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A Systematic Review of the Challenges and Opportunities of Electronic Waste Management in India

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Abstract: Electronic waste has emerged as one of the most rapidly expanding waste categories worldwide. India currently produces more than 1.1 million tonnes of discarded electrical and electronic equipment each year, a figure expected to escalate sharply as digital adoption and urban expansion accelerate. This review consolidates findings from scientific literature, global datasets, Indian government documents, and policy statements to evaluate the major barriers and emerging possibilities associated with e-waste management in India. A systematic search was carried out in major academic databases (Scopus, Web of Science, PubMed, Google Scholar) and official repositories following PRISMA guidelines. Thirty-eight relevant publications were analysed. The review identifies persistent challenges such as the dominance of informal recycling systems, labour-intensive and unsafe dismantling practices, weak enforcement of existing regulations, limited public awareness, and fragmented recycling infrastructure. At the same time, opportunities exist through strengthened Extended Producer Responsibility (EPR) mechanisms, expansion of authorised recycling facilities, circular-economy interventions, job creation in green industries, and the adoption of technologies such as automated dismantling, digital tracking, and urban mining. Overall, although India has introduced progressive regulations, the gap between policy and on-ground implementation remains wide. Integrating informal workers, upgrading infrastructure, and enhancing compliance mechanisms are essential for developing a sustainable and equitable e-waste management pathway.

Keywords: e-waste, informal recycling, Extended Producer Responsibility, circulareconomy, Policy implementation gap.

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