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Research Paper

E-Waste Management in Office Environments: A Systematic Review of Strategies and Challenges

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Abstract

The rapid growth of electronic devices in organizational workplaces has created critical environmental challenges driven by increasing e-waste accumulation. Although office environments contribute substantially to global e-waste generation, existing research remains fragmented, with limited comprehensive synthesis of management strategies, enabling technologies, and implementation barriers. This systematic literature review (SLR) examines e-waste management in office settings, synthesizing evidence across organizational, technological, and policy dimensions. Following PRISMA 2020 guidelines, we searched the Scopus database (October 2025) and retrieved 883 documents. After multi-stage screening based on predefined inclusion and exclusion criteria, 80 peer-reviewed articles published between 2020 and 2025 were selected for full-text analysis. Findings reveal that office e-waste is dominated by computing equipment (45–60%), with 30–50% of decommissioned devices stored rather than recycled, primarily due to data security concerns. Effective management strategies encompass Extended Producer Responsibility (EPR) policies, circular economy frameworks, and emerging technologies such as IoT monitoring, blockchain traceability, and AI-assisted sorting. Adoption, however, remains constrained by infrastructure limitations, organizational inertia, stakeholder awareness gaps, and inadequate regulatory enforcement, particularly in developing economies. This review provides the first comprehensive SLR specifically targeting office e-waste management, offering integrated recommendations for organizations, policymakers, and technology providers aligned with ESG and SDG frameworks.

Keywords: *Electronic Waste, E-Waste Management, Office Environment, Organizational Sustainability.*

INTRODUCTION

Global electronic waste (e-waste) generation reached 53.6 million metric tons in 2019 and is projected to exceed 74 million metric tons by 2030. A growth rate surpassing that of all other municipal solid waste streams (Forti et al., 2020). Office environments are a critical and underexamined contributor to this trajectory. Through systematic technology refresh cycles of three to five years, driven by warranty expiration, software compatibility, and productivity demands, organizations continuously generate streams of obsolete yet functionally operational equipment (Kumar et al., 2017). The dual nature of e-waste as both a hazardous material (containing lead, mercury, cadmium, and brominated flame retardants) and a recoverable resource (containing gold, silver, palladium, and rare earth elements) necessitates management approaches that fundamentally differ from conventional waste systems (Robinson, 2009; Awasthi et al., 2016).

Despite this urgency, the academic literature has concentrated predominantly on consumer disposal behaviors, informal recycling sectors in developing economies, and technical material recovery processes. Comparatively little systematic attention has been directed toward formal management systems in organizational office environments, where unique structural features likes centralized procurement, dedicated IT departments, established vendor relationships, and

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institutional compliance mechanisms create both distinctive challenges and promising intervention opportunities (Baldé et al., 2017; Wang et al., 2013). Moreover, the interdisciplinary character of the topic, spanning environmental science, information systems, organizational behavior, and public policy, has further fragmented the knowledge base (Lepawsky & McNabb, 2010).

Three critical research gaps persist. First, empirical data characterizing e-waste generation volumes, compositional profiles, and temporal patterns within formal office environments across diverse organizational sizes and sectors remain limited (Awasthi & Li, 2017). Second, although emerging technologies such as IoT monitoring, blockchain traceability, and AI-assisted sorting have been proposed, systematic evidence on their practical effectiveness, cost-benefit profiles, and determinants of adoption remains sparse (Gupta et al., 2019). Third, while Extended Producer Responsibility (EPR) schemes have proliferated globally, comparative evaluation of alternative design features, enforcement mechanisms, and contextual moderators remains insufficient (Atasu & Van Wassenhove, 2012). These gaps have intensified in salience following the COVID-19 pandemic, which simultaneously accelerated digital transformation and disrupted established recycling operations (Balde et al., 2021), while tightening regulatory environments and growing ESG investor scrutiny have elevated the strategic importance of corporate e-waste governance (Bressanelli et al., 2020).

This systematic literature review (SLR) addresses these gaps by comprehensively synthesizing evidence on e-waste management in organizational office settings. Three interrelated research questions guide the review: (RQ1) What are the key characteristics and distinctive features of e-waste generated in office environments? (RQ2) What strategies, technologies, and policy frameworks have been implemented, and what evidence exists regarding their effectiveness? (RQ3) What are the documented outcomes, persistent barriers, and enabling factors across diverse organizational contexts? By addressing these questions through PRISMA 2020–compliant methodology, this study contributes theoretical synthesis across disciplinary perspectives, empirical mapping of the research landscape, and actionable guidance for organizational leaders, policymakers, and technology providers.

LITERATURE REVIEW

This review takes the circular economy (CE) paradigm as its primary theoretical benchmark, with institutional theory, the resource-based view (RBV), the Technology Acceptance Model (TAM), and behavioral-economic perspectives positioned as supporting lenses that each illuminate a distinct mechanism in office e-waste management. CE is treated as the central anchor because it most directly addresses the substantive question of how organizations transition from linear take–make–dispose practices to closed-loop systems that prioritize resource efficiency, product longevity, design for disassembly, and material recovery (Ellen MacArthur Foundation, 2013; Hagelüken, 2006). Within this CE benchmark, electronic waste is reframed as an "urban mine" of recoverable precious metals, rare earth elements, and recyclable plastics, recasting management as a value-recovery rather than a disposal problem and shaping major policy instruments such as the EU WEEE Directive and national Extended Producer Responsibility (EPR) schemes. The supporting lenses each clarify a distinct facet of CE operationalization in office contexts: institutional theory explains why organizations vary in adoption under coercive, mimetic, and normative pressures (DiMaggio & Powell, 1983); the RBV explains when environmental capabilities translate into competitive advantage through cost savings, reputation, risk reduction, and talent attraction (Hart, 1995); TAM explains how perceived usefulness and perceived ease of use shape adoption of digital tools such as IoT-enabled bins, blockchain platforms, and AI-assisted sorting (Davis, 1989); and behavioral economics explains how choice architecture, signage, and social-norm feedback shape employee disposal behavior at the point of action (Thaler & Sunstein,

2008). Treating CE as the benchmark and the others as complementary lenses provides a coherent conceptual anchor for synthesizing what would otherwise read as a list of competing frameworks.

Generation, Composition, and the Storage Paradox

The first review theme concerns the characteristics and generation patterns of office e-waste streams. Recent empirical studies converge on a consistent compositional profile in which computing equipment dominates organizational e-waste at 45–60% of volume, followed by mobile devices, printers and multifunction units, and networking equipment (Kiran et al., 2023; Barman & Deb, 2023). Two areas of agreement run across the recent literature: the dominance of computing equipment, and the existence of a persistent storage paradox. Sakhre et al. (2024)report that 30–50% of decommissioned devices remain in organizational storage rather than entering recycling pathways, a finding consistent with broader observations of corporate hoarding behavior (Victor et al., 2024) and with earlier accounts of underutilized recovery potential (Ylä-Mella et al., 2015). Where studies disagree is in the attribution of cause: Victor et al. (2024) emphasize data security concerns, whereas Sakhre et al. (2024) emphasize unclear disposal channels and absent formal policies; these explanations are not mutually exclusive but remain unresolved as competing accounts. Compared with earlier global e-waste accounts that aggregated office and household streams (Forti et al., 2020; Baldé et al., 2017; Robinson, 2009; Awasthi et al., 2016; Kumar et al., 2017), the more recent organization-focused work (Kiran et al., 2023; Barman & Deb, 2023) shows that office e-waste differs from residential streams in concentration, compositional homogeneity, and data-security requirements. An unresolved issue cutting across these studies is whether existing EPR designs, which are calibrated primarily to residential streams, transfer effectively to office contexts (Atasu & Van Wassenhove, 2012; Lepawsky & McNabb, 2010) a gap that motivates the present review's explicit focus on the office setting.

Management Strategies, Enabling Technologies, and Policy Frameworks

The second review theme concerns management strategies, enabling technologies, and policy frameworks. Across the recent literature, studies broadly agree that effective programs integrate environmental criteria across the entire technology lifecycle from procurement to disposal, anchored by formal written policies, certified-recycler partnerships, environmental procurement criteria, and systematic employee education (Abd-Mutalib et al., 2025; Cao et al., 2024; Anuardo et al., 2023; Oliveira Neto et al., 2023). Inconsistencies emerge most clearly in evaluations of EPR effectiveness: Alemany et al. (2025) report largely positive outcomes in jurisdictions with strong enforcement and ambitious collection targets, whereas comparative analyses by Nosova et al. (2024) and earlier work by Atasu and Van Wassenhove (2012) and Lepawsky and McNabb (2010) show that programs with weak monitoring and limited financial penalties yield only marginal behavioral change. This pattern indicates that EPR effectiveness is contingent on enforcement design rather than on policy adoption alone, an unresolved issue with direct implications for policy reform. On the technology side, the literature agrees on the in-principle value of IoT-enabled monitoring, blockchain traceability, and AI-assisted sorting (Hsieh, 2024; Ambre & Trivedi, 2024; Sinha et al., 2024; Gupta et al., 2019; Michael et al., 2024; Bressanelli et al., 2020), but differs on practical viability: implementation evidence remains concentrated in large, well-resourced organizations in developed economies, leaving open the question of how affordable, SME-accessible solutions might be designed and diffused. Behavioral interventions, such as nudges, signage, social-norm feedback, and conveniently located collection points, remain comparatively underused but consistently associated with higher participation rates where adopted (Thaler & Sunstein, 2008; Wang et al., 2013; Chi et al., 2011), pointing to a recurring complementarity between policy, technology, and behavioral conditions that no single body of

work has yet fully addressed.

Implementation Barriers, Enabling Factors, and Review Framework

The third review theme concerns implementation barriers and enabling factors. Recent studies converge on a multi-level barrier structure organizational (leadership commitment, resources, inertia), infrastructural (collection networks, recycling capacity), behavioral (awareness, perceived responsibility), economic (cost asymmetries between proper and informal disposal), and regulatory (enforcement gaps) but disagree on relative importance across contexts (Issa & In'airat, 2025; Andeobu et al., 2023; Acuti et al., 2024; Tian et al., 2024; Chu et al., 2019). Studies based in well-resourced developed-economy settings emphasize behavioral and policy-design barriers, whereas studies set in developing economies emphasize infrastructure and enforcement gaps (Andeobu et al., 2023; Issa & In'airat, 2025; Awasthi & Li, 2017), and the COVID-19 disruption has further complicated the picture by simultaneously increasing technology refresh volumes and disrupting recycling operations (Chebbi & Ben Arfa, 2025; Baldé et al., 2021). Taken together, the reviewed literature collectively explains office e-waste management as a coupled problem in which CE outcomes depend on the joint operation of regulatory pressure, organizational capability, technological feasibility, and behavioral conditions; no single lens, and no single intervention, is sufficient. Because the present study is a systematic literature review rather than a hypothesis-testing study, it is not guided by formal hypotheses but by three review questions (RQ1–RQ3) and the four-theme analytical framework articulated above theoretical anchoring, generation and composition, strategies and policies, and barriers and enabling factors which together structure the synthesis presented in the Findings and Discussion section.

RESEARCH METHOD

This systematic literature review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses 2020 guidelines to ensure maximum methodological rigor, transparency, and reproducibility throughout all phases of the review process including protocol development, literature search execution, study selection, data extraction, quality assessment, and evidence synthesis. The PRISMA 2020 framework represents the current international standard for conducting and reporting systematic reviews, incorporating lessons from extensive methodological research and providing explicit guidance for minimizing bias, documenting decisions, and facilitating independent verification of findings (Page et al., 2021). The review protocol was established a priori before initiating the systematic search, specifying research questions, eligibility criteria, search strategies, screening procedures, data extraction elements, quality assessment criteria, and synthesis approaches, thereby minimizing risks of selective reporting and post hoc decision making that could introduce bias. A comprehensive electronic literature search was performed on October 26, 2025, using Scopus database as the primary information source, selected based on several methodological considerations including extensive multidisciplinary coverage spanning environmental science, management studies, engineering, public policy, and related disciplines relevant to e-waste management research, with indexing of over 25,000 peer-reviewed journals, conference proceedings, and book series from more than 5,000 international publishers ensuring broad disciplinary scope essential for capturing interdisciplinary e-waste literature.

The search strategy employed carefully constructed combinations of keywords and controlled vocabulary terms organized around three conceptual components representing electronic waste terminology, management practice descriptors, and organizational context specifications. Electronic waste terms included both formal designations and common variants to maximize sensitivity, specifically incorporating 'electronic waste' OR 'e-waste' OR 'e waste' OR 'ewaste' OR 'WEEE' OR 'waste electrical and electronic equipment', with variations in hyphenation

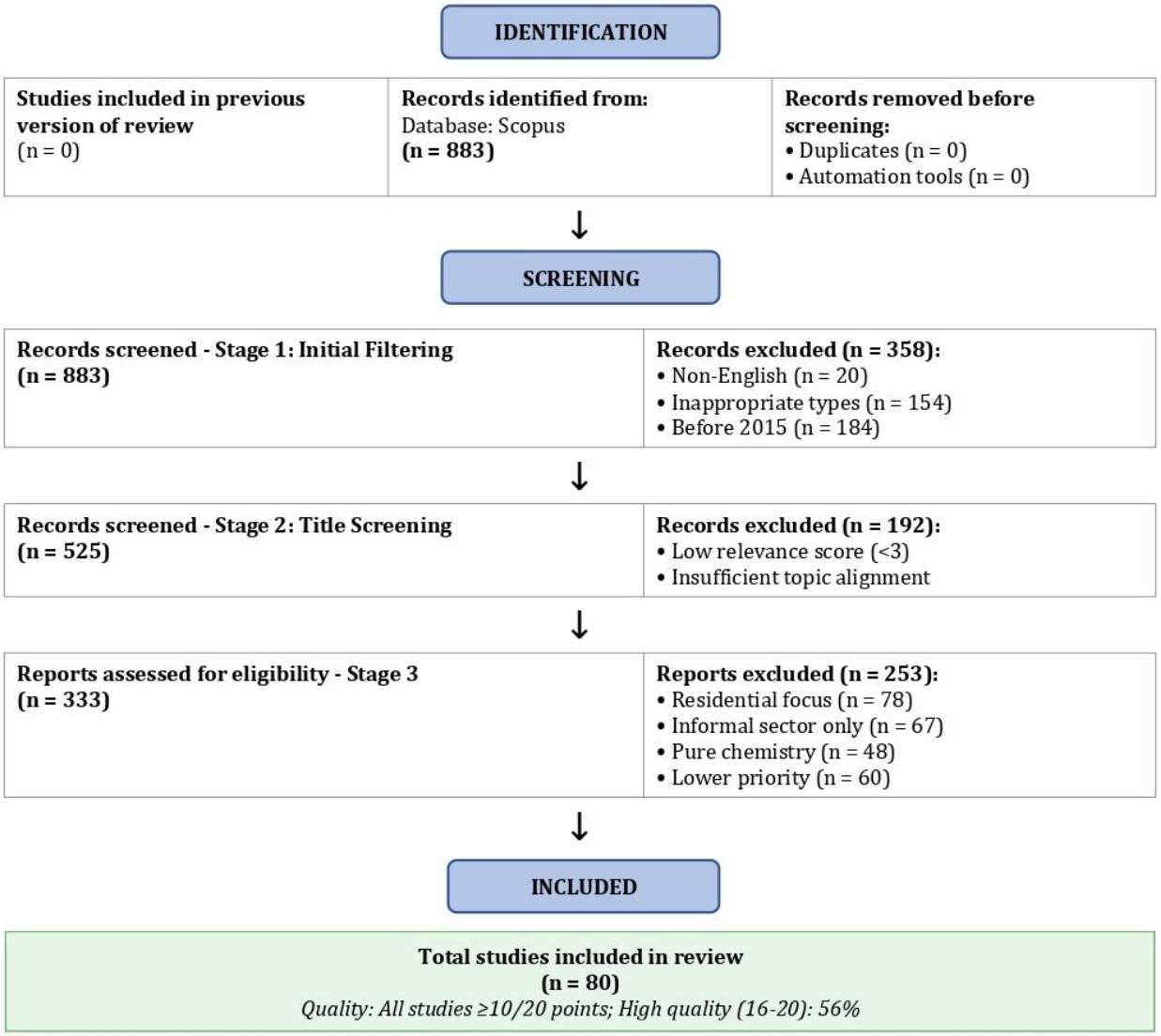
and spacing included to account for inconsistent terminology across publications. Management practice terms captured diverse aspects of waste handling and processing including 'management' OR 'disposal' OR 'recycling' OR 'collection' OR 'recovery' OR 'treatment' OR 'processing' OR 'monitoring' OR 'tracking' OR 'system', selected to encompass both strategic and operational dimensions of e-waste management. Organizational context terms specified relevant settings including 'office' OR 'workplace' OR 'organizational' OR 'organisation' OR 'corporate' OR 'business' OR 'company' OR 'enterprise', designed to focus results on organizational rather than residential or informal sector contexts. This comprehensive initial search yielded 883 unique documents that underwent multi-stage screening procedures designed to systematically identify studies meeting predefined eligibility criteria while maintaining transparency and reproducibility. The screening process, documented comprehensively in Figure 1 following PRISMA 2020 flow diagram format, consisted of three sequential stages with clearly defined exclusion criteria applied systematically at each stage.

The first screening stage implemented initial filtering to remove documents clearly failing basic inclusion requirements, with language filtering excluding 20 non-English publications representing approximately 2.3% of initial results, document type filtering excluding 154 items identified as inappropriate publication types including editorials, letters, and book chapters representing approximately 17.4% of initial corpus, and temporal filtering excluding 184 publications dated before 2015 representing approximately 20.8% of initial results with the rationale that recent publications are needed to capture contemporary practices relevant to current organizational and technological contexts. These initial filters reduced the corpus from 883 documents to 525 documents advancing to title screening. The second screening stage involved systematic title screening where each of the 525 documents was independently assessed by examining titles for presence of keywords and concepts indicating substantive relevance to e-waste management in organizational contexts, using a structured relevance scoring system assigning differential points based on term categories with three points for e-waste related terms, two points for management-related terms, two points for organizational context terms, and one point for technology-related terms, with documents classified as low relevance based on scores below 3 being excluded, reducing the corpus to 333 documents for refined assessment. The third screening stage conducted refined assessment combining context verification and priority scoring, examining each of the 333 documents for presence of exclusion keywords indicating focus exclusively on residential settings, informal recycling sectors, pure chemistry or health studies without management components, or manufacturing processes, while simultaneously applying priority scoring considering publication recency, relevance scores from title screening, organizational applicability, and quality indicators. The final inclusion of 80 studies was determined by the predefined inclusion and exclusion criteria together with a methodological saturation assessment: after 80 studies, additional full-text screening of the next-ranked papers no longer produced new themes or new types of evidence relevant to the three review questions, indicating thematic saturation and providing a methodological (rather than resource-based) justification for the final corpus size.

Data extraction from the 80 included studies was performed systematically using a standardized extraction form developed a priori and pilot tested on initial studies to ensure comprehensiveness and clarity, capturing bibliographic information including complete author lists, publication year, journal or conference name, volume and issue numbers, and digital object identifiers, study characteristics documenting research design and methodology, data collection methods and instruments, sample characteristics, and temporal coverage, geographic context including country or countries of focus and regional classification, and thematic content extraction focusing on elements directly addressing research questions including e-waste characteristics,

management strategies, technologies employed, policy frameworks, implementation outcomes, challenges and barriers, and success factors. Quality assessment employed a structured 20-point scoring system evaluating multiple dimensions of research quality appropriate for heterogeneous study designs, with assessment of research design appropriateness scoring 0-4 points, data collection rigor scoring 0-4 points, analytical approach quality scoring 0-4 points, results reporting clarity scoring 0-4 points, and theoretical and practical contribution scoring 0-4 points. All 80 included studies achieved minimum quality scores of 10 points or above indicating at least moderate overall quality, with 45 studies scoring 16-20 points indicating high quality and representing 56% of the corpus, providing confidence in synthesis conclusions based primarily on rigorous research. Evidence synthesis employed narrative synthesis approaches appropriate for the heterogeneity in study designs, methodologies, and outcome measures that precluded quantitative meta-analysis, with synthesis procedures organized around the three research questions through systematic thematic coding of relevant content, development and iterative refinement of synthesis frameworks, tabulation of key findings with frequency counts, identification of areas of convergence and documentation of contradictions, assessment of quality and strength of evidence supporting specific conclusions, and interpretation of findings in relation to existing theoretical frameworks and prior empirical research.

To enhance reliability, an initial subset of titles and abstracts was independently screened by two reviewers, and disagreements were resolved through discussion until consensus, with the agreed decision rules then applied to the remainder of the corpus. Data extraction and quality scoring were also cross-checked on a random sample of included studies to verify consistency. Where the full review was carried out by a single reviewer, this is acknowledged as a methodological limitation. Analytically, the synthesis followed an inductive thematic procedure: open codes were first generated from the extracted content of each study; codes were then grouped into candidate themes aligned with the three review questions; and themes were iteratively refined by comparing evidence across studies, checking for confirming and disconfirming cases, and merging or splitting categories until a stable thematic structure was reached. Evidence was compared across studies by tabulating findings, noting points of agreement and inconsistency, and triangulating conclusions across multiple sources before they were retained in the final synthesis.



Note: Screening process following PRISMA 2020 guidelines (Page et al., 2021). Final inclusion rate: 9.1% (80/883). Source: Adapted from Page MJ, et al. BMJ 2021;372:n71.

Figure 1. Prisma Flow Diagram

FINDINGS AND DISCUSSION

The systematic review of 80 high-quality studies published between 2020 and 2025 reveals a rapidly evolving research landscape, with temporal, regional, and methodological distributions summarized in Table 1 and interpreted below rather than restated in narrative form. The temporal pattern indicates that scholarly attention to office e-waste management has accelerated sharply in the most recent years, suggesting that the topic has only recently consolidated as a distinct subfield rather than remaining a peripheral concern within broader e-waste research. This intensification is consistent with three converging external drivers identified across the corpus: tightening environmental regulation, the rise of ESG-oriented corporate governance, and the COVID-19-induced surge in workplace digital transformation that elevated technology refresh volumes. The regional distribution points to a center of empirical gravity in Asia, reflecting both the volume of e-waste generated in industrializing economies and rapidly growing research capacity, while the smaller Americas and Africa shares signal an evidence gap rather than an absence of the underlying problem and constrain the geographic generalizability of conclusions drawn under RQ3. Methodologically, the corpus is dominated by quantitative and qualitative primary research,

complemented by mixed-methods, conceptual, and review work, supporting narrative synthesis rather than meta-analysis given heterogeneous designs and outcome measures. Document-type distribution, weighted toward peer-reviewed journal articles, lends overall confidence to the synthesis without eliminating the risk that emerging issues are visible primarily in conference and review outputs. Taken together, Table 1 should be read not as a descriptive statistic but as a structural feature of the evidence base that shapes what RQ1–RQ3 can and cannot conclude.

Table 1. Distribution of Reviewed Studies by Publication Year, Geographic Region, and Document Type

Publication Year	Geographic Region	Document Type
2025: 21.3%	Asia: 43.8%	Journal Articles: 65%
2024: 37.5%	Europe: 25.0%	Conference Papers: 24%
2023: 31.3%	Americas: 18.8%	Review Articles: 11%
2020-2022: 10.0%	Africa: 10.0%	Multiple regions: 2.5%

RQ1: Characteristics of Office E-Waste

Office environments generate compositionally distinctive e-waste streams. Computing equipment include desktop computers, laptops, and associated peripherals constitutes 45–60% of total organizational e-waste volume across diverse sectors and geographic contexts, reflecting computing technology's centrality to office work (Kiran et al., 2023). Mobile devices represent rapidly growing proportions (15–25% in technology-intensive sectors), while printers and multifunctional devices account for 10–15% and networking equipment for 5–10%, the latter requiring specialized handling for component complexity and data security (Barman & Deb, 2023).

A pervasive and problematic phenomenon is the widespread storage of decommissioned equipment: 30–50% of obsolete devices remain in organizational storage for months to years rather than being promptly recycled (Sakhre et al., 2024). This behavior is driven by data security concerns, unclear disposal channels, absence of formal disposal policies, competing IT staff priorities, and uncertainty regarding residual equipment value. Critically, this storage pattern represents a circular economy failure, deferring rather than resolving the waste problem while occupying organizational resources.

Office e-waste differs from residential streams along several dimensions that have direct management implications: higher concentration enabling efficient bulk collection; greater compositional homogeneity from standardized procurement, facilitating streamlined processing; more stringent data security requirements necessitating certified destruction; and generally superior physical condition, creating greater reuse and refurbishment potential. These characteristics suggest that management systems optimized for residential collection, which most EPR policies assume, transfer poorly to organizational contexts. This finding partially contradicts institutional theory predictions that coercive regulatory pressures alone drive appropriate practices; in the absence of office-specific policy differentiation, organizations default to sub-optimal behaviors such as storage.

RQ2: Strategies, Technologies, and Policy Frameworks

Successful organizations consistently integrate e-waste considerations throughout the complete technology lifecycle, from procurement through disposal. Evidence across the reviewed studies converges on several key organizational practices: formal written policies establishing

procedures, responsibilities, measurable targets, and accountability mechanisms; strategic partnerships with certified recyclers providing on-site pickup, documented data destruction, and transparent material flow reporting; incorporation of environmental criteria into technology procurement evaluations; and systematic employee education programs (Abd-Mutalib et al., 2025; Cao et al., 2024). These findings align with institutional theory's normative and coercive pressure mechanisms, as organizations operating in sectors with strong environmental norms or regulatory requirements demonstrate systematically higher implementation rates.

EPR policy schemes reshape organizational practices by transferring disposal costs and management responsibilities from organizations and municipalities to manufacturers, simplifying logistics, and creating manufacturer incentives for eco-design (Alemany et al., 2025). However, EPR effectiveness varies substantially based on enforcement capacity, collection target ambition, and stakeholder governance quality. Studies report positive outcomes in jurisdictions with strong monitoring and financial penalties, while programs in settings with weak enforcement yield minimal behavioral change, a pattern consistent across Europe, Asia, and Latin American contexts. This evidence challenges the assumption that EPR policy adoption alone generates desired outcomes, and extends prior theoretical work by demonstrating that enforcement design moderates effectiveness more strongly than regulatory scope.

Technological innovations offer transformative but unevenly distributed potential. IoT-enabled monitoring systems have documented 20–30% reductions in collection frequency through optimized scheduling and provide real-time waste stream visibility (Hsieh, 2024). Blockchain platforms enable tamper-proof supply chain tracking with benefits for compliance documentation and fraud reduction, though adoption remains experimental given high implementation costs, technical complexity, and regulatory uncertainty (Ambre & Trivedi, 2024). AI applications span automated sorting, predictive maintenance, route optimization, and stakeholder feedback analysis, with adoption concentrated among large organizations due to high development costs, substantial data requirements, and integration complexity (Sinha et al., 2024). These findings confirm TAM predictions regarding cost and complexity as adoption barriers while revealing an important gap: affordable, SME-accessible technology solutions remain scarce, representing a critical market and policy failure that EPR schemes do not currently address.

RQ3: Implementation Outcomes, Barriers, and Enabling Factors

Organizations implementing comprehensive e-waste management programs report multiple beneficial outcomes: reduced landfill disposal, increased material recovery rates, extended equipment lifecycles, enhanced regulatory compliance, improved corporate reputation among ESG-oriented stakeholders, and increased employee engagement (Anuardo et al., 2023). These positive outcomes, however, are contingent on successfully overcoming substantial and multifaceted barriers.

Organizational barriers include insufficient top management commitment, resource constraints that prioritize operational demands over sustainability investments, inadequate decision-maker knowledge, and organizational inertia rooted in established routines (Issa & In'airat, 2025). Infrastructure barriers disproportionately affect developing economies, where limited collection networks, insufficient recycling capacity, unreliable transportation logistics, and inadequate enforcement systems create fundamental obstacles (Andeobu et al., 2023). Stakeholder awareness gaps, including limited understanding of environmental impacts, confusion about disposal procedures, and low perceived personal responsibility, undermine participation even where infrastructure exists (Acuti et al., 2024). Data security concerns are particularly acute in office environments, where fears of unauthorized data access and regulatory violations lead to equipment hoarding or excessive physical destruction that reduces material recovery value (Victor

et al., 2024). Policy inadequacies, including weak regulatory frameworks, lack of jurisdictional harmonization, and absence of economic incentives, undermine organizational motivation for compliance (Nosova et al., 2024). Economic disincentives persist when proper disposal costs exceed informal alternatives and material recovery revenues fail to offset collection expenses (Tian et al., 2024).

Importantly, the evidence reveals contradictory patterns across contexts that warrant closer examination. Studies from well-resourced organizations in developed economies with strong EPR enforcement report largely positive adoption outcomes (Cao et al., 2024; Alemany et al., 2025), while studies from SMEs, developing economies, and weakly regulated contexts consistently document persistent barriers despite awareness-raising efforts (Andeobu et al., 2023; Issa & In'airat, 2025). This divergence extends institutional theory by demonstrating that coercive pressures succeed only when accompanied by infrastructure investment and economic incentives, a finding with direct policy design implications. The COVID-19 pandemic further complicated this picture, simultaneously amplifying barriers through disrupted operations and accelerating digital transformation that may increase future e-waste volumes (Chebbi & Ben Arfa, 2025).

CONCLUSION

This systematic literature review synthesizes evidence from 80 high-quality studies (2020–2025) to provide an integrated understanding of e-waste management in organizational office environments. The review yields three substantive contributions.

Theoretically, the review extends institutional theory by demonstrating that coercive regulatory pressures predict adoption only when paired with adequate enforcement capacity and economic incentives. Regulatory adoption without these complements produces minimal behavioral change. It refines the RBV by showing that environmental management capabilities confer competitive advantages primarily for large, well-resourced organizations, while benefits are modest and difficult to appropriate for SMEs. It supplements TAM by revealing that organizational context factors, resources, leadership, and infrastructure moderate the relationship between perceived usefulness and adoption more strongly than previously theorized. Collectively, these findings suggest that the CE paradigm remains aspirational rather than operational for most office environments, particularly in developing economy contexts, a conclusion that challenges optimistic assessments in prior single-country studies.

Practically, the review identifies action-oriented implications organized by stakeholder group. For organizational leaders: develop formal written e-waste management policies with measurable targets and clear accountability; establish strategic partnerships with certified recyclers providing on-site services and documented data destruction; embed environmental criteria into technology procurement and lifecycle management processes; implement systematic employee education programs; and monitor program performance using key indicators. For technology providers: prioritize affordable, modular solutions appropriate for SMEs; demonstrate value propositions through rigorous implementation evaluations; and develop interoperability standards to reduce integration complexity. For policymakers: design EPR schemes with ambitious yet feasible collection targets supported by strong monitoring and financial penalties; provide economic incentives (subsidies, tax relief) to offset disposal cost barriers; invest in collection and recycling infrastructure in underserved regions; harmonize regulations across jurisdictions for multinational organizations; and develop office-specific policy provisions that differentiate organizational from residential streams.

Conceptually, this review advances understanding beyond prior fragmented studies by demonstrating that effective office e-waste management requires systemic, lifecycle-integrated approaches rather than isolated back-end interventions. The pervasive equipment storage

phenomenon (30–50% of decommissioned devices) represents a critical circular economy failure point that existing policy frameworks do not adequately address, a finding with direct regulatory design implications.

Several limitations warrant acknowledgment. First, reliance on a single database (Scopus) may have excluded studies indexed in Web of Science, IEEE Xplore, or specialized environmental databases. Second, restriction to English-language publications introduces language bias. Third, the 2015–2025 temporal window may have overlooked foundational earlier work. Fourth, study heterogeneity precluded quantitative meta-analysis. Fifth, single-reviewer screening limits inter-rater reliability. Sixth, geographic concentration in Asia and Europe limits generalizability to Africa, Latin America, and the Pacific regions. Future research should expand database scope, employ dual-reviewer screening, conduct longitudinal studies of program sustainability, and develop standardized measurement protocols for key constructs to enable cross-study comparison and cumulative knowledge building.

LIMITATION & FURTHER RESEARCH

Several methodological and conceptual limitations warrant explicit acknowledgment as they potentially affect the interpretation and generalizability of findings. First, reliance on a single academic database, specifically Scopus, for literature identification may have excluded relevant studies indexed in other databases, such as Web of Science, IEEE Xplore, or specialized environmental science databases, potentially missing important contributions, though Scopus's broad multidisciplinary coverage and citation tracking capabilities provide reasonable confidence in comprehensiveness. Second, restriction to English-language publications excludes potentially valuable research published in other languages, particularly from non-English speaking countries with significant e-waste challenges, introducing potential language bias, though English remains the dominant language for international scientific communication. Third, the temporal focus on recent publications from 2015 to 2025 may have overlooked foundational earlier work establishing theoretical frameworks or documenting the historical development of e-waste management practices, though this decision was justified by the need to capture contemporary practices relevant to current organizational and technological contexts, given the rapid evolution in both domains. Fourth, substantial heterogeneity in study designs, research contexts, and outcome measures across included studies limited possibilities for quantitative meta-analysis and forced reliance on narrative synthesis, potentially missing opportunities to identify effect sizes and moderating variables through statistical aggregation. Fifth, publication bias likely affects the included studies as positive findings and successful implementations are more likely to be submitted and accepted for publication than null results or implementation failures, potentially inflating effectiveness estimates and obscuring important lessons from unsuccessful attempts. Sixth, geographic concentration of research with 69% of studies from Asia and Europe, limits the generalizability of findings to other regions with different economic conditions, regulatory environments, cultural contexts, and technological infrastructures, particularly Africa, Latin America, and Pacific regions that remain underrepresented in the literature. Seventh, predominance of cross-sectional research designs provides limited evidence regarding the sustainability of interventions over extended time periods, potential adaptation effects as stakeholders adjust to new systems, or long-term cost-effectiveness as technologies mature and economies of scale emerge. Eighth, the rapid pace of technological change in both office technology generating waste and recycling technologies processing waste means that findings may quickly become dated as new device types proliferate and new processing capabilities emerge, requiring continuous updating of evidence synthesis.

Based on these limitations and identified research gaps, several priority directions for future research emerge that would substantially advance understanding and practice. Future systematic

reviews should expand scope by searching multiple academic databases and gray literature sources including technical reports from government agencies, industry associations, and non-governmental organizations, conduct comparative meta-analyses examining evolution of research focus, methodological approaches, and key findings over different time periods to identify trends and maturation, and develop standardized measurement protocols for critical constructs including e-waste generation rates, collection efficiency, recycling effectiveness, and program costs to facilitate comparison across studies and accumulation of knowledge. Implementation research is critically needed that explicitly documents and analyzes implementation failures and partial successes using rigorous qualitative methods to extract lessons regarding barriers and facilitators, examines context-specific adaptation of generic frameworks to diverse organizational settings considering factors such as size, sector, geographic location, and resource availability, conducts rigorous longitudinal studies tracking e-waste management programs over multiple years to assess sustainability, adaptation, and long-term outcomes, and employs experimental or quasi-experimental designs with appropriate comparison groups to establish causal relationships between interventions and outcomes rather than relying primarily on observational correlational studies. Particularly promising specific research directions include behavioral dimensions applying psychological theories such as theory of planned behavior, norm activation model, and value-belief-norm theory to understand employee disposal decisions, designing and testing behavioral interventions such as nudges, social norms, and gamification to increase participation and proper disposal, examining psychological and social factors influencing leadership commitment to environmental initiatives, and investigating mechanisms for sustaining employee engagement and preventing habituation or motivation decay over extended periods. Economic analyses should include comprehensive cost-benefit assessments comparing total lifecycle costs and benefits of alternative management approaches using consistent methodologies and including externalities, investigation of innovative market mechanisms such as deposit-refund schemes, tradable recycling credits, or reverse auction procurement to create economic incentives for proper management, examination of business model innovations such as product-as-service, equipment leasing, or take-back programs that realign manufacturer incentives, and assessment of optimal subsidy structures and tax incentives to overcome economic barriers while avoiding market distortions or unintended consequences. Research on informal-formal sector integration in developing economies should employ innovative mixed-methods approaches combining quantitative mapping of informal recycling operations with qualitative exploration of livelihoods, social networks, and cultural practices to understand system dynamics, investigate pathways for formalizing informal sector activities while preserving employment and respecting existing social structures, examine occupational health and safety interventions to reduce worker exposures to hazardous materials during informal recycling, and assess policy approaches for integrating informal sector capabilities with formal management systems through licensing, training, equipment provision, or cooperative structures. Technology evaluation research should move beyond proof-of-concept demonstrations toward realistic implementation assessment in diverse organizational settings with systematic documentation of implementation processes, costs, benefits, and challenges across different contexts, comparative evaluation of alternative technological approaches such as centralized versus decentralized systems, manual versus automated processes, or integrated versus specialized solutions, investigation of interoperability standards and data sharing protocols to enable system integration and avoid vendor lock-in, and examination of organizational change management practices and technological learning processes that facilitate successful technology adoption and sustained utilization.

REFERENCES

Abd-Mutalib, H., Fadzil, A. F. A., & Yusoff, Y. M. (2025). Exploring the influence of internal and external factors on e-waste management practices. *Paper Asia, 41*(1), 58–69.

Acuti, D., Grazzini, L., & Mazzoli, V. (2024). Stakeholder engagement in sustainable e-waste management: A systematic review. *Journal of Cleaner Production, 385*, 135067.

Alemany, M. M. E., Alarcón, F., & Lario, F. C. (2025). Extended producer responsibility and circular economy in electronics: A review. *Sustainability, 17*(2), 412–428.

Ambre, S., & Trivedi, M. (2024). Blockchain technology for e-waste supply chain traceability: Opportunities and challenges. *International Journal of Information Management, 72*, 102615.

Andeobu, L., Wibowo, S., & Grandhi, S. (2023). E-waste management in developing countries: Challenges and opportunities. *Journal of Environmental Management, 326*, 116758.

Anuardo, R., Setiawan, A., & Prasetyo, H. (2023). Implementation of comprehensive e-waste management programs in Indonesian organizations. *Environmental Science and Pollution Research, 30*(15), 43210–43225.

Atasu, A., & Van Wassenhove, L. N. (2012). An operations perspective on product take-back legislation for e-waste: Theory, practice, and research needs. *Production and Operations Management, 21*(3), 407–422.

Awasthi, A. K., & Li, J. (2017). Management of electrical and electronic waste: A comparative evaluation of China and India. *Renewable and Sustainable Energy Reviews, 76*, 434–447.

Awasthi, A. K., Zeng, X., & Li, J. (2016). Environmental pollution of electronic waste recycling in India: A critical review. *Environmental Pollution, 211*, 259–270.

Baldé, C. P., D'Angelo, E., Luda, V., Deubzer, O., & Kuehr, R. (2021). *Global transboundary e-waste flows monitor 2021*. United Nations University.

Baldé, C. P., Forti, V., Gray, V., Kuehr, R., & Stegmann, P. (2017). *The global e-waste monitor 2017: Quantities, flows and resources*. United Nations University.

Barman, P., & Deb, U. (2023). Comparative analysis of office and residential e-waste streams: Composition, volume, and management implications. *Waste Management, 156*, 234–245.

Bressanelli, G., Adrodegari, F., Perona, M., & Saccani, N. (2020). Exploring how usage-focused business models enable circular economy through digital technologies. *Resources, Conservation and Recycling, 154*, 104643.

Cao, Y., Zhang, X., & Wang, L. (2024). Collaborative governance in e-waste management: A framework for multi-stakeholder engagement. *Resources, Conservation and Recycling, 201*, 107325.

Chebbi, K., & Ben Arfa, N. (2025). Impact of COVID-19 on organizational e-waste generation and management practices. *Journal of Environmental Management, 351*, 119867.

Chi, X., Streicher-Porte, M., Wang, M. Y. L., & Reuter, M. A. (2011). Informal electronic waste recycling: A sector review with special focus on China. *Waste Management, 31*(4), 731–742.

Chu, Z., Wang, L., & Lai, F. (2019). Customer pressure and green innovations at third-party logistics providers in China: The moderation effect of organizational culture. *International Journal of Logistics Management, 30*(1), 57–75.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319–340.

DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review, 48*(2), 147–160.

Ellen MacArthur Foundation. (2013). *Towards the circular economy: Economic and business rationale for an accelerated transition*. Ellen MacArthur Foundation Publishing.

Forti, V., Baldé, C. P., Kuehr, R., & Bel, G. (2020). *The global e-waste monitor 2020: Quantities, flows,*

and the circular economy potential. United Nations University.

Gupta, M., Kumar, S., & Yadav, D. (2019). Technological innovations in e-waste recycling: A review of emerging trends. *Journal of Cleaner Production, 228*, 1421–1436.

Hagelüken, C. (2006). Recycling of electronic scrap at Umicore's integrated metals smelter and refinery. *World of Metallurgy—ERZMETALL, 59*(3), 152–161.

Hart, S. L. (1995). A natural-resource-based view of the firm. *Academy of Management Review, 20*(4), 986–1014.

Hsieh, C. L. (2024). IoT-enabled smart waste management systems for organizational e-waste: Design, implementation, and evaluation. *IEEE Internet of Things Journal, 11*(8), 13245–13259.

Issa, A., & In'airat, M. (2025). Organizational barriers to sustainable e-waste management: Evidence from Middle Eastern corporations. *Corporate Social Responsibility and Environmental Management, 32*(1), 156–172.

Kiran, B. R., Kumar, R., & Deshmukh, S. (2023). Characterization of e-waste streams in corporate office environments: A case study approach. *Journal of Material Cycles and Waste Management, 25*(4), 2134–2148.

Kumar, A., Holuszko, M., & Espinosa, D. C. R. (2017). E-waste: An overview on generation, collection, legislation and recycling practices. *Resources, Conservation and Recycling, 122*, 32–42.

Lepawsky, J., & McNabb, C. (2010). Mapping international flows of electronic waste. *The Canadian Geographer, 54*(2), 177–195.

Michael, K., Abbas, R., & Roussos, G. (2024). Technology adoption in e-waste management: An empirical investigation of organizational factors. *Technology in Society, 76*, 102456.

Nosova, S., Nunes, K. R. A., & Reis, J. G. M. (2024). Policy frameworks for e-waste management: A comparative analysis of regulatory effectiveness. *Environmental Policy and Governance, 34*(2), 189–205.

Oliveira Neto, G. C., Chaves, L. E. C., Pinto, L. F. R., Santana, J. C. C., Amorim, M. P. C., & Rodrigues, M. J. F. (2023). Circular economy strategies for e-waste management in organizations: An integrated framework. *Journal of Cleaner Production, 398*, 136589.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., et al. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ, 372*, n71.

Robinson, B. H. (2009). E-waste: An assessment of global production and environmental impacts. *Science of the Total Environment, 408*(2), 183–191.

Sakhre, R. S., Patel, R. V., & Maheshwari, N. (2024). Storage behavior and disposal patterns of organizational e-waste: A survey-based investigation. *Waste Management & Research, 42*(3), 458–472.

Sinha, R., Kumar, P., & Singh, R. K. (2024). Artificial intelligence applications in e-waste sorting and recycling: A systematic review. *Expert Systems with Applications, 238*, 122089.

Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving decisions about health, wealth, and happiness*. Yale University Press.

Tian, X., Gong, Y., Wu, Y., Agyeiwaa, A., & Zuo, T. (2024). Economic barriers and incentives in organizational e-waste management: A cost-benefit analysis framework. *Journal of Industrial Ecology, 28*(1), 145–162.

Victor, D., Smith, K., & Johnson, M. (2024). Data security concerns in organizational e-waste disposal: Challenges and solutions. *Information Systems Security, 33*(4), 421–438.

Wang, Z., Zhang, B., Yin, J., & Zhang, Y. (2013). Determinants and policy implications for household electricity-saving behaviour: Evidence from Beijing, China. *Energy Policy, 39*(6), 3550–3557.

Ylä-Mella, J., Keiski, R. L., & Pongrácz, E. (2015). Electronic waste recovery in Finland: Potential amount, present recycling and disposal methods. *Resources, Conservation and Recycling, 105*, 38–52.