E-WASTE MANAGEMENT RULES IN INDIA: A CRITICAL LEGAL ANALYSIS OF EXTENDED PRODUCER RESPONSIBILITY, REGULATORY ENFORCEMENT AND ENVIRONMENTAL JUSTICE

Abstract

The increasing consumption and premature disposal of electrical and electronic equipment have made electronic waste (e-waste) management an important environmental and regulatory concern in India. Improper disposal and unsafe recycling practices may release hazardous substances into the environment and expose workers and nearby communities to significant health risks. India regulates covered e-waste through the Environment (Protection) Act, 1986, and the E-Waste (Management) Rules, 2022, which introduced a strengthened, registration-based framework for Extended Producer Responsibility (EPR). This article examines the statutory framework, producer obligations, digital compliance mechanisms, recycling certificates and environmental compensation provisions under the Rules, together with subsequent amendments. It adopts a doctrinal and analytical approach based on legislation, official regulatory materials and published academic literature. The analysis identifies potential gaps between formal regulatory compliance and environmentally sound recycling, particularly in relation to verification, collection infrastructure, institutional capacity and the position of informal-sector workers. It argues that effective implementation requires reliable compliance data, proportionate enforcement, accessible collection systems and safeguards for occupational health. The article concludes that e-waste governance should be assessed not merely through registration and certificate generation but also through verifiable recycling outcomes, environmental protection and accountability throughout the recycling chain.

Keywords: E-Waste; Extended Producer Responsibility; Environmental Law; Regulatory Enforcement.Environmental Justice; Circular Economy.

1.Introduction

Electrical and electronic equipment has become integral to communication, education, healthcare, banking, commerce and public administration. Mobile phones, computers, televisions, printers and other electronic products facilitate everyday activities and support

economic development. However, increasing consumption, technological obsolescence and the premature replacement of electronic products create significant waste-management challenges.

Electronic waste, commonly known as e-waste, includes discarded electrical and electronic equipment and the components, parts and consumables covered by the applicable regulatory framework. Unlike ordinary household waste, e-waste may contain valuable recoverable materials alongside hazardous substances. When discarded equipment is dismantled, burned or processed without adequate safeguards, harmful substances may contaminate soil, water and air. Unsafe recycling practices may also expose workers and nearby communities to hazardous dust, fumes and chemicals.

The challenge is therefore not limited to the disposal of discarded equipment. It also concerns the recovery of valuable resources, the prevention of environmental contamination and the protection of human health. A regulatory framework based solely on prohibitions against improper disposal cannot be effective unless it is supported by accessible collection arrangements, authorised recycling facilities, reliable monitoring and clear accountability.

India's regulatory approach has evolved through the E-Waste (Management and Handling) Rules, 2011, the E-Waste (Management) Rules, 2016, and the E-Waste (Management) Rules, 2022. The 2022 Rules were notified under the Environment (Protection) Act, 1986, and came into force on 1 April 2023. They establish a registration-based system for specified regulated entities and strengthen Extended Producer Responsibility (EPR) obligations for covered electrical and electronic equipment.

The regulatory framework has subsequently been amended, including through amendments in 2023 and 2024. These developments make it necessary to examine the Rules as amended rather than relying exclusively on the original notification.

This article critically examines the relationship between statutory obligations and their practical implementation. It considers whether the EPR framework promotes genuine recycling, how regulatory authorities can improve verification and enforcement, and why environmental justice and worker protection should form part of an effective e-waste management strategy.

2. Statement of the Research Problem

India's e-waste regulatory framework places substantial responsibility on producers and registered recyclers. Nevertheless, the existence of statutory obligations does not automatically ensure that discarded electronic equipment reaches authorised recycling facilities or is processed in an environmentally sound manner.

A significant policy concern is the continued role of informal collectors, dealers and dismantlers. Consumers may prefer informal channels because they offer convenient collection, immediate payment or better accessibility than formal take-back mechanisms. At the same time, informal processing conducted without adequate safeguards may expose workers and surrounding communities to environmental and occupational risks .

A further concern is the relationship between documentary compliance and actual environmental performance. Registration, online reporting and recycling certificates may improve traceability, but their effectiveness depends on the reliability of the information recorded and the verification of reported recycling activities.

The central research problem is whether the registration-based EPR framework adequately addresses the practical gap between legal compliance and environmentally sound recycling. The article also considers whether enforcement, collection infrastructure and worker protection can be strengthened without unnecessarily excluding informal-sector participants from legitimate economic activity.

3. Research Objectives

The objectives of this study are:

1.To examine the statutory foundation and principal provisions of the E-Waste (Management) Rules, 2022.

2.To analyse the role of Extended Producer Responsibility in promoting the collection and recycling of covered e-waste.

3.To examine the functions of regulatory authorities and the legal mechanisms available for monitoring and enforcement.

4.To identify implementation challenges relating to collection infrastructure, verification, institutional capacity and informal recycling.

5.To assess the relationship between e-waste management, environmental justice and circular-economy principles.

6.To identify legal and administrative measures that could improve accountability and environmentally sound recycling.

4. **Research Questions**

This study addresses the following questions:

1.How do the E-Waste (Management) Rules, 2022 regulate the management and recycling of covered electronic waste?

2.To what extent can EPR promote actual recycling rather than merely formal regulatory compliance?

3.What difficulties arise from informal recycling, inadequate collection infrastructure and monitoring limitations?

4.What responsibilities do regulatory authorities have in verifying compliance and addressing violations?

5.Which reforms could improve enforcement while protecting workers and encouraging sustainable resource recovery?

5. **Research Methodology and Scope**

This article adopts a doctrinal and analytical research methodology. It examines the Environment (Protection) Act, 1986, the E-Waste (Management) Rules, 2022, relevant subsequent amendments, official materials issued by the Central Pollution Control Board (CPCB), and selected academic publications concerning e-waste management and the circular economy.

The statutory analysis focuses on the legal structure of EPR, registration, recycling certificates, institutional responsibilities and environmental compensation. The analytical discussion considers the practical implications of these mechanisms for compliance, environmental protection and worker inclusion.

The study is primarily qualitative and legal in character. It does not claim to provide original fieldwork, interviews, statistical measurement or an empirical assessment of the performance of individual recycling facilities. Accordingly, implementation challenges are examined as regulatory concerns and areas requiring further empirical investigation, rather than as quantified findings.

The scope is confined principally to the Indian legal framework governing e-waste under the 2022 Rules and their relevant amendments. Other waste streams, including waste batteries governed by separate rules, are outside the central scope except where their treatment helps clarify the boundaries of the e-waste regime.

6. Evolution and Statutory Framework of E-Waste Management in India

6.1 The Environment (Protection) Act, 1986

The Environment (Protection) Act, 1986, provides the principal statutory foundation for India's environmental regulatory framework. Sections 3 and 6 empower the Central Government to take environmental protection measures and make rules within the scope of the Act. Section 25 provides rule-making powers, subject to the statutory requirements.

The E-Waste (Management) Rules, 2022, were notified in exercise of powers under sections 6, 8 and 25 of the Act, read with the applicable provisions of the Environment (Protection) Rules, 1986. The Rules therefore form part of a broader legislative framework intended to prevent and control environmental harm.

The significance of this statutory foundation lies in its ability to establish obligations for regulated entities and provide mechanisms for monitoring and responding to non-compliance. However, the effectiveness of subordinate legislation ultimately depends on implementation, administrative capacity and the quality of compliance verification.

6.2 Earlier E-Waste Rules

India's e-waste regulatory framework developed through successive rules intended to address the environmental risks associated with discarded electrical and electronic equipment.

The E-Waste (Management and Handling) Rules, 2011, represented an early regulatory step. The E-Waste (Management) Rules, 2016, subsequently revised the framework and placed greater emphasis on EPR and the responsibilities of producers.

The E-Waste (Management) Rules, 2022, superseded the 2016 Rules and introduced a more centralised, registration-based system for covered entities. The revised framework strengthened digital compliance arrangements and established a certificate-based mechanism linked to recycling obligations.

This evolution reflects a movement towards more structured producer responsibility and regulatory traceability. Nevertheless, the development of more detailed legal requirements should be accompanied by scrutiny of how those requirements operate in practice.

6.3 The E-Waste (Management) Rules, 2022

The 2022 Rules came into force on 1 April 2023. They establish the principal regulatory framework for covered electrical and electronic equipment and specified entities involved in its manufacture, sale, transfer, purchase, refurbishment, dismantling, recycling and processing.

The Rules establish registration requirements for manufacturers, producers, refurbishers and recyclers. They also provide for responsibilities relating to EPR, the management of e-waste, recycling certificates, hazardous-substance restrictions, environmental compensation and regulatory oversight.

The exact scope of the Rules must be determined by reference to the definitions, applicable schedules, exclusions and subsequent amendments. It should not be assumed that every discarded electronic item or every participant in the waste-management chain is subject to identical obligations.

The 2022 framework should therefore be read together with the amendments issued in 2023 and 2024, applicable CPCB guidelines and other relevant official directions.

6.4 Subsequent Amendments

The original Rules have been amended through several notifications. Relevant developments include amendments concerning the regulatory framework and the exchange of EPR certificates, as well as the 2024 amendment addressing the consequences of contravention.

The E-Waste (Management) Amendment Rules, 2024, notified on 8 March 2024, introduced provisions concerning platforms for the exchange or transfer of EPR certificates and the associated pricing framework. The E-Waste (Management) Second Amendment Rules, 2024, notified on 12 November 2024, substituted rule 23 to provide for penalties in accordance with section 15 of the Environment (Protection) Act, 1986.

These changes demonstrate that the legal framework is not static. Legal analysis must distinguish between the original provisions, subsequent amendments and the administrative guidelines governing their implementation.

effective prevention of false or otherwise invalid claims. Compliance should therefore be assessed through documentary scrutiny and, where appropriate, physical or technical verification of recycling operations.

A certificate-based system should ultimately support actual environmental outcomes. The generation of certificates is a regulatory mechanism, not a substitute for evidence that the applicable obligations have been fulfilled.

7. Principal Features of the E-Waste (Management) Rules, 2022

7.1 Scope and Applicability

The Rules apply to the entities, activities and categories of electrical and electronic equipment specified in their provisions and schedules. Their applicability must be determined by examining the statutory definitions, equipment categories and exclusions.

The framework seeks to ensure that covered e-waste is managed in a manner that protects human health and the environment from adverse effects. It also seeks to channel relevant activities towards registered entities and prescribed compliance procedures.

Clear communication of the Rules' scope is important for producers, recyclers, refurbishers and other affected stakeholders. Uncertainty about legal obligations may undermine compliance, particularly where businesses operate across different waste streams or participate in several stages of the product life cycle.

7.2 Extended Producer Responsibility

Extended Producer Responsibility is a central feature of the 2022 framework. It places defined end-of-life management obligations on producers of covered electrical and electronic equipment.

Under EPR, responsibility for a product's environmental impact is not treated as ending at the point of sale. Producers must fulfil the obligations prescribed by the Rules, including applicable recycling targets and registration and reporting requirements.

EPR can encourage producers to consider the end-of-life management of their products and support the development of recycling systems. It may also create economic incentives for resource recovery and more efficient material use.

However, the effectiveness of EPR depends on the integrity of the compliance system. The purchase or use of a certificate should not be treated as conclusive proof that every stage of the

waste-management process is environmentally sound. Regulatory authorities must ensure that the underlying recycling activity is genuine and consistent with the applicable requirements.

7.3 Registration and Digital Compliance

The Rules establish a registration framework administered through the CPCB's online E-Waste EPR portal. Registration requirements apply to the relevant regulated categories, and the Rules restrict covered entities from conducting specified business activities without registration.

7.5 Refurbishment and Resource Recovery

Refurbishment can extend the useful life of electrical and electronic equipment and delay its entry into the waste stream. Recycling, by contrast, involves processing waste to recover materials in accordance with the applicable requirements.

A sustainable regulatory approach should distinguish between reuse, refurbishment and recycling. Each activity should be assessed according to its legal treatment, environmental implications and applicable compliance obligations.

Extending product life may reduce premature disposal and conserve resources. However, refurbishment should not become a means of avoiding the proper management of equipment that has reached the relevant end-of-life stage.

Resource recovery should also be accompanied by appropriate handling of residues and hazardous components. Otherwise, the recovery of valuable materials may occur alongside continuing environmental harm.

7.6 Environmental Compensation and Penalties

Rule 22 of the 2022 Rules provides the framework for environmental compensation. It requires the CPCB to lay down guidelines for the imposition and collection of environmental compensation for relevant violations, subject to the approval specified in the Rules. It also addresses environmental compensation relating to the non-fulfilment of EPR obligations and transactions involving false EPR certificates.

CPCB has published environmental compensation guidelines under the Rules and their amendments. These guidelines form an important part of the administrative framework for implementing the compensation provisions.

Environmental compensation can help address situations in which non-compliance creates economic advantages or imposes environmental costs on others. Its effectiveness depends on reliable evidence, transparent criteria, appropriate calculation and consistent application.

The legal framework must also be distinguished from the consequences of contravention. Following the Second Amendment Rules, 2024, rule 23 provides for penalties in accordance with section 15 of the Environment (Protection) Act, 1986.

The existence of compensation and penalty provisions does not by itself demonstrate effective enforcement. Their practical value depends on whether violations are identified, assessed fairly and addressed through appropriate procedures.

8. Institutional Responsibilities

Effective e-waste management requires coordination among government departments, regulatory authorities, producers, recyclers, refurbishers and other relevant stakeholders.

8.1 Central Government

The Ministry of Environment, Forest and Climate Change establishes the regulatory framework and exercises the powers assigned to it under the relevant environmental legislation. Its responsibilities include the development and amendment of applicable rules and the approval of guidelines where required by the Rules.

Policy clarity is important because regulated entities must understand their obligations and the consequences of non-compliance. Consistent implementation also requires coordination between the legal framework and the administrative arrangements used to monitor it.

8.2 Central Pollution Control Board

The CPCB performs functions assigned under the Rules, including administering the relevant registration and EPR mechanisms, issuing guidelines and undertaking regulatory oversight.

The Board's role is important in maintaining the digital compliance framework and developing procedures for the administration of recycling certificates and environmental compensation.

Reliable information, consistent compliance criteria and appropriate scrutiny of registered entities are essential to this role. Where records indicate irregularities, further verification may be necessary to determine whether the applicable requirements have been fulfilled.

8.3 State Pollution Control Boards and Pollution Control Committees

State Pollution Control Boards and Pollution Control Committees perform functions assigned to them under the applicable environmental framework and relevant directions.

Their role in environmental administration can support the monitoring of facilities, compliance with applicable conditions and coordination with other authorities. Effective implementation requires clarity regarding the respective responsibilities of central and state-level institutions.

Institutional cooperation is particularly important where the collection, transport, storage and processing of waste involve multiple locations and stakeholders.

8.4 Producers, Manufacturers, Refurbishers and Recyclers

Producers and other regulated entities have responsibilities determined by the applicable Rules. These may include registration, compliance with prescribed obligations, maintaining records and providing information in the required manner.

Producers must fulfil their applicable EPR obligations. Registered recyclers must comply with the relevant requirements governing recycling and the generation of certificates. Refurbishers must follow the provisions applicable to refurbishment and the management of equipment that subsequently becomes waste.

Compliance should not be regarded as a purely administrative exercise. Regulated entities must ensure that their activities and records accurately reflect the operations undertaken and the obligations fulfilled.

8.5 Consumers and Other Stakeholders

Consumers influence e-waste management through their decisions about repair, reuse, replacement and disposal. Accessible collection arrangements and reliable information can help consumers transfer discarded equipment through appropriate channels.

Other stakeholders, including collection intermediaries and informal-sector participants, may also influence the movement of e-waste. Their activities must be understood in the context of the applicable legal requirements and the practical structure of the waste-management chain.

An effective system should make environmentally sound choices accessible and should communicate clearly how covered equipment can be transferred for authorised management.

9. Implementation Challenges and Critical Analysis

9.1 The Gap Between Formal Compliance and Actual Recycling

The registration-based EPR framework improves the structure of regulatory compliance. Nevertheless, formal registration and the maintenance of digital records do not automatically establish that waste has been collected and recycled in an environmentally sound manner.

The central challenge is to connect administrative evidence with actual processing outcomes. Where the reliability of records is uncertain, authorities may need to examine the underlying transactions, operating conditions and evidence of material recovery.

This does not mean that certificate-based compliance is inherently ineffective. Rather, the system requires appropriate safeguards to ensure that certificates correspond to qualifying recycling activity and that reported obligations are fulfilled according to the Rules.

9.2 Informal Recycling and Collection Infrastructure

Informal collectors and dismantlers can play a role in the movement of discarded electronic equipment. Consumers may use informal channels because they are convenient, accessible or offer immediate payment.

However, informal processing without suitable environmental and occupational safeguards may expose workers and surrounding communities to avoidable risks. The regulatory challenge is to improve the environmental performance of the waste-management chain without assuming that all informal-sector participants operate in the same manner.

Collection infrastructure is also important. Where authorised take-back or collection arrangements are difficult to access, consumers may have limited practical incentives to use formal channels.

Possible responses include accessible collection arrangements, clearer public information, cooperation with authorised recyclers and pathways through which eligible informal-sector

participants can engage with compliant operations. Any such approach must remain consistent with registration and other applicable legal requirements.

9.3 Monitoring, Verification and Data Reliability

Digital compliance systems can improve record-keeping and support the identification of irregularities. However, the reliability of digital reporting depends on the quality of the underlying information and the capacity of authorities to examine it.

Potential risks include inaccurate reporting, discrepancies between recorded and actual operations, and claims that cannot be adequately substantiated. These are regulatory risks requiring appropriate verification, rather than proof that every certificate or reported transaction is unreliable.

A stronger approach would combine digital monitoring with risk-based inspections, suitable technical checks and proportionate scrutiny of suspicious records. Clear procedures for identifying and addressing irregularities would also improve accountability.

9.5 Environmental Justice and Occupational Safety

The environmental consequences of unsafe e-waste handling may not be distributed equally. Workers engaged in hazardous processing and communities living near unsafe recycling or disposal sites may bear disproportionate environmental and health burdens.

Environmental justice requires attention to who benefits from resource recovery and who bears the associated risks. A system that encourages material recovery without adequate attention to occupational safety and environmental protection may fail to achieve its wider public-interest objectives.

Worker training, suitable protective equipment, safer handling practices and proper treatment of residues are important considerations in the design and implementation of e-waste policy.

Formalisation should therefore be accompanied by measures that promote safer livelihoods and practical participation in compliant waste-management arrangements. Worker inclusion should not be treated as separate from environmental compliance; it is an important consideration in achieving sustainable implementation.

9.6 Circular Economy and the Right to Repair

The circular economy seeks to retain the value of products and materials through durability, repair, reuse, refurbishment and recycling. E-waste policy can contribute to this objective, but recycling alone cannot address every stage of a product's environmental impact.

Manufacturers, policymakers and consumers should consider product durability, repairability, spare-part availability and responsible product design. Extending the useful life of equipment can reduce avoidable waste generation, although equipment that ultimately becomes waste must still be managed in accordance with applicable requirements.

The right to repair should be analysed with reference to the relevant legal and policy framework. It should not be assumed that every aspect of such a right is established by the E-Waste (Management) Rules, 2022.

An integrated approach would connect waste prevention, repair, refurbishment and recycling while ensuring that hazardous materials and residues are handled safely.

9.3 Monitoring, Verification and Data Reliability

Digital compliance systems can improve record-keeping and support the identification of irregularities. However, the reliability of digital reporting depends on the quality of the underlying information and the capacity of authorities to examine it.

Potential risks include inaccurate reporting, discrepancies between recorded and actual operations, and claims that cannot be adequately substantiated. These are regulatory risks requiring appropriate verification, rather than proof that every certificate or reported transaction is unreliable.

A stronger approach would combine digital monitoring with risk-based inspections, suitable technical checks and proportionate scrutiny of suspicious records. Clear procedures for identifying and addressing irregularities would also improve accountability.

9.4 Institutional Capacity and Coordination

Effective enforcement requires trained personnel, technical expertise, reliable information systems and coordination between the authorities concerned.

Where regulatory capacity is limited, the burden of checking registrations, records, certificates and operating conditions may exceed available resources. This creates a risk that administrative compliance receives greater attention than environmental performance.

Risk-based inspections, consistent reporting responsibilities and better coordination between relevant authorities could help direct resources towards activities presenting greater environmental concerns.

The appropriate design of these measures should be informed by reliable implementation data and periodic evaluation of regulatory performance.

9.5 Environmental Justice and Occupational Safety

The environmental consequences of unsafe e-waste handling may not be distributed equally. Workers engaged in hazardous processing and communities living near unsafe recycling or disposal sites may bear disproportionate environmental and health burdens.

Environmental justice requires attention to who benefits from resource recovery and who bears the associated risks. A system that encourages material recovery without adequate attention to occupational safety and environmental protection may fail to achieve its wider public-interest objectives.

Worker training, suitable protective equipment, safer handling practices and proper treatment of residues are important considerations in the design and implementation of e-waste policy.

Formalisation should therefore be accompanied by measures that promote safer livelihoods and practical participation in compliant waste-management arrangements. Worker inclusion should not be treated as separate from environmental compliance; it is an important consideration in achieving sustainable implementation.

9.6 Circular Economy and the Right to Repair

The circular economy seeks to retain the value of products and materials through durability, repair, reuse, refurbishment and recycling. E-waste policy can contribute to this objective, but recycling alone cannot address every stage of a product's environmental impact.

Manufacturers, policymakers and consumers should consider product durability, repairability, spare-part availability and responsible product design. Extending the useful life of equipment can reduce avoidable waste generation, although equipment that ultimately becomes waste must still be managed in accordance with applicable requirements.

The right to repair should be analysed with reference to the relevant legal and policy framework. It should not be assumed that every aspect of such a right is established by the E-Waste (Management) Rules, 2022.

An integrated approach would connect waste prevention, repair, refurbishment and recycling while ensuring that hazardous materials and residues are handled safely.

10. **Recommendations**

10.1 Strengthen Verification of Recycling Claims

Regulatory authorities should ensure that reported recycling activity and EPR certificates are supported by reliable information. Risk-based scrutiny and appropriate physical or technical verification can help identify inconsistencies and improve confidence in the compliance system.

10.2 Improve Collection Accessibility

Producers and relevant stakeholders should work towards accessible and clearly communicated collection and take-back arrangements. Consumer awareness should explain how covered electronic equipment can be transferred through appropriate channels.

10.3 Enhance Institutional Coordination

Clear reporting responsibilities and appropriate coordination between central and state-level authorities can improve the administration of the Rules. Regulatory priorities should be supported by reliable information and sufficient technical capacity.

10.4 Protect Workers and Support Safer Participation

Implementation strategies should consider occupational safety, training, suitable protective equipment and practical pathways for eligible informal-sector participants to engage with compliant operations.

Formalisation should be accompanied by safeguards that reduce environmental and occupational risks rather than simply shifting existing activities from one part of the waste-management chain to another.

10.5 Promote Transparency and Accountability

Compliance information should be sufficiently reliable to support regulatory scrutiny and public accountability, subject to applicable legal requirements. Environmental compensation and penalty mechanisms should be administered through appropriate procedures, supported by evidence and applied consistently.

10.6 Encourage Repair, Reuse and Resource Efficiency

Waste-management policy should complement recycling with measures that encourage product durability, repair and refurbishment. Such measures can reduce avoidable waste generation and retain the value of materials for longer periods.

10.7 Evaluate Environmental Outcomes

Regulatory performance should be assessed through evidence of compliance and environmental outcomes rather than registration figures alone. Further empirical research could examine collection accessibility, verification practices, worker safety and the relationship between recorded recycling activity and actual material recovery.

11. Conclusion

The E-Waste (Management) Rules, 2022, represent an important development in India's environmental regulatory framework. Through registration requirements, Extended Producer Responsibility, recycling targets, digital compliance arrangements and environmental compensation provisions, the Rules establish a structured approach to the management of covered electronic waste. Subsequent amendments further demonstrate the continuing development of the regulatory framework.

Nevertheless, the effectiveness of the system depends on the relationship between formal obligations and actual environmental performance. Registration, online reporting and recycling certificates can support traceability, but they must be accompanied by reliable verification and appropriate enforcement. The credibility of EPR ultimately depends on whether regulated entities fulfil their obligations and whether recycling activities are conducted in accordance with applicable environmental requirements.

The position of informal-sector workers also deserves sustained attention. Policies that promote formalisation without addressing collection accessibility, occupational safety and practical economic participation may fail to address the circumstances that shape waste-management practices. A more inclusive approach should seek to improve environmental compliance while promoting safer working conditions and viable participation in authorised systems.

India's e-waste framework would benefit from stronger verification of recycling claims, accessible collection arrangements, effective institutional coordination, transparent enforcement and greater attention to repair and refurbishment. These measures should be developed and evaluated through reliable legal, administrative and empirical evidence.

Ultimately, effective e-waste governance requires more than registration and regulatory certificates. It requires an accountable framework that connects legal compliance with verifiable recycling outcomes, environmental protection, responsible resource recovery and the fair distribution of environmental risks. Integrating these objectives would strengthen the contribution of e-waste regulation to a more sustainable and environmentally just circular economy.

Footnotes

1.Environment (Protection) Act, No. 29 of 1986, 3, 6, 8, 15, 25, India Code (India).

2.E-Waste (Management) Rules, 2022, G.S.R. 801(E), Gazette of India, Extraordinary, pt. II, sec. 3(i) (Nov. 2, 2022).

3.E-Waste (Management) First Amendment Rules, 2023, G.S.R. 61(E) (Jan. 30, 2023).

4.E-Waste (Management) Second Amendment Rules, 2023, G.S.R. 534(E) (July 24, 2023).

5.E-Waste (Management) Amendment Rules, 2024, G.S.R. 164(E) (Mar. 8, 2024).

6.E-Waste (Management) Second Amendment Rules, 2024, G.S.R. 699(E) (Nov. 12, 2024).

7.Central Pollution Control Board, Environmental Compensation Guidelines under the E-Waste (Management) Rules, 2022 and Amendments Thereof (2024), available through the official CPCB E-Waste EPR portal.

8.Kalyan Bhaskar & Rama Mohana Turaga, India's E-Waste Rules and Their Impact on E-Waste Management Practices: A Case Study, 22(4) Journal of Industrial Ecology 930–942 (2018), https://doi.org/10.1111/jiec.12619.

9.Diyasha Sengupta, I.M.S.K. Ilankoon, Kai Dean Kang & Meng Nan Chong, Circular Economy and Household E-Waste Management in India: Integration of Formal and Informal Sectors, Minerals Engineering, art. 107661 (2022), https://doi.org/10.1016/j.mineng.2022.107661.

10.Rama Mohana R. Turaga et al., E-Waste Management in India: Issues and Strategies, 44(3) Vikalpa 127–162 (2019), https://doi.org/10.1177/0256090919880655.

Liji Samuel, Need for a Circular Economy to Manage E-Waste: An Analysis of Indian Legal Regime, 14(Special Issue 1) Christ University Law Journal 47–77 (2025), https://doi.org/10.12728/culj.sp1.3.

References

Primary Sources

- Environment (Protection) Act, No. 29 of 1986 (India).
- E-Waste (Management) Rules, 2022, G.S.R. 801(E), Nov. 2, 2022.
- E-Waste (Management) First Amendment Rules, 2023, G.S.R. 61(E), Jan. 30, 2023.
- E-Waste (Management) Second Amendment Rules, 2023, G.S.R. 534(E), July 24, 2023.
- E-Waste (Management) Amendment Rules, 2024, G.S.R. 164(E), Mar. 8, 2024.
- E-Waste (Management) Second Amendment Rules, 2024, G.S.R. 699(E), Nov. 12, 2024.
- Central Pollution Control Board, E-Waste EPR Portal and applicable official guidelines.
- Secondary Sources
- Bhaskar, Kalyan, & Rama Mohana Turaga. “India's E-Waste Rules and Their Impact on E-Waste Management Practices: A Case Study.” 22(4) Journal of Industrial Ecology 930–942 (2018).
- Sengupta, Diyasha, I.M.S.K. Ilankoon, Kai Dean Kang, & Meng Nan Chong. “Circular Economy and Household E-Waste Management in India: Integration of Formal and Informal Sectors.” Minerals Engineering, art. 107661 (2022).
- Turaga, Rama Mohana R., et al. “E-Waste Management in India: Issues and Strategies.” 44(3) Vikalpa 127–162 (2019).
- Samuel, Liji. “Need for a Circular Economy to Manage E-Waste: An Analysis of Indian Legal Regime.” 14(Special Issue 1) Christ University Law Journal 47–77 (2025).

Official Sources for Verification

- Ministry of Environment, Forest and Climate Change: notifications under the E-Waste (Management) Rules, 2022.
- Central Pollution Control Board: E-Waste EPR Portal, applicable guidelines and standard operating procedures.
- India Code: statutory text of the Environment (Protection) Act, 1986, and relevant rules.