the ideas of trade inclination and import similarity to develop dependence and competition networks, thereby addressing this gap. From 2006, China emerged as the most dependent nation in the dependence network. The outcome of community division indicated that China had disengaged from the “American community” and had established new alliances with the “Association of South-east Asian Nations” (ASEAN) countries.

3. RESEARCH GAP

The research gap regarding the topic of and the impact of the title "India's Rare Earth Industry and its impact on International Market" might emanate from the non-existence of a thorough analysis of India's “rare earth supply chain”, especially in the global context of market dynamics and strategic autonomy. Despite of the global demand for the REEs and the abundant reserves in the country, there remains a lack of inquiry into the strategic problems and possibilities that India has in leading the global market of the scarce metals. Most of the available literature basically deals with the fact that most of the REE sectors are dominated by the existing trade conditions of countries like China and the structural competitiveness of the USA, Russia, and Australia, yet the role of India has been largely undefined even as the factors required such as policy, infrastructure, and supply chain development have been explored. The majority of the previous literature only does overall descriptions of REE products without dealing with the competitive dynamics and export potential of specific REE categories. There is also a lack of research on how India can take advantage of its resource base to the benefit of the economy and at the same time, keep sustainability of the environment. The study will not only focus on India’s rare earth industry from a worldwide perspective and strategically depict the problems but also will come up with a strategy that can be taken by India to get competitive and self-reliant in this sector.

4. OBJECTIVE OF THE STUDY

- I.To assess the availability and distribution of “rare earth elements” (REEs) in India.
- II.To analyze the current status of India’s rare earth industry.

5. HYPOTHESIS OF THE STUDY

H1: There is a statistically significant variation in the availability and geographical distribution of rare earth elements across different regions of India.

H2: The current level of infrastructure, technological adoption, and production capacity in India’s rare earth industry significantly affects its contribution to the global REE market.

6. RESEARCH METHODOLOGY

The research methodology for the paper entitled "India’s Rare Earth Industry and Its Impact on the International Market" utilises a quantitative approach, emphasising a descriptive and analytical research design. The study intends to evaluate the availability and distribution of “rare earth elements” (REEs) throughout India and examine the present condition of the rare earth sector. Secondary data collecting is employed, utilising statistical tools such as MS Excel and SPSS for analysis. Essential statistical methods encompass mean, standard deviation, correlation, and trend analysis, which will assist in substantiating the hypotheses concerning regional disparities and the industry's influence on the worldwide market.

7. RESULT BASED ON OBJECTIVES

Objective 1: To assess the availability and distribution of rare earth elements (REEs) in India.

India is placed as the single largest country with respect to the Rare Earth Elements (REEs) reserves with nearly 13.07 million tonnes located in the monazite sands which are the coastal regions of the country, for example, Andhra Pradesh, Odisha, and Tamil Nadu. Specialists claim that these sands are good enough to recover not less than 55-60% of the total rare earth oxides and hence they are the key sources of the India's

REEs (Vajiramandravi 2025). One of the main reasons why India's production of REEs is so low (under 1% of the global output) is that it faces numerous technical, economic, and regulatory challenges while harnessing these rich earth resources.

Apart from the fact that the extraction of REE minerals is quite a technological challenge in terms of the rather irregular distribution of elements in ores and the complex process of individual element separation, there are further difficulties in the process (Government of India 2012). Indeed, India's deposits are abundant in LREEs like neodymium, although the HREEs which are indispensable for new technologies are in short supply (Drishti IAS 2022). At present, the Indian Rare Earths Limited (IREL), a state-owned corporation, has set up an effective monopoly in the area of mining and monazite sand processing (Drishti IAS 2022).

The Geological Survey of India (GSI) in recent times has been working towards exploring not only the coastal areas of India but also the heart of the country - Rajasthan to find out the magnet-grade REEs deposits which can be economically mined. The REEs distribution in India is mostly concentrated in the coast and a few inland areas due to placer sands, with carbonatite complexes being the next source, but they are not so economical (PADHAI 2025). For India to be able to take off and benefit from its better situation regarding the rare earth sector, Jha et al. (2024) argued it is genuinely important that these challenges be overcome by financial investment, regulatory changes, and global cooperation.

Objective 2: To analyze the current status of India's rare earth industry.

India's rare earth industry currently finds itself at a crossroads where a huge potential is yet to be uncovered as well as where substantial struggles are curtailing its fight for global competitive advantage. Despite having the 3rd largest rare earth element (REE) deposits of about 6.9 million metric tonnes, the sector is not developed to the required size as less than 20% of their geological potential have been put into use (Butts, D. 2025). The government-owned IREL (India) Limited company is the major contributor in the field of extraction and processing and their production in the last fiscal year was at a level of 2,900 metric tons only which was only 0.74% of the total production of REE in the world. The government's reserved standpoint due to the fear of the radioactive element in the rare earth and the issue of national security has jointly led to the limited progress (Kumar, N. 2025). The fact that many of India's rare earth minerals contain radioactive elements has forced the resulting regulations to say that the rest of the private sector can participate only in non-radioactive sites. While the main focus of this policy is safety, it has at the same time been obstructing the exploiting of nature and the technological progress, marginalizing private investors and innovations (D. K. Srivastava 2025).

On this issue, the latest news is about The Geological Survey of India to execute 1,200 exploration projects by the fiscal year 2031 and to make efforts to improve the domestic processing and magnet manufacturing (Tandon, A. 2025). However, the creation of a robust and sustainable supply chain is projected to demand huge financial investments, the latest technology, and a protracted gestation period (Now, E. 2025). Notably, advancing policy actions alongside global supply chain disruptions have enabled the pace of the current drive, but yet the lack of regulations, technology, and investment is what stands as a significant obstacle for India to succeed in the rare earth sector (India Rare Earth Elements Market Size 2025).

8. DISCUSSION

The global rare earth market has become a lot more complicated and significantly more strategically important. This is marked by the fact that China is still the dominant player in production and processing, as they account for over 60% of global output and more than 85% of the world's refining capacity (Guo & Wang, 2024). Consequently, this situation has given rise to a number of potential weaknesses in the supply chain as well as geopolitical issues which have forced other countries to reconsider their resource strategies. In this context, the rare earth reserves of India are at the fifth position mostly found in the sands of monazite along the coastal regions of Odisha, Tamil Nadu, and Andhra Pradesh. (Government of India, 2012; Vajiramandravi, 2025). Nevertheless, India, because of the problems like technological backwardness, environmental constraints, and a highly centralized production model that is monopolized by Indian Rare Earths Limited (IREL), and which has no downstream processing capabilities, accounts for less than 1% of REE global output (Drishti IAS, 2022). (Zhang et al., 2017). Hence, the Indian government has rolled out schemes like the National Critical Mineral Mission (NCMM) as a part of the process of encouraging local mining and cutting down the foreign dependency that is usual for India (Now, 2025). However, the contention of Butts (2025) and Kumar (2025) is that in the absence of private investment, simple

regulations, and the application of advanced technologies, the Indian rare earth industry may not very well compete in the international market.

9. CONCLUSION

In conclusion, the “rare earth industry” is still the cornerstone of the 21st-century technology, economic, and strategic revolution, which is significantly influenced by the breakthroughs in electronics, renewable energy, defense, and digital infrastructure. However, though India has abundant geological reserves of rare earth elements, especially in monazite-rich coastal sands, it is the least contributor to the global supply chain as it is not only poorly developed on the downstream infrastructure but also restricted by technological barriers, legal regulations, and the private sector. Nevertheless, the Indian rare earth sector does not encounter significant aspects of success with regards to the production, refining capacity, and the innovation of further downstream applications, whereas some programs, e.g. the establishing of greenfield plants and national missions for critical minerals, clearly indicate the intentions of a good policy but they are less in descent to change India to be a big player globally. For the country to truly realize its rare earth potential, it must put in place a much wider strategy which includes deployment of appropriate technology, public-private collaborations, environmental sustainability, and embark on joint ventures with other countries. No country can build a secure supply chain without first making these integrated actions.

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