

Critical Minerals in Global Production Networks: A Perspective on Goods–Services Linkages

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Critical minerals such as lithium, nickel, copper, and cobalt form the backbone of the global energy transition, yet their supply chains exhibit severe structural imbalances. While mining is geographically distributed, midstream processing for most minerals is highly concentrated, creating systemic vulnerabilities that amplify the impact of disruptions. Existing assessments of mineral security focus overwhelmingly on physical production, overlooking the equally critical role of services that govern how minerals move through fragmented global production networks. Using constructed indicators, the paper compares structural vulnerabilities across minerals and selected economies. The results demonstrate that resilience is overwhelmingly shaped by structural positioning: countries with significant mining or processing dominance display higher baseline resilience, while those relying solely on strong services ecosystems (notably India and, to a lesser extent, the United States) remain constrained by limited upstream and midstream capacity. By integrating service performance with mining and processing structure, this study demonstrates that resilience in critical mineral supply chains emerges from the interaction of physical concentration and service-enabled connectivity. The findings provide a policy-relevant framework for identifying where countries, especially India, can realistically strengthen their strategic position through targeted investments in processing capacity, logistics infrastructure, and digital coordination systems, rather than relying solely on downstream manufacturing or services competitiveness.

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