LEAD JOURNAL

Beyond Compliance: Producer Responsibility Organisations, Climate Governance, and Legal Reform in India's E-Waste Framework: A Case Study of Ye Prayas

by Aladdin H.M. Shaker, Puneet Pathak, Nyamat Sekhon & Siddharth Prabhakar

Vol 22/2
2026

SOAS & IELRC

ISSN 1746-5893

LEAD Journal, 2026, Vol. 22/2, page 001 - 031
DOI: https://doi.org/10.25501/soas.1207590
Publication date: October 2026
Original Article

Beyond Compliance: Producer Responsibility Organisations, Climate Governance, and Legal Reform in India's E-Waste Framework: A Case Study of Ye Prayas

Aladdin H.M. Shaker,* Puneet Pathak,** Nyamat Sekhon*** & Siddharth Prabhakar****

ABSTRACT

The rapid growth of electronic waste (e-waste) has heightened concerns about resource depletion, environmental degradation, and climate change, especially in low-income nations where regulatory enforcement is inconsistent. While India has embraced Extended Producer Responsibility (EPR) as the foundation of its e-waste governance system, little attention has been paid to the evolving role of Producer Responsibility Organisations (PROs) in advancing circular economy and climate goals. This paper investigates the role of PROs as innovation-oriented governance entities rather than simply as compliance middlemen.

This study used a qualitative single-case study design to examine Ye Prayas, a registered Producer Responsibility Organisation in India. Empirical data were gathered through a semi-structured expert interview and analysed alongside the E-Waste (Management) Rules of 2016 and 2022, CPCB guidance documents, and other policy materials, using the EPR–Circular Economy PRO Model.

The study argues that India's EPR framework remains constrained by a compliance-oriented regulatory logic and proposes legal reforms that explicitly recognise PROs, institutionalise digital traceability, incorporate carbon accountability, and enable inclusive circular-economy transformations.

* Corresponding Author: Aladdin H.M. Shaker, Department of Law, Central University of Punjab. Email: aladdinshaker34@gmail.com

** Associate Professor, Department of Law, Central University of Punjab.

*** Research Scholar, Rajiv Gandhi National University of Law, Punjab.

**** Master of Laws, Department of Law, Central University of Punjab.

Published by LEAD Journal (www.lead-journal.org)

This is an Open Access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted reuse, distribution, and reproduction in any medium, provided the original work is properly cited.

1. INTRODUCTION

1.1 E-Waste Crisis in India: Environmental and Legal Context

The global proliferation of electronic and electrical waste (e-waste) has become an unprecedented environmental and health crisis, driven by rapid digital transformation and

the shorter lifecycles of electronic devices.[1] Globally, e-waste production reached 62 billion kg in 2022 and is projected to escalate to 82 billion kg by 2030. India currently occupies a critical position in this global trajectory as the world's third-largest generator of e-waste, producing approximately 4.1 million metric tons (4.1 billion kg) in 2022.[2] Despite the magnitude of this waste stream, India faces a severe 'implementation gap': less than two percent of generated e-waste is formally documented as recycled through authorised channels.[3] The informal sector generates nearly 95 percent of e-waste, creating a burgeoning 'snowball disaster' through unregulated, hazardous backyard operations.[4]

The environmental and public health ramifications of this informal dominance are significant. Crude processing methods, such as manual dismantling, open-air incineration of cables, and acid-based leaching of printed circuit boards, release a cocktail of toxic substances—including lead, mercury, cadmium, and brominated flame retardants—into the soil, hydrological systems, and the atmosphere. These pollutants are known to cause severe health complications, including respiratory ailments, neurological abnormalities, DNA mutations, and developmental disorders, particularly among vulnerable populations such as children and pregnant women working in informal recycling hubs.[5]

To address these systemic hazards, India has adopted Extended Producer Responsibility (EPR) as its primary regulatory cornerstone. EPR is a global environmental policy approach that extends the 'Polluter Pays Principle' (PPP), shifting the financial and organisational burden of post-consumer waste management from public authorities and taxpayers to the producers. The objective of EPR is to internalise environmental

1 Arun Lal Srivastav and others, 'Concepts of Circular Economy for Sustainable Management of Electronic Wastes: Challenges and Management Options' (2023) 30 Environmental Science and Pollution Research 48654.

2 Cornelis P Baldé and others, 'Global E-waste Monitor 2024'(International Telecommunication Union (ITU) and United Nations Institute for Training and Research (UNITAR) 2024) 77 <https://ewastemonitor.info/wp-content/uploads/2024/03/GEM_2024_18-03_web_page_per_page_web.pdf>.

3 ibid.

4 Amit Dhar and Debapriya Nandi, 'Exploring the Effects of Electronic Waste: A Comprehensive Study of Production, Management, and Health Risks in India' (2026) 20(51) International Journal of Environmental Research.

5 Lynda Andeobu, Santoso Wibowo and Srinarayana Grandhi, 'Environmental and Health Consequences of E-Waste Dumping and Recycling Carried out by Selected Countries in Asia and Latin America' (2023) 15(13) Sustainability 10405.

externalities and incentivise manufacturers to incorporate 'life-cycle thinking' into product design to facilitate easier recycling and reduced toxicity.[6]

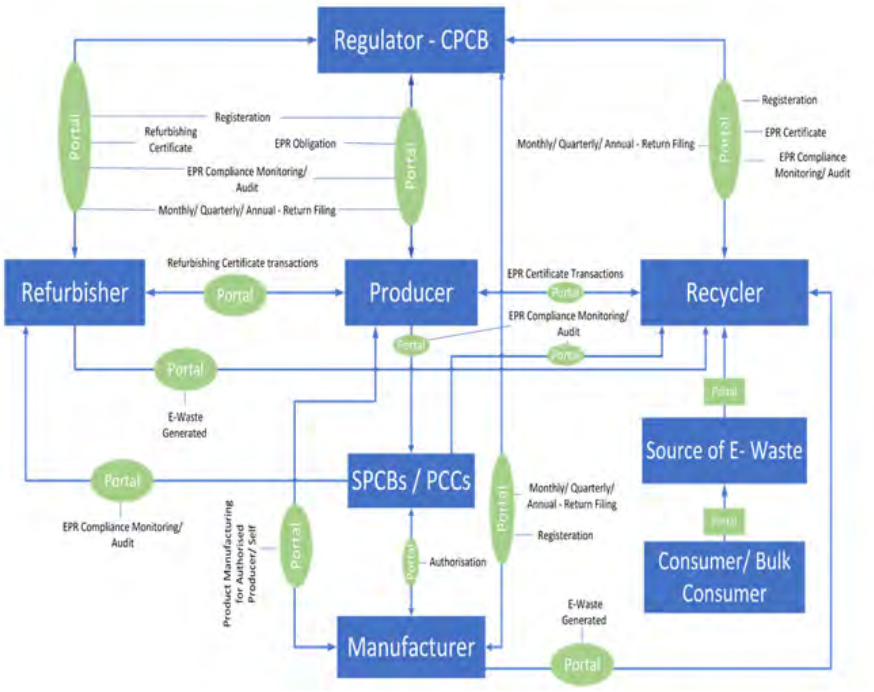

Figure 1: E-Waste Management Regulatory Workflow under EPR Regime[7]

Figure 1 shows the process flow for the 2022 E-Waste Management Rules, including registrations, return filings, EPR certificate transactions, and compliance monitoring. This diagram illustrates how a portal-based strategy simplifies tracking and enforces duties, with CPCB serving as the nodal regulator.

India's regulatory framework for e-waste has undergone a decade of evolution through a series of 'critical junctures'. The foundational E-Waste (Management and Handling) Rules of 2011 first introduced the EPR mandate, requiring producers to establish take-back systems and obtain authorisations from state environmental regulators. This was succeeded by the E-Waste (Management) Rules of 2016, which represented a more robust, performance-based intervention by introducing explicit, phase-wise quantitative collection targets and formally recognising Producer Responsibility Organisations (PROs) as specialised institutional facilitators.[8] Most recently, the E-Waste (Management) Rules of 2022, effective as of April 2023, have signaled a

6 Yamini Gupt and Samraj Sahay, 'Review of Extended Producer Responsibility: A Case Study Approach' (2015) 33(7) Waste Management and Research 595, 600.

7 Central Pollution Control Board, 'E-Waste Management System' <https://eprewaste.cpcb.gov.in/#/target>.

8 Shashi Arya and Sunil Kumar, 'E-Waste in India at a Glance: Current Trends, Regulations, Challenges and Management Strategies' (2020) 271 Journal of Cleaner Production 122707.

paradigm shift toward a digitally monitored compliance ecosystem. These rules introduce market-based instruments, such as EPR certificate trading and refurbishing credits, to align waste management with circular-economy principles.[9] However, the E-Waste (Management) Rules of 2022 represent a 'regulatory retreat' or the marginalisation of PROs, removing their statutory definition and making their engagement optional in favour of a market-based EPR certificate-trading system. This shift risks transforming EPR from a transformative interface policy into a mere procedural compliance exercise focused on weight-based targets rather than systemic resource retention.[10]

Current academic scholarship has largely remained descriptive, focusing on statutory summaries rather than critically evaluating the institutional efficacy of these intermediaries.[11] This paper seeks to address this lacuna by using 'Ye Prayas' as a case study—a registered PRO selected for its self-reported practices that encompass carbon-credit mechanisms and digital traceability tools, representing an intersection between EPR and carbon governance that has received little empirical attention in the literature to date. By applying a mixed-method socio-legal approach, this study evaluates how PROs can aggregate producer duties and coordinate logistics to facilitate a transition toward a legally established circular economy. Ultimately, the study uses the case to examine how the functional role of PROs may extend beyond conventional compliance services to encompass digital traceability, circular economy coordination, and climate accountability, while recognising that the broader applicability of these practices requires evidence from additional cases.

1.2 E-Waste Climate Risks and India's Role in Global GHG Emissions

The embodied carbon footprint of electronics, primarily from mining, manufacturing, and transportation, constitutes around 67 percent of their total lifetime greenhouse gas emissions. Worldwide, e-waste from ICT devices emitted 580 million metric tons of CO2e in 2020, with forecasts projecting 852 million metric tons by 2030 if prevailing trends persist.[12]

The electronics sector constitutes one of the eight principal supply chains that collectively account for almost 50 percent of global greenhouse gas emissions; however, its individual contribution is below five percent, primarily due to emissions from upstream material production and energy-intensive manufacturing processes.[13] India, a prominent producer

9 Angela Serpe and others, '2002–2022: 20 Years of e-Waste Regulation in the European Union and the Worldwide Trends in Legislation and Innovation Technologies for a Circular Economy' (2025) 3(3) RSC Sustainability 1039 <https://doi.org/10.1039/D4SU00548A>.

10 'Waste Not, Recycle Lots: India's 2022 E-Waste Regulations' (*King Stubb and Kasiva,* 9 January 2024) <https://ksandk.com/regulatory/indias-new-e-waste-management-rules-of-2022/>.

11 Shashi Arya and Sunil Kumar, 'E-Waste in India at a Glance: Current Trends, Regulations, Challenges and Management Strategies' (2020) 271 Journal of Cleaner Production 122707.

12 Narendra Singh and Oladele A Ogunseitan, 'Disentangling the Worldwide Web of E-Waste and Climate Change Co-Benefits' (2022) 1(2) Circular Economy 100011.

13 World Economic Forum, 'Net-Zero Challenge: The Supply Chain Opportunity' (World Economic Forum, in collaboration with Boston Consulting Group 2021).

and processor of e-waste, plays a crucial role in this global phenomenon.[14] Current Indian waste management regulations predominantly emphasise hazardous material management and public health, with minimal incorporation of techniques to mitigate climate change. Most policies prioritise garbage collection and public health, with minimal attention to greenhouse gas reduction or climate objectives.[15] Regulations on e-waste and plastic waste are not aligned with the principles of the circular economy and climate mitigation.[16] Additionally, insufficient enforcement, inadequate infrastructure, and low public knowledge impede advancement towards sustainable, climate-aligned waste management.[17]

1.3 Regulatory Space for Innovation

Legislation significantly boosts both urban and corporate green innovation, particularly through green patents and technological advancements.[18] Robust legislative frameworks, including extensive environmental protection legislation, enhance both the volume and quality of green innovation, particularly within capital-intensive sectors and major enterprises.[19] Moreover, investment-based, market-driven regulations such as green finance, tradable permits, and subsidies are most effective at fostering green innovation and reducing emissions, as they incentivise long-term, knowledge-intensive innovation and encourage enterprises to invest in sustainable solutions.[20]

These policies operate by augmenting government investment, facilitating industrial restructuring, and offering subsidies that are particularly advantageous to small, medium, and non-state-owned firms.[21] In the meantime, do Indian laws enable or hinder the use of climate-linked models, digital tools,

14 Singh and Ogunseitan (n 12) 100013.

15 Himani S Bansod and Prasad Deshmukh, 'Biomedical Waste Management and Its Importance: A Systematic Review' (2023) 15(2) Cureus; Leelavathy Karthikeyan and others, 'The Management of Hazardous Solid Waste in India: An Overview' (2018) 5(9) Environments 103.

16 Rena and others, 'Eco-Innovations and Sustainability in Solid Waste Management: An Indian Upfront in Technological, Organizational, Start-Ups and Financial Framework' (2022) 302 Journal of Environmental Management 113953.

17 Kishan Kumar Prajapati and others, 'An Overview of Municipal Solid Waste Management in Jaipur City, India: Current Status, Challenges and Recommendations' (2021) 152 Renewable and Sustainable Energy Reviews 111703.

18 Chaofan Chen and others, 'Can Government Low-Carbon Regulation Stimulate Urban Green Innovation? Quasi-Experimental Evidence from China's Low-Carbon City Pilot Policy' (2022) 54(57) Applied Economics 6559.

19 Xingmin Yin, Dandan Chen and Jianyue Ji, 'How Does Environmental Regulation Influence Green Technological Innovation? Moderating Effect of Green Finance' (2023) 342 Journal of Environmental Management 118112.

20 Rohit Agrawal and others, 'Adoption of Green Finance and Green Innovation for Achieving Circularity: An Exploratory Review and Future Directions' (2024) 15(4) Geoscience Frontiers 101669.

21 Yonggen Luo and others, 'Low-Carbon City Pilot Policy and Enterprise Low-Carbon Innovation–A Quasi-Natural Experiment from China' (2024) 83 Economic Analysis and Policy 204; An Pan and others, 'Climate Policy and Low-Carbon Innovation: Evidence from Low-Carbon City Pilots in China' (2022) 112 Energy Economics 106129.

or ESG-driven compliance mechanisms? Indian regulations have increasingly incorporated ESG (Environmental, Social, and Governance) principles, primarily through the Securities and Exchange Board of India (SEBI) Business Responsibility and Sustainability Reporting (BRSR) framework. This framework requires publicly traded firms to publish ESG-related information that complies with global standards and embodies a 'double materiality' perspective, addressing both financial and impact materiality.[22] These approaches have enabled Producer Responsibility Organisations (PROs) to implement data-driven traceability, lifecycle analytics, and climate-related operational models; however, the framework remains in a developmental stage.[23] Despite robust regulatory impetus, the enforcement and integration of digital technologies remain ongoing endeavors.[24] Smaller PROs and non-state entities often face high compliance costs and conflicting directives,[25] whereas climate-related issues are largely marginal in most EPR audits.[26] institutions to innovation-oriented agents that advance circular economy and climate goals.

1.4 Case Selection: Why Ye Prayas?

Researchers reviewed the CPCB's formal database of 74 registered PROs (as of February 2022)[27] and contacted each entity by email and phone. Seventeen of the organisations reached out to did not respond, while twenty-four were no longer functioning as PROs. Furthermore, several organisations have recently redirected their efforts toward recycling rather than operating predominantly as Producer Responsibility Organisations. This significantly diminished the number of organisations that were both functionally active and accessible for empirical interaction. Ye Prayas was consequently selected from the limited pool of active PROs that were available and had consented to participate in the study. The organisation's readiness to cooperate, along with the availability of relevant organisational and digital documentation for EPR implementation, enabled the researchers to gather comprehensive empirical data

22 Sugandha Yadav, 'Beyond Materiality: Materiality in ESG Disclosures under Securities Regulations in India' [2024] SSRN Electronic Journal.

23 Dea Wehrli and Sonia Valdivia, Assessing the Practical Implementation of ISO 59014 for Secondary Materials Recovery: Pilot Testing at E[co]work in India (Sustainable Recycling Industries (SRI) program and the World Resources Forum (WRF) 2025) <https://circular-electronics.org/wp-content/uploads/2025/12/2025_Assessing-the-Practical-Implementation-of-ISO-59014-Pilot-Testing-at-Ecowork-in-India_Wehrli-et-al.pdf>.

24 Aanchal Kabra, 'Locating the Future of ESG in India's Present Sustainability Framework' (2024) 13 Asian Journal of Business Ethics 137.

25 Tejendra Singh Gaur and others, 'E-Waste Management Challenges in India from the Perspective of Producer Responsibility Organizations' (2025) 13 IEEE Access 54462.

26 Manu Sharma, Sudhanshu Joshi and Ashwani Kumar, 'Assessing Enablers of E-Waste Management in Circular Economy Using DEMATEL Method: An Indian Perspective' (2020) 27 Environmental Science and Pollution Research 13325.

27 Central Pollution Control Board (CPCB), 'List of PRO's under E-Waste Management Rules, 2016 Registered by the CPCB (as on 18.02.2022)' (Central Pollution Control Board, Ministry of Environment, Forest and Climate Change, Government of India 2022) <https://kspcb.karnataka.gov.in/sites/default/files/inline-files/List%20of%20PRO's%20under%20E-waste%20as%20on%2018.02.2022.PDF>.

and analyse the correlation between the organisation's stated practices and the relevant regulatory framework. The selection was therefore predominantly determined by accessibility, ongoing operational engagement, and readiness to participate, rather than an evaluation of Ye Prayas as representative or superior to other PROs. As a single case study, the research does not assert that Ye Prayas epitomises the broader demographic of PROs in India; instead, it offers an opportunity to investigate thoroughly how an engaged PRO functions within and responds to the regulatory landscape of India's developing EPR framework.

Despite growing scholarly attention to Extended Producer Responsibility (EPR) and the shift toward a circular economy, empirical research on carbon-integrated e-waste management in India remains limited.[28] The case is thus analytically significant as the organisation's disclosed operations encompass carbon accounting, digital traceability, and sustainability-focused services in addition to traditional EPR-related activities. These methodologies offer an opportunity to explore how an engaged Producer Responsibility Organisation (PRO) might operate beyond the limited compliance roles typically associated with Extended Producer Responsibility (EPR) implementation, while also enabling the research to pinpoint the legal and institutional constraints that shape these activities. Figure 2 elaborates the operational framework of Ye Prayas, emphasising its role in coordinating key stakeholders and promoting compliance, recycling, circular economy activities, and climate-focused efforts within the e-waste management ecosystem.

The relevance of the case extends beyond India, as the regulatory and institutional circumstances studied are not exclusive to India. Many countries in the Global South face similar challenges, including insufficient institutional capacity, fragmented enforcement, and heavy reliance on informal waste management systems.[29] The objective, nonetheless, is not to regard Ye Prayas as emblematic of PROs in general, but to utilise the case as an empirical gateway to explore broader enquiries into EPR execution, institutional intermediation, circular-economy governance, and climate accountability.

Ye Prayas also reports receiving industry recognition, including a 2022 'Most Promising Waste Management Companies' designation from Silicon India, a 2024 trade-press mention from Corporate Connect Magazine, Startup India recognition, and a 2025 award for its founder from the Times Group.[30]

This study does not consider these self-publicised, industry-media accolades as evidence of the quality of Ye Prayas's

28 Ministry of Environment, 'Forest and Climate Change, Government of India, India's Long-Term Low-Carbon Development Strategy' (2022) 83.

29 Obiora B Ezeudu, 'Harnessing the Drivers and Barriers to Implementation of Extended Producer Responsibility for Circular Economy in Nigeria' (2024) 4 Circular Economy and Sustainability 1461; Rimaz Hammoud and others, 'Exploring the Feasibility of Extended Producer Responsibility for Efficient Waste Management in Lebanon' (2025) 15 Scientific Reports 15444; Jooyoung Park, Nohora Díaz-Posada and Santiago Mejía-Dugand, 'Challenges in Implementing the Extended Producer Responsibility in an Emerging Economy: The End-of-Life Tire Management in Colombia' (2018) 189 Journal of Cleaner Production 754.

30 YE PRAYAS, 'Media Coverage — YE PRAYAS', available at <https://www.ye-prayas.com/media-coverage>.

practices, which are independently evaluated in Sections 3 and 4. They are included here solely to indicate a degree of public visibility within the sector, which is not considered evidence of independently audited rankings.

Consequently, this study contributes to the field of environmental governance in three ways. First, it provides empirical evidence grounded in fieldwork on the implementation of carbon-integrated Extended Producer Responsibility, drawing on a case study of a functioning Producer Responsibility Organisation in India, a relatively under-researched domain. Second, it uses the case to investigate the potential role of PROs as hybrid governance structures linking regulatory compliance to digital, circular-economy, and climate-related activities. Third, it offers a legal examination of India's Extended Producer Responsibility (EPR) framework, identifying structural deficiencies related to the institutional role of Producer Responsibility Organisations (PROs), digital traceability, carbon accountability, and the involvement of the informal sector, while considering legal and policy reforms that could enhance the alignment of EPR implementation with circular economy and climate objectives.

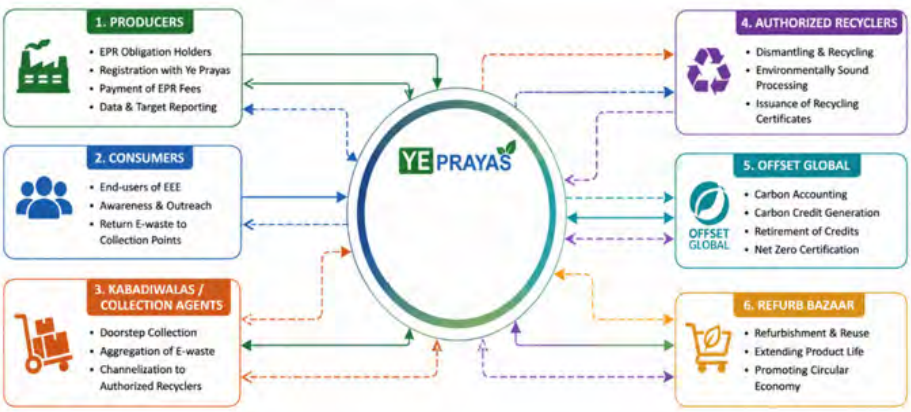

Figure 2: Ye Prayas: Operational and Structural Framework

2. MATERIALS AND METHODS

2.1 Case Study Design and Rationale

This study employs a qualitative single-case study design rooted in the interpretive traditions of Yin (2018) and Stake (1995).[31] These traditions emphasise the in-depth examination of bounded systems to comprehend complex institutional dynamics. Ye Prayas was selected as an active and accessible PRO willing to participate in the study, as detailed in Section 1.4. The case is analysed as

31 Robert K Yin, *Case Study Research and Applications: Design and Methods* (6th edn, SAGE Publications 2018); Robert E Stake, *The Art of Case Study Research* (SAGE Publications 1995.

an empirical setting to explore broader questions about EPR implementation, institutional intermediation, digital traceability, circular-economy practices, and climate accountability, rather than as a representative example of PROs in India.

The primary empirical source was a semi-structured online interview with Mr. Sanyog Mehra, Product Head at Ye Prayas. Supplementary documentary materials comprised the 2018 CPCB Guidelines, the E-Waste (Management) Rules of 2016 and 2022, and other pertinent legal and policy documents. These materials established the regulatory context for analysing the interview evidence and distinguishing the organisation's reported practices from the researchers' analysis.

The study applies a deductive, framework-guided thematic strategy using the EPR-CE PRO analytical framework. Figure 3 illustrates the three-phase methodological process adopted to identify the case, collect empirical data, and analyse the findings using the EPR-CE PRO analytical Framework.

2.2 Data Collection and Sampling Strategy

The primary data source was a detailed, semi-structured online interview conducted with Mr. Sanyog Mehra, Product Head at Ye Prayas. Supplementary sources included the E-Waste (Management) Rules (2016, 2022), CPCB Guidelines (2018), public circulars, and legal commentaries.

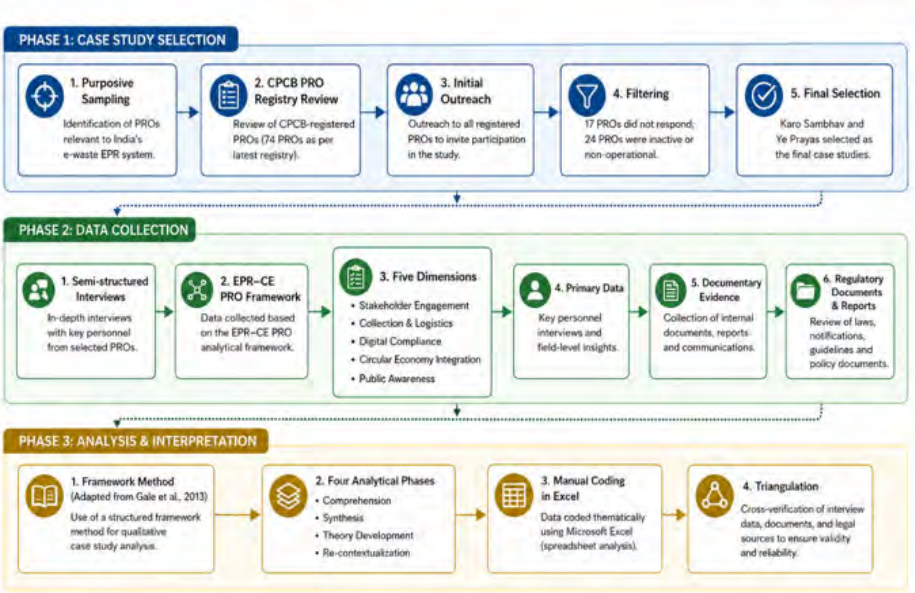

Figure 3. Three-Phase Methodology for PRO Case Study

2.3 Analytical Framework: The EPR–CE PRO Model

The EPR–CE PRO Model is an analytical framework for evaluating the role of Producer Responsibility Organisations (PROs) in implementing Extended Producer Responsibility (EPR) within a Circular Economy (CE) context. This

approach assesses the role of PROs as institutional intermediaries connecting regulatory requirements to tangible sustainability outcomes. The framework emphasises five fundamental dimensions: (1) Stakeholder Engagement and Flow, (2) Collection and Logistics Management, (3) Digital Compliance and Documentation, (4) Integration of Circular Strategies including, reuse, repair, and carbon credits, and (5) Public Awareness and Inclusion of the Informal Sector. This study uses the framework to examine the practices of a Producer Responsibility Organisation (PRO), using Ye Prayas as the case, and to assess how those practices align with circular economy principles and legal Extended Producer Responsibility (EPR) obligations.

This analytical tool was developed through a triangulated review of: (1) E-waste Rules and CPCB guidance documents, (2) Academic literature that connects Extended Producer Responsibility (EPR) implementation with circular economy principles. Awasthi et al. (2016) and Manomaivibool (2009) underscore the issues within India's e-waste management system and the pivotal function of Producer Responsibility Organisations (PROs).[32] Kirchherr et al. (2017) elucidate the concepts of the Circular Economy and the value-creation process.[33] De Angelis and Vesci (2025) show how micro-sized social enterprises can use circular business models to create diverse social value through humane entrepreneurship.[34] Lifset et al. (2013) provide insights into EPR design and intermediary functions.[35] Together, these papers jointly elucidate the structure and indications of the analytical framework. (3) Practitioner insights from the semi-structured interview.

The framework consists of 31 structured items, grouped under three categories: A. Organisational Profile, B. EPR Implementation Performance, and C. Circular Economy Contributions.

Each item is mapped to a regulatory requirement, theoretical construct, or practical compliance function. The complete framework is provided in Appendix A.

2.4 Analytical Procedure

The study applied the Framework Method (Gale et al., 2013),[36] as a primary analytical tool to develop structured, thematic analysis aligned with the EPR-CE PRO framework. To enhance the analytical rigor,

32 Abhishek Kumar Awasthi, Xianlai Zeng and Jinhui Li, 'Environmental Pollution of Electronic Waste Recycling in India: A Critical Review' (2016) 211 Environmental Pollution 259; Panate Manomaivibool, 'Extended Producer Responsibility in a Non-OECD Context: The Management of Waste Electrical and Electronic Equipment in India' (2009) 53(3) Resources, Conservation and Recycling 136.

33 Julian Kirchherr, Denise Reike and Marko Hekkert, 'Conceptualizing the Circular Economy: An Analysis of 114 Definitions' [2017] SSRN Electronic Journal <https://www.ssrn.com/abstract=3037579>.

34 Roberta De Angelis and Massimiliano Vesci, 'Circular Economy Business Models, Value Creation and Humane Entrepreneurship: A Micro-Sized and Social Enterprise Perspective' (2025) 5 Circular Economy and Sustainability 147.

35 Reid Lifset, Atalay Atasu and Naoko Tojo, 'Extended Producer Responsibility: National, International, and Practical Perspectives' (2013) 17(2) Journal of Industrial Ecology 162.

36 Nicola K Gale and others, 'Using the Framework Method for the Analysis of Qualitative Data in Multi-Disciplinary Health Research' (2013) 13(117) BMC Medical Research Methodology.

Morse's (1994)[37] four-phase qualitative verification strategy: 1. Comprehension – Immersion in interview data and regulatory documents to contextualise Ye Prayas' operational model; 2. Synthesis – Coding responses and matching them to the EPR-CE PRO framework to identify key themes; 3. Theory Development – Interpreting findings in light of institutional innovation and regulatory lag in Indian EPR law; 4. Re-contextualisation – Situating results within India's broader policy discourse and global ESG/circular economy benchmarks. This systematic method enabled coherence between the case findings and the study's conceptual objectives. Then, the interview was manually coded using Excel and structured around the EPR-CE PRO framework to enable deductive thematic extraction.

2.5 Validity, Limitations, and Scope

To ensure rigor, factual details reported from the interview were checked with the interviewee where clarification was required. The structured analytical framework enhanced transparency and interpretive consistency. As a single-case study, the research does not aim for statistical generalisability but follows Yin's (2018)[38] logic of analytical generalisation. The study recognises that its findings are subject to limitations arising from the absence of field observation, the use of a single semi-structured interview, and limited triangulation.

The study is based on a single semi-structured interview with a Ye Prayas representative and therefore doesn't capture the perspectives of other stakeholders involved in the EPR system. In particular, the study did not include interviews with officials from the CPCB, licensed recyclers, manufacturers, or collectors from the informal sector. Their perspectives are consequently represented through documentary and secondary sources, including legal texts, CPCB reports, and relevant literature, rather than through direct interview testimony. Field observation was not conducted. The analysis presents the organisation's internal framework and self-reported compliance strategies to examine how the organisation operates within e-waste governance in practice. These claims are not independently verified through third-party audits or official regulatory records. These limitations are relevant to the interpretations of the findings, especially in contexts where the study discusses the intersection between formal Extended Producer Responsibility frameworks and informal collection practices.

Despite these constraints, the study provides a case-specific empirical basis for legal and policy analysis. Ye Prayas is treated not as a representative PRO but as a case through which regulatory gaps, institutional practices, and potential areas for legal development within India's EPR regime can be examined. The findings should therefore be understood as analytical insights derived from the selected case rather than as evidence of practices across the wider population of PROs in India.

37 Janice M Morse, 'Emerging from the Data: The Cognitive Processes of Analysis in Qualitative Inquiry' in Janice M Morse, *Critical Issues in Qualitative Research Methods* (SAGE Publications 1994).

38 Robert K Yin, *Case Study Research and Applications: Design and Methods* (6th edn, SAGE Publications 2018) 45.

3. RESULTS: OPERATIONAL STRATEGIES AND INSTITUTIONAL PRACTICES OF YE PRAYAS

3.1 Stakeholder Network and Flow

Ye Prayas Private Limited, a registered Producer Responsibility Organisation that operates in India, was established in 2020 during the COVID-19 pandemic. The organisation's activities, as per the interview with the Product Head, encompass e-waste collection and recycling coordination, services for bulk consumers, digital compliance solutions for producers, data destruction, and awareness initiatives. These activities are reported here as part of the organisation's stated operational model and are analysed in the subsequent sections in relation to the relevant regulatory framework. Ye Prayas operates within a tri-company structure: Ye Prayas Private Limited manages EPR operations and logistics; Offset Global specialises in sustainability analytics, including carbon credit valuation;[39] and Refurb Bazaar specialises in refurbishing IT assets, including laptops and desktops.[40] According to the company, the motivation at inception was to move beyond the typical recycling model replicated by most players in the sector. 'Every company was doing the same thing; picking up material, recycling it, giving it to kabadiwalas', explained Mr. Mehra. 'No one was talking about incentivising something from outside'. To address this, they established Offset Global to calculate the cost and carbon impact of recycling, thereby opening a pathway to climate-linked value generation in e-waste governance. Additionally, Ye Prayas states that it operates across several functions that extend beyond conventional Extended Producer Responsibility (EPR) compliance. At its core, the organisation offers EPR compliance services to producers, manufacturers, and importers, in line with Rule 4 of the E-Waste (Management) Rules, 2016, and its 2022 amendments. Alongside this essential compliance role, Ye Prayas also reports on a wide range of operational activities, including direct collection, coordination with accredited recyclers, management of B2B and B2C waste streams, and supplementary services such as data deletion and office decommissioning.

Ye Prayas reports collaborations with electronics and appliance manufacturers, including Samsung, LG, Acer, and Dell, to facilitate the collection and recycling of e-waste. The organisation has formed a distinct business, Ye Prayas Recycling Private Limited, which was founded in February 2026 and is presently registered as a functioning company with the RoC-Delhi. The formation of this entity serves as documentary evidence of the company's transition to a specialised recycling operation. However, its incorporation record alone does not confirm that a recycling plant is currently operating.[41]

Ye Prayas stated that it collected nearly 2,000 tonnes of electronic waste through its nationwide activities in the previous

39 Offset Global Technologies Pvt. Ltd., 'OffsetGo – Carbon Footprint Calculator and Marketplace' (OffsetGo, 2025) <https://www.offsetgo.earth/>.

40 Refurb Bazaar Sustainable Products India Private Limited, 'RefurbBazaar – Refurbished Electronics Marketplace' (2025) <https://refurbbazaar.com/>.

41 'YE PRAYAS RECYCLING PRIVATE LIMITED' (13 July 2026) <https://www.zaubacorp.com/YE-PRAYAS-RECYCLING-PRIVATE-LIMITED-U38210HR2026PTC141595>.

fiscal year, generating an estimated revenue of Rs. 60 crore. These statistics reflect the operational magnitude stated by the organisation and serve as interview-derived evidence in this research.[42]

Beyond its current e-waste expertise, Ye Prayas confirmed that it is in the advanced stages of developing a large-scale, multi-stream recycling plant intended to operate as an integrated waste management hub. The proposed facility, covering more than 10 acres, will process several material streams, including e-waste, plastics, electric-vehicle components, and metals such as copper and aluminum, providing a comprehensive single-window system for resource recovery. This planned facility is designed to aid in the comprehensive transformation from a compliance provider focused on PRO to a more unified sustainability organisation. Since the facility was not yet completed at the time of the interview, this indicates the organisation's projected future path rather than a change that had already been implemented.

Despite these activities falling outside the legal parameters of India's E-Waste (Management) Rules, 2022, they exemplify how private entities are implementing integrated circular-economy techniques by linking various waste streams within a unified value chain. This model corresponds with evolving governmental concerns regarding resource efficiency, infrastructural integration, and sustainable urban waste management.[43]

3.2 Collection and Logistics Coordination

One of the organisation's central roles is to channel e-waste collection for producers and bulk consumers, including corporate entities that use large volumes of IT equipment (e.g., servers, routers, laptops). This reflects the regulatory push to directly involve bulk consumers in waste-stream traceability, as emphasised in Rule 9 of the 2016 Rules. In practice, the company acts as a logistical intermediary, coordinating asset pickup, segregation, recycling, and post-processing documentation—a model supported in the OECD's operational taxonomy for EPR organisations.[44]

They also operate a consumer-facing disposal mechanism for those seeking to dispose of their electronic waste responsibly. Consumers can request assistance disposing of items such as laptops, CFL bulbs, batteries, and other small-scale electronic waste via a toll-free number. Upon receiving a request, the support team assesses the type and quantity of waste, and either dispatches a logistics partner for pickup or advises the user to courier the materials to the Ye Prayas warehouse. Once received, the waste is segregated and processed within 15 days. The organisation issues an appreciation certificate to each individual who helps encourage public participation and acknowledges their role in responsible recycling. This initiative illustrates how Ye Prayas integrates decentralised waste flows into its formal operations and, according to the company, is intended to encourage environmental awareness among consumers.

42 Interview with Mr Sanyog Mehra, Product Head, YE PRAYAS PRO (conducted virtually via Google Meet, 2 July 2025).

43 G20 Secretariat, India and others, 'Unlocking India's Circular Waste Economy Potential for Sustainability: Insights Across Seven Key Sectors'(2024) (G20 Secretariat, India, discussion paper) <https://www.ceew.in/sites/default/files/india-circular-economy-potentialwebceew16dec.pdf>.

44 OECD, Extended Producer Responsibility: Updated Guidance for Efficient Waste Management (OECD 2016) <https://www.oecd.org/en/publications/extended-producer-responsibility_9789264256385-en.html>.

Currently, Ye Prayas relies on third-party authorised recyclers to complete end-stage material recovery processes, including dismantling and extracting valuable metals, such as copper and gold, from printed circuit boards and other components. While recyclers are mandated to share recovery data, the lack of direct control over these processes limits Ye Prayas's ability to verify outcomes independently. Once received, Ye Prayas uploads this data to the CPCB portal to enable EPR credit generation, which producers and manufacturers can subsequently purchase. In response to this structural limitation, Ye Prayas is establishing a recycling facility that will launch in 2026. According to the interview, the new plant is intended to enable the organisation to manage more of the value chain in-house—from collection to material recovery and data reporting—which the company expects will improve operational transparency, credit traceability, and compliance reliability.

3.3 Engagement with Informal Sector and Public Users

The actions of informal recyclers directly support the waste hierarchy principles of reduction, reuse, repair, refurbishment, remanufacturing, and recycling, while indirectly promoting the values of rethinking, refusal, and recovery. The comprehensive contribution of the IRS to a Circular Economy (CE) can be encapsulated through various business models, including micro-enterprises, community-based organisations, and public-private partnerships.[45] These models aim to close, narrow, slow, intensify, or dematerialise resource loops, providing a diverse array of services, such as landfill prevention, greenhouse gas reduction, enhanced waste collection efficiency, commercialisation of recyclable materials, and public education on source waste sorting.[46] Ye Prayas adopts a non-direct approach to collaborating with collectors in the informal sector. Instead of forming direct legal or financial ties with informal collectors (kabadiwalas), the organisation collaborates with around 200–300 kabadiwalas across Indian states via alliances with licensed recyclers. The interviewee stated that kabadiwalas in urban areas such as Mumbai, Delhi, and Pune participate in upstream collection, with training and compliance assistance provided by registered recyclers and Ye Prayas. This configuration enables the integration of informal collecting efforts into the organisation's upstream sourcing while preserving formal contractual ties with authorised recyclers. Nevertheless, it fails to establish an official framework for incorporating informal participants into the EPR compliance system.

3.4 Digital Infrastructure and Traceability Tools

Ye Prayas has developed its digital compliance portal, the *'Ye Prayas Compliance Portal',* a centralised platform for tracking and documenting all EPR-related activities. The platform manages every transaction, from collection and logistics to Form 6 documentation and waste weighing. It ensures the company

45 Filippos K Zisopoulos and others, 'Informal Recyclers as Stakeholders in a Circular Economy' (2023) 415 Journal of Cleaner Production 137894.

46 Florence Barbara Awino and Sabine E Apitz, 'Solid Waste Management in the Context of the Waste Hierarchy and Circular Economy Frameworks: An International Critical Review' (2024) 20(1) Integrated Environmental Assessment and Management 9.

meets all statutory requirements while providing transparency and traceability for its clients. The system includes modules for managing producer obligations, internal logistics records, and compliance documentation required by the Central Pollution Control Board (CPCB). Although the portal is proprietary and not publicly accessible, it is used internally to track compliance status in real time and generate the data required for CPCB uploads. Ye Prayas has created CONNECT, a digital solution for EPR compliance and waste monitoring. The organisation's website characterises the platform as offering monitoring, documentation, and assistance for EPR-related compliance and CPCB obligations. The interviewee stated that CONNECT is utilised to administer EPR-related documents and to support traceability.[47] The case exemplifies how private entities can create additional digital tools to facilitate EPR execution; the platform's efficacy and broader regulatory influence were not evaluated independently in this research.

The interviewee stated that the internal platform captures data on waste pickup, transportation, weighing, Form 6 generation, and downstream recycling, allowing the organisation to monitor e-waste throughout the management chain. On Ye Prayas's account, the internal platform illustrates one way a PRO may use proprietary digital infrastructure to support operational traceability and regulatory reporting. The effectiveness of these functions was not independently evaluated in this study.

47 Ye Prayas Pvt. Ltd., 'CONNECT: EPR Obligation Fulfillment' <https://www.yeprayas.com/connect>.

3.5 Carbon-Linked EPR Performance and Certification

Ye Prayas has developed an operational model that integrates carbon accounting directly into e-waste compliance. This model is implemented in partnership with its affiliated company, Offset Global, which quantifies Scope 1, 2, and 3 greenhouse gas (GHG) emissions for each transaction in the e-waste management cycle. These emissions calculations cover all primary operational stages, including collection, transportation, dismantling, and processing of waste materials.

Based on these calculations, Ye Prayas issues Net Zero Certificates to its clients. These certificates indicate that the e-waste processed through its platform contributes to carbon-neutral operations. For example, according to internal estimates shared by the organisation, recycling one tonne of plastic generates approximately two carbon credits, currently valued at Rs 250–Rs 260 per kilogram. These credits are calculated using standard carbon conversion factors applied to the emissions data collected throughout the logistics and recycling chain.

Each participating company receives traceable, transaction-specific documentation that certifies the estimated carbon reduction or offset. These records are integrated into Ye Prayas's broader digital compliance platform, enabling data to be linked to internal reporting and external ESG disclosures.

According to the interviewee, Ye Prayas is among the first PROs in India to integrate carbon accounting and net zero certification into EPR compliance services. The Net Zero Certificates are issued alongside the standard documentation required under India's

E-Waste (Management) Rules, including Form 6 documentation, CPCB portal uploads, and proof of recycling. This dual reporting structure enables producers to fulfill compliance and voluntary sustainability reporting obligations in a single coordinated process.

All emissions-related data are managed through Ye Prayas' digital infrastructure, which captures detailed information on waste collection, processing, and recovery activities. Offset Global's carbon assessment process applies recognised emissions factors to each material stream, and the results are consolidated into an internal dashboard that tracks carbon performance by client, material, and transaction.

This carbon-accounting activity is also documented in a Carbon Footprint Report prepared by OffsetGo. The report assesses Ye Prayas's Scope 1, 2, and 3 emissions for FY 2024–25 and reports a total carbon footprint of approximately 118.986 tCO_2e, equivalent to 118,986 kgCO2e.[48]

The model has been applied across various waste types, with an initial focus on plastics and metals recovered from IT and electronic waste streams. As of the last reporting cycle, Ye Prayas has issued Net Zero Certificates to over 30 institutional clients, including multinational corporations in electronics, banking, and IT sectors.

Although the current Indian e-waste law does not mandate carbon tracking or certification,[49] Ye Prayas has voluntarily incorporated this function into its operational model to enhance the environmental performance of EPR fulfillment. The carbon credit program is an optional add-on for producers, many of whom use the certification for their ESG portfolios and sustainability reporting.

The system is supported by Offset Global's in-house methodology for emissions accounting, which includes periodic calibration against international reporting benchmarks. Ye Prayas reports that this methodology is reviewed annually to reflect carbon valuation and to document norm updates, enabling continuous improvement and adaptation to market and regulatory changes. Ye Prayas reports a bundled service model that connects waste recovery, emissions accounting, and associated documentation by combining EPR compliance functions with carbon quantification. The organisation's website indicates that its carbon footprint calculations adhere to the GHG Protocol and ISO 14064, and that its sustainability services include net-zero transaction reporting and carbon-neutral waste solutions.

4. DISCUSSION: STRATEGIC CONTRIBUTIONS AND REGULATORY IMPLICATIONS

4.1 Reimagining and Re-legitimising PROs in India's E-Waste Governance

The Ye Prayas case highlights a significant conflict within India's e-waste legal framework. Although the regulatory

48 OffsetGo, 'Carbon Footprint Report 2024-25' (OffsetGo 2025) Carbon Footprint Report <https://1e16461f-9f76-4ceb-81b7-ba753829104c.filesusr.com/ugd/dc3965_b29ebfbf79ed4639b701f84c07572aaf.pdf>.

49 Anwesha Borthakur, 'Design, Adoption and Implementation of Electronic Waste Policies in India' (2023) 30 Environmental Science and Pollution Research 8672.

system officially embraces Extended Producer Responsibility (EPR) as a governance mechanism, it fails to acknowledge or institutionalise the evolving roles of intermediaries that facilitate its implementation. According to the E-Waste (Management) Rules, 2016, Producer Responsibility Organisations (PROs) were established as organised compliance entities to facilitate collection, channelisation, and reporting. The E-Waste (Management) Rules, 2022, fail to provide any statutory acknowledgment of Producer Responsibility Organisations (PROs), thus excluding them from the formal regulatory framework. This legal oversight has considerable ramifications. It not only compromises institutional coherence but also hinders the development of innovation-driven compliance approaches. Ye Prayas illustrates that PROs are increasingly taking on roles beyond their legal obligations, encompassing digital traceability, emissions accounting, and stakeholder integration. The lack of legal recognition of these expanded duties reflects a broader regulatory constraint: the persistence of a limited, weight-centric compliance framework that fails to address the systemic and climate-related aspects of e-waste control.

The E-Waste (Management) Rules, 2022, do not expressly recognise Producer Responsibility Organisations (PROs) as a distinct institutional category within the regulatory framework. This creates a gap between the functions certain PROs perform in practice and their official legal status. In the Ye Prayas case, the organisation reports activities that go beyond traditional EPR coordination, encompassing digital documentation, public awareness initiatives, carbon accounting, Net Zero certification, and ESG-related support for producers. These activities illustrate how a PRO may perform functions that are not explicitly outlined in the 2022 Rules, while simultaneously prompting enquiries into the appropriate legal classification, oversight, and responsibility for such activities.

Ye Prayas' long-term vision further confirms its departure from the traditional compliance intermediary role. The organisation is establishing its recycling facility with a projected annual capacity of 50,000 metric tons. This facility, designed to handle electronic waste, tires, plastics, and metals, marks a decisive step toward vertical integration. The plant will allow Ye Prayas to internalise the entire e-waste value chain—from pickup and segregation to material recovery and emissions accounting.

As noted by Mr. Sanyog Mehra, 'We do not restrict ourselves to PRO only'. This statement reflects a deliberate strategy to reposition Ye Prayas as a full-spectrum sustainability enterprise. The organisation is filling governance vacuums left by India's fragmented regulatory approach by expanding into digital compliance platforms, carbon valuation methodologies, and training services. In doing so, its practices suggest a broader possibility for what a PRO role could become—not simply a service contractor for producers, but potentially an active participant in shaping waste governance. This possibility is consistent with the emerging scholarship that conceptualises EPR as involving broader forms of institutional coordination and shared responsibility.[50] The extent to which PROs

50 Jakob T Pruess, 'Unraveling the Complexity of Extended Producer Responsibility Policy Mix Design, Implementation, and Transfer Dynamics in the European Union' (2023) 27(6) Journal of Industrial Ecology 1500; Pravin Kumar Mallick and others, 'Designing and Operationalising Extended Producer Responsibility under the EU Green Deal' (2024) 16 Environmental Challenges 100977.

can assume such a role depends on the regulatory authority granted to them.[51]

4.1.1. Legal Marginalisation of PROs Under the 2022 Rules

The E-Waste (Management) Rules, 2022, signify a notable regulatory shift that diminishes the legal standing and institutional role of Producer Responsibility Organisations (PROs) within India's e-waste governance framework.[52] In contrast to the 2016 Rules and the 2018 CPCB Guidelines, which explicitly identified and acknowledged PROs as organised compliance intermediaries, the 2022 Rules make no statutory mention of them. This exclusion is not solely terminological but also structural: PROs are essentially eliminated from the formal regulatory framework and reclassified as optional private service providers, subject to producers' discretion. Table 1 traces the evolving legal standing of Producer Responsibility Organisations (PROs) across the stages of India's e-waste regulatory system, highlighting the transition from institutional acknowledgment to regulatory marginalisation.

Consequently, PROs are exempt from direct accreditation, oversight, or integration within the compliance framework regulated by the Central Pollution Control Board (CPCB). This legislative withdrawal transfers full responsibility for Extended Producer Responsibility (EPR) to producers, while abolishing institutional frameworks that previously ensured standardisation, traceability, and accountability through PRO-led systems.

Table 1: Evolution of PRO Recognition

Regulation	Position of PROs
2011 Rules	No recognition
2016 Rules	Defined and recognised
2018 Guidelines	Detailed registration framework
2022 Rules	Definition removed

The outcome is a disjointed governance framework that emphasises transactional compliance rather than integrated system management.

Empirical research substantiates this structural transformation. Observations indicate that numerous registered PROs have either discontinued their operations or shifted to recycling-focused jobs following the regulatory change. This contraction signals a broader phenomenon of disintermediation, in which the regulatory framework indirectly undermines the functions of organised intermediaries. Ye Prayas also indicates a rise in manufacturers entering into direct

51 Helen Micheaux and Franck Aggeri, 'Eco-Modulation as a Driver for Eco-Design: A Dynamic View of the French Collective EPR Scheme' (2021) 289 Journal of Cleaner Production 125714.

52 Shri Dhirendra Newar and Prof (Dr) Stuti Deka, 'From Toxic Trash to Green Governance: Legal and Policy Dimensions of E-Waste Regulation in India' (2025) 11(5s) International Journal of Environmental Sciences 418.

agreements with recyclers, mostly driven by cost factors, thereby diminishing the integrated compliance services often provided by PROs. Ye Prayas affirmed this by saying, 'The role of PRO is minimal... it is at the company's discretion to seek our assistance'.

This discretionary engagement paradigm presents numerous risks. It diminishes institutional coherence, promotes price-centric competition to the detriment of environmental integrity, and undermines accountability mechanisms within the EPR framework. Legally, the lack of a required function for PROs poses a risk of 'regulatory erosion', in which governance mechanisms become ineffective due to insufficient specificity and policy retractions. PROs are susceptible to capricious termination, lack contractual safeguards, and operate without established grievance-resolution processes.[53]

The ramifications surpass mere institutional instability. The lack of legal recognition also hinders innovation. Organisations like Ye Prayas, which invest in digital traceability systems, emissions accounting, and public awareness programs, lack governmental incentives or protections for these enhanced functions. Consequently, PROs encounter a structural disparity: they are tasked with ensuring compliance while shouldering the risks of market marginalisation and regulatory uncertainty.

Rectifying this deficiency necessitates the formal re-legitimation of Producer Responsibility Organisations within India's Extended Producer Responsibility framework. This should encompass the reinstatement of their official function for high-volume producers, the introduction of performance-based accreditation processes that recognise innovation and climate alignment, and the establishment of institutional dispute-resolution systems. These reforms are crucial not only for reinstating institutional equilibrium but also for advancing India's e-waste governance from disjointed compliance to a more cohesive, efficient circular-economy framework.[54]

4.1.2. From Service Providers to Systemic Innovators

The evolution of PROs from service providers to systemic innovators represents a critical, yet under-recognised, transformation within India's e-waste governance landscape. While traditional PRO models focused on fulfilling producer obligations through collection and recycling targets, emerging practices indicate a shift toward innovation-driven governance. Entities such as Ye Prayas exemplify this transition by embedding technological and climate-oriented interventions within their operational frameworks. These include the development of digital traceability platforms, the integration of informal-sector actors through authorised recycler networks, and the introduction of market-based instruments such as carbon-credit-linked certifications. Such practices illustrate one way PROs could reposition themselves as institutional co-designers rather than mere intermediaries, on the evidence of this single case. They help build verifiable, data-driven ecosystems that align waste management with broader climate and circular-economy objectives. In doing so, PROs generate public value

53 Lalita Som and Faisal Naru, 'Regulatory Policy in India: Moving towards Regulatory Governance' (2017) OECD Regulatory Policy Working Papers No. 8 <https://doi.org/10.1787/b335b35d-en>.

54 Gaur and others (n 25) 54462.

that extends beyond compliance, including emissions reduction, resource efficiency, and enhanced regulatory visibility. This transition remains largely unsupported within the current legal framework, which neither incentivises innovation nor formally recognises these expanded functions. The absence of enabling provisions risks stifling progressive models and perpetuating a minimalistic compliance regime. Recognising PROs as systemic innovators would therefore require a normative shift in regulatory design—one that embeds flexibility, rewards innovation, and aligns EPR implementation with climate governance imperatives.

4.2 Addressing Legal Blind Spots: The Carbon Governance Gap

The current structure of India's e-waste framework reflects a narrowly compliance-driven approach, emphasising collection targets and channelisation protocols while overlooking climate integration and digital governance tools.[55] Ye Prayas's experience exposes this disconnect: despite developing proprietary platforms, implementing carbon tracking for scopes 1–3, and delivering standardised school modules, these contributions remain legally unrecognised. There are no statutory provisions to certify or incentivise such enhanced compliance models.

This regulatory inertia discourages private investment in transformative governance practices. Legal scholars argue that 'reflexive law' approaches—such as those adopted in the European Union's Circular Economy Action Plan—enable dynamic sectors, such as e-waste, to evolve through experimental governance.[56] India's EPR system would benefit from similar frameworks that allow for differentiated obligations, innovation-based recognition, and formal integration of high-performing PROs into the legal architecture.[57]

This regulatory blind spot underscores the importance of decentralised actors like Ye Prayas, whose operational model exemplifies how climate accountability can be integrated into e-waste governance. In Section 4.6, the carbon-integrated compliance model developed by Ye Prayas is examined in detail as a regulatory response to this gap. The Ye Prayas case study reveals several areas in which operational practice has evolved beyond the current legal and regulatory framework. Table 2 summarises the principal governance gaps identified through the case study.

4.3 Institutionalising Traceability: The Digital Compliance Imperative

Despite Ye Prayas's investment in a proprietary, real-time compliance portal that facilitates granular documentation of e-waste flows, the E-Waste (Management) Rules, 2022 offer no legal mandate for standardised traceability. There are no

55 Borthakur (n 49) 8672.

56 Neil Gunningham, 'Environment Law, Regulation and Governance: Shifting Architectures' (2009) 21(2) Journal of Environmental Law 179.

57 Kieran Campbell-Johnston and others, 'Future Perspectives on the Role of Extended Producer Responsibility within a Circular Economy: A Delphi Study Using the Case of the Netherlands' (2021) 30(8) Business Strategy and the Environment 4054.

Table 2: Governance Gaps between India's framework and Ye Prayas practices

Area	Current Law	Ye Prayas Practice	Gap
Carbon Accounting	Not required	Implemented	Legal gap
Digital Traceability	Limited	Full portal	Regulatory gap
Informal Sector Integration	Weak	Partial inclusion	Institutional gap
ESG Reporting	Indirect	Active support	Policy gap

statutory requirements compelling PROs, recyclers, or producers to segregate data streams, document contributions from informal actors, or ensure interoperability of systems with the Central Pollution Control Board (CPCB) portal. This omission results in regulatory blind spots—obscuring the performance of the national EPR system, underreporting the role of decentralised actors, and weakening enforcement capabilities. Without digital harmonisation across institutional actors, India's e-waste governance framework lacks the traceability backbone for a circular economy informed by climate accountability.

Simultaneously, Ye Prayas's climate-linked initiatives are hindered by the outdated technological landscape of India's recycling sector. Many authorised recyclers rely on inefficient recovery methods and legacy systems that are incompatible with carbon-tracking protocols or ESG-linked certification processes. The absence of targeted incentives—such as grants for digital upgrades, R&D subsidies, or innovation-linked compliance credits—further entrenches these limitations. As a result, even high-performing PROs struggle to scale their models across a fragmented backend infrastructure. Bridging this digital and technological divide will require statutory reforms that mandate traceability standards, facilitate interoperability across systems, and provide financial support for modernising India's recycling ecosystem.

4.4 Integrating Informal Actors into the Regulated System

Despite the critical role of informal collectors (kabadiwalas) in India's e-waste ecosystem, the E-Waste (Management) Rules, 2022, remain silent on pathways to formalise their contributions. No certification, capacity-building, or institutional engagement provisions exist that would allow these actors to participate within a recognised Extended Producer Responsibility (EPR) framework. Ye Prayas has responded to this regulatory vacuum by indirectly coordinating with 200–300 kabadiwalas through authorised recyclers, offering them informal training and operational guidance. While this workaround facilitates upstream collection, it perpetuates a fragmented compliance chain that lacks statutory oversight, accountability, and social protections for informal workers. In contrast, international models such as Brazil's waste picker cooperatives and Colombia's formal

inclusion schemes offer blueprints for legally sanctioned integration.[58] To build an equitable and climate-responsive e-waste governance system, India's EPR regime must adopt hybrid legal models that formally recognise, regulate, and incentivise participation by the informal sector.[59]

4.5 Carbon-Integrated Compliance as a Legal Innovation

This section examines Ye Prayas's carbon-credit-linked compliance model as an illustration of how e-waste compliance and climate accountability might be connected in practice. On the account given in the interview, this model goes beyond what is required by India's current e-waste regulations, which do not address the carbon implications of e-waste operations.[60]

The E-Waste (Management) Rules of 2016 and 2022 primarily emphasise collection targets and environmentally sound disposal but remain silent on the carbon implications of e-waste operations. Ye Prayas, through its affiliated company Offset Global, has developed a mechanism - described to the researchers as covering Scope 1, 2, and 3 emissions for each waste management transaction. This system enables producers to issue Net Zero Certificates, aligning Extended Producer Responsibility (EPR) obligations with broader Environmental, Social, and Governance (ESG) goals.

This practice could be understood as supporting a broader interpretation of 'environmentally sound management' as defined in Rule 3(k) of the 2022 Rules, mandating measures to avert environmental damage. Although this section does not mention climate consequences, Ye Prayas's emissions tracking and certification might be interpreted as a deliberate extension of the regulation, linking compliance with ecological integrity. This interpretive shift reflects legal developments in the European Union, where the Green Deal incorporates circular-economy principles alongside carbon-reduction efforts.[61]

This case highlights how private actors can prefigure future regulatory trajectories in carbon-informed waste governance. Ye Prayas's operations offer a potential model for integrating carbon accountability into EPR regimes. This single-case study is not equipped to address whether models of this nature could make a substantial contribution to India's Nationally Determined Contributions (NDCs) under the Paris Agreement. However, it

58 Nathalia Silva De Souza Lima and Sandro Donnini Mancini, 'Integration of Informal Recycling Sector in Brazil and the Case of Sorocaba City' (2017) 35(7) Waste Management & Research: The Journal for a Sustainable Circular Economy 721; Jutta Gutberlet, 'Grassroots Waste Picker Organizations Addressing the UN Sustainable Development Goals' (2021) 138 World Development 105195.

59 Diyasha Sengupta and others, 'Circular Economy and Household E-Waste Management in India: Integration of Formal and Informal Sectors' (2022) 184 Minerals Engineering 107661.

60 'Advancing Circular Economy of Waste Electronic and Electrical Equipment (E-Waste) and Lithium-Ion Batteries in India' (NITI Aayog).

61 Patrick Schroeder, Kartika Anggraeni and Uwe Weber, 'The Relevance of Circular Economy Practices to the Sustainable Development Goals' (2019) 23(1) Journal of Industrial Ecology 77.

represents a plausible direction for future, quantitatively grounded research.[62]

India's steep emissions trajectory underscores the urgency of such innovations. Between 1990 and 2023, India's carbon dioxide (CO_2) emissions increased more than fivefold, constituting over 71.5 percent of total national greenhouse gas (GHG) emissions in 2023.[63] Although per capita emissions remain relatively low at 2.9 tCO_2eq, India recorded the highest relative increase among major economies that year. These figures make it imperative to embed carbon-sensitive approaches across all sectors, including waste.

The Ye Prayas case illustrates how EPR-related activities may be extended to include carbon accounting functions. The organisation functions as a decentralised climate actor by integrating carbon accounting, facilitating Net Zero certification, and advising producers on ESG disclosures. This redefinition of a PRO's role provides a potential model for harmonising India's e-waste law with its 2070 net-zero vision.

Cross-sectoral governance is vital to institutionalising such innovations. Currently, the Ministry of Environment, Forest and Climate Change (MoEFCC), the Central Pollution Control Board (CPCB), and the Bureau of Energy Efficiency (BEE) operate in silos. A coordinated regulatory architecture could unlock carbon-informed EPR credits, national registries of Net Zero-compliant waste systems, and performance metrics calibrated to climate benchmarks.[64]

Ye Prayas provides a tangible instance of these synergies in operation. The entire methodology—encompassing emissions monitoring, digital traceability, and participatory compliance—illustrates the capacity to transform Extended Producer Responsibility into a climate policy tool. Integrating carbon traceability and producer reporting exemplifies an ESG-compliant method that incorporates environmental, social, and governance factors into decentralised waste management systems.

Expanding and validating these models throughout India's e-waste sector could produce significant co-benefits for circularity and climate goals. As India progresses toward its 2070 net-zero objective, integrating dual environmental and climate principles into its waste legislation is both advantageous and imperative. Figure 4 depicts a conceptual transformation framework illustrating the progression of Producer Responsibility Organisations (PROs) from compliance-focused intermediaries to hybrid climate-governance entities, with Ye Prayas as an example of this trajectory.

62 Saumya Kumar and others, 'E-Waste Management in India: A Strategy for the Attainment of SDGs 2030' (2022) 60(2) Materials Today: Proceedings 811.

63 European Commission, Joint Research Centre and IEA., GHG Emissions of All World Countries (Publications Office of the European Union 2024) <https://data.europa.eu/doi/10.2760/4002897>.

64 Zun Yu and others, 'Catalyzing Co-Benefits: How Cross-Regional Coordination Accelerates Pollution and Carbon Reduction in China's Yangtze River Economic Belt' (2025) 13 Frontiers in Environmental Science 1601165.

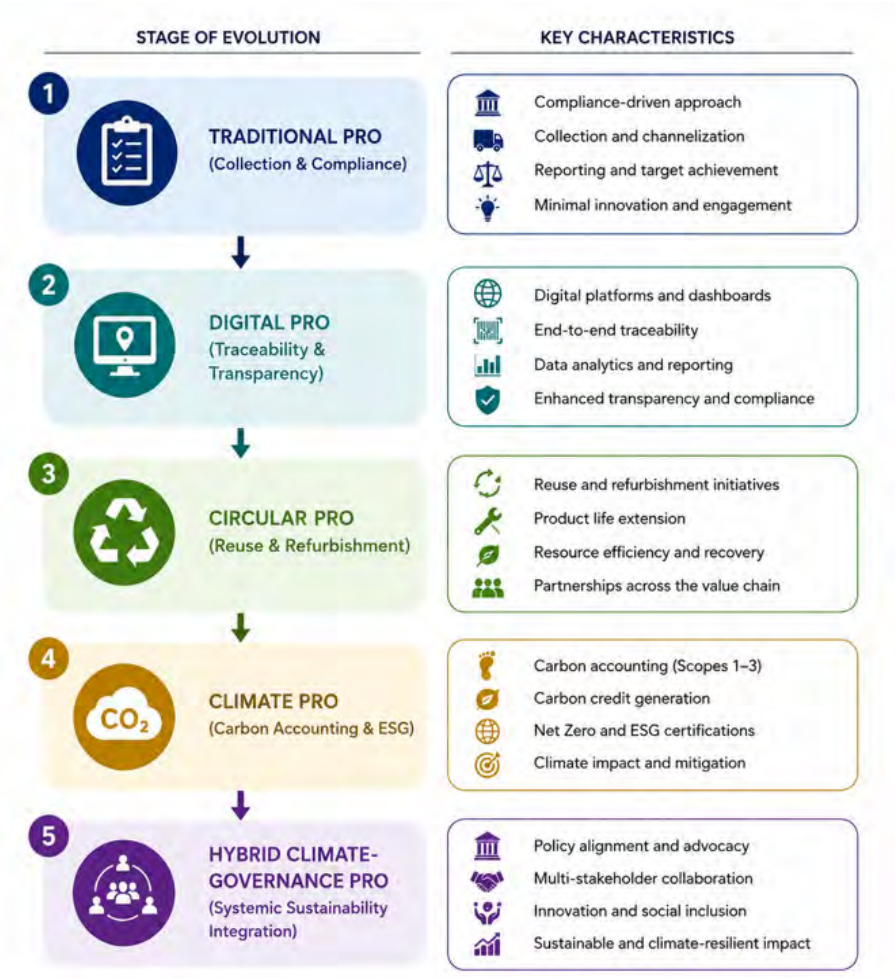

Figure 4: A Conceptual Model of PRO Evolution. Illustrated by Ye Prayas Case: From Compliance Intermediaries to Hybrid Climate- Governance Actors

4.6 Strategic Policy and Legal Recommendations

Based on the operational findings of the 'Ye Prayas' case study and the diagnostic results of the E-Waste Circularity Assessment Framework (ECAF), several systemic legal and policy reforms are necessary to transition India's Extended Producer Responsibility (EPR) regime from a weight-based compliance model to a climate-aligned circular economy.

4.6.1 Strengthening the Role of PROs

1 Carbon Recognition and Regulatory Integration: The current Indian regulatory framework, notably the E-Waste (Management) Rules of 2022, focuses primarily on end-of-life material volumes while remaining silent on the climate implications of resource recovery. To align waste regulation with India's 2070 Net Zero commitments, the Rules must be amended to explicitly recognise recycling

and refurbishment as greenhouse gas (GHG) mitigation activities. This legal recognition would facilitate the integration of carbon accounting and credit generation into the statutory EPR framework, enabling organisations to monetise emissions savings as a co-benefit of compliance.[65] To bridge the gap between waste management and climate action, producers should be mandated to disclose the carbon footprint of their end-of-life operations, including collection, reverse logistics, and final processing.[66] Institutionalising these requirements within India's Business Responsibility and Sustainability Reporting (BRSR) framework would ensure that climate accountability is a core component of EPR compliance rather than a voluntary innovation.[67]

2 Statutory Re-legitimation of PROs: The 2022 Rules amendments signaled a 'regulatory retreat' by removing the statutory definition of Producer Responsibility Organisations (PROs) and making their engagement optional. This shift has triggered institutional instability, leading producers to prioritise low-cost, direct recycler agreements over the comprehensive compliance and innovation services offered by professional PROs. Statutory re-legitimation is required to reinstate the mandatory role of PROs for high-volume and complex product categories, accompanied by a performance-based accreditation system that evaluates actors on innovation, digital traceability, and climate alignment.[68]

3 Standardised Digital Traceability Protocols: While private actors like Ye Prayas have developed proprietary real-time compliance portals, the lack of standardised protocols creates regulatory blind spots and data gaps. India must establish a uniform, centralised digital platform that mandates interoperability between private PRO portals and the national CPCB registry. Establishing mandatory traceability standards would mitigate the risks of 'paper compliance' and fraudulent certificate trading, ensuring the environmental integrity of the material loop.[69]

4 Rights-Based Informal Sector Inclusion: Despite managing over 90 percent of India's e-waste, informal collectors (kabadiwalas) remain legally invisible under the 2022 Rules. A formal, statutory mechanism must be introduced to certify and integrate these actors into the regulated EPR ecosystem. This transition requires hybrid legal models that recognise informal collection as a valid compliance contribution while providing workers with occupational health protections and guaranteed buy-back rates through PRO-led networks.[70]

65 Sarita Kumari Sandwal, Rakshit Jakhar and Katarzyna Styszko, 'E-Waste Challenges in India: Environmental and Human Health Impacts' (2025) 18(8) Applied Sciences 4350.

66 Alessio Baratta and others, 'The Impact of ESG Practices in Industry with a Focus on Carbon Emissions: Insights and Future Perspectives' (2023) 15(8) Sustainability 6685.

67 Bening Mayanti and Petri Helo, 'Circular Economy through Waste Reverse Logistics under Extended Producer Responsibility in Finland' (2024) 42 Waste Management & Research: The Journal for a Sustainable Circular Economy 59.

68 Gaur and others (n 25) 55463.

69 Vanessa Heinrich, Hritik Bansal and Magnus Fröhling, 'Electronic Waste Management in Northern India: A Regional Case Study of Chandigarh' (2025) 27 Journal of Material Cycles and Waste Management 1944.

70 Diyasha Sengupta and others, 'Circular Economy and Household E-Waste Management in India. Part II: A Case Study on Informal e-Waste Collectors (Kabadiwalas) in India' (2023) 200 Minerals Engineering 108154.

Such inclusion is essential for achieving a socially just and comprehensive circular economy transition in the Global South.

5. CONCLUSION

This study analyses the evolving role of Producer Responsibility Organisations (PROs) within India's e-waste governance system through a comprehensive case study of Ye Prayas. The findings indicate that although India's Extended Producer Responsibility (EPR) framework has increasingly enhanced compliance mechanisms, it predominantly focuses on collection targets and recycling mandates, with insufficient emphasis on climate governance, digital traceability, and institutional innovation.

The Ye Prayas case suggests that PROs can take on roles that extend beyond conventional compliance facilitation. The company reports having built a strategy that links e-waste management to wider circular economy and climate goals by integrating carbon accounting, Net Zero certification, digital monitoring technologies, and indirect engagement with informal-sector participants. These projects demonstrate PROs' capacity to function as hybrid governance entities that integrate regulatory mandates, market incentives, and sustainability objectives. Nevertheless, the investigation reveals considerable regulatory deficiencies. The elimination of formal acknowledgment of PROs under the E-Waste (Management) Rules, 2022; the absence of carbon-compliance measures; the lack of standardised digital traceability mandates; and the ongoing marginalisation of informal participants collectively hinder the transformative capacity of India's EPR framework. The existing regime risks becoming a compliance-oriented system focused on waste volumes rather than a governance framework that promotes resource circularity, climate mitigation, and environmental justice.

The paper contends that the future efficacy of India's e-waste governance hinges on a transition from limited compliance management to comprehensive environmental governance. Legal reforms must officially acknowledge the function of PROs, integrate carbon accountability into EPR responsibilities, develop interoperable digital traceability systems, and facilitate the involvement of informal-sector actors. These improvements would enhance regulatory efficacy while connecting India's e-waste framework with its circular economy objectives and long-term climate obligations.

The findings offer broader insights for Global South regions facing similar issues of institutional capacity, informality, and regulatory fragmentation. The Ye Prayas case illustrates that such practices may emerge beyond the functions expressly specified in the current EPR framework. This raises a policy question as to whether, and under what conditions, Indian regulators should formally recognise, regulate, or support such additional functions.

Declarations

Ethics approval and Ethical Consideration: This study was conducted in accordance with the requirements and guidelines of the Ethical Research Committee of Central University of Punjab (CUP). The interview participant provided informed consent to participate in the study and to the use of the information provided for academic research purposes.

Conflict of interest: The authors declare no financial or commercial relationships with Ye Prayas. Ye Prayas had no role in the analysis or interpretation of the findings, the preparation of the manuscript, or the decision to submit the manuscript for publication.

Appendix A. EPR-CE PRO Interview Framework for Producer Responsibility Organisation (PRO)

Code	Item	Reference
A1	Name of the PRO	Custom EPR-CE Interview Form
A2	Name & Designation of Interviewee	Custom EPR-CE Interview Form
A3	Date of Interview	Custom EPR-CE Interview Form
A4	Head Office Location (City & State)	Custom EPR-CE Interview Form
A5	Operational States/UTs Covered	Custom EPR-CE Interview Form
A6	Year of Establishment	Custom EPR-CE Interview Form
A7	Year EPR Operations Began	Custom EPR-CE Interview Form
A8	CPCB Registration Number (if available)	CPCB Guidelines (2021)
A9	Approximate Number of Employees	Custom EPR-CE Interview Form
A10	Type of Services Offered (Collection, Recycling, Logistics, etc.)	CPCB Guidelines (2021)
B1	Is your organisation registered under CPCB's EPR system? What specific services do you offer?	E-Waste (Management) Rules, 2016; CPCB Guidelines

B2	What steps do you take to comply with CPCB/SPCB reporting and documentation requirements?	CPCB Guidelines (2021); E-Waste (Management) Rules, 2016
B3	What strategies or models do you use for e-waste collection and reverse logistics?	Awasthi et al. (2019); Roy & Han (2018)
B4	How do you coordinate collection from households, bulk consumers, and institutions?	Gupta et al. (2021); CPCB Guidelines (2021)
B5	How is recycling managed — in-house or via partnerships?	Manomaivibool (2009); CPCB Guidelines (2021)
B6	How do you collaborate with producers to fulfill their EPR obligations?	E-Waste (Management) Rules, 2016; CPCB Guidelines (2021)
B7	What kind of agreements or contracts exist with producers?	Practitioner interviews
B8	Do you coordinate with recyclers and CPCB/SPCBs? If so, how?	E-Waste (Management) Rules, 2016
B9	What are the most significant institutional or operational challenges you face?	Practitioner interviews
B10	Have you experienced regulatory overlaps or enforcement issues?	Practitioner interviews
B11	How have the 2018 E-Waste Rules amendments impacted your work?	E-Waste (Management) Rules, 2018 Amendment
B12	What improvements would you suggest to the EPR framework?	Practitioner interviews

C1	How much e-waste has your organisation collected or recycled in the past year?	CPCB Annual Reports; Practitioner interviews
C2	Do you track recovery rates for key materials (e.g., metals, plastics)?	Kirchherr et al. (2017); Stahel (2019)
C3	Have you adopted any traceability tools, automation, or digital innovations?	Awasthi et al. (2019); Kalana (2010)
C4	Are you piloting or planning any innovations to improve efficiency or recovery?	Practitioner interviews
C5	What types of awareness campaigns have you conducted recently?	Gupta et al. (2021); Ajzen (1991)
C6	How do you evaluate public response or awareness outcomes?	Gupta et al. (2021); Practitioner interviews
C7	Do you work with informal collectors or dismantlers? If yes, how?	Manomaivibool (2009); Roy & Han (2018)
C8	Have you supported formalisation or training programs for informal actors?	Manomaivibool (2009); ILO (2015)
C9	Do you coordinate with informal collectors or informal recyclers? If yes, how?	Roy & Han (2018); CPCB Guidelines (2021)

LEAD Journal is a peer-reviewed journal which publishes - on lead-journal.org - articles, case notes and documents of interest to professionals, practitioners, researchers, students and policy-makers in the field of international and regional environmental law and domestic environmental laws of developing countries. It emphasises a comparative approach to the study of environmental law and is the only journal in the field to carry a North-South focus. It is unique in providing perspectives from both developed and developing countries. Bearing in mind the principles of "sustainable development", LEAD Journal also solicits writings which incorporate related concerns, such as human rights and trade, in the study of environmental management, thus adopting a contextual approach to the examination of environmental issues. LEAD Journal encourages scholarship which combine theoretical and practical approaches to the study of environmental law and practice.



SOAS IELRC
LEAD Journal: Law, Environment and Development Centre, SOAS University of London