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ELECTRONIC MANUFACTURERS' OBLIGATIONS REGARDING E-WASTE AND WASTE MANAGEMENT ENGINEERING

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Abstract- *This article examines the legal obligations of electronic manufacturing companies regarding the management of electrical and electronic equipment waste in the post-use phase, as well as the consequences of civil relations with consumers and waste management service providers. The method used is normative legal research through the examination of legislation, the principle of producer responsibility, and the rules of contract. The results of the study show that the obligations of producers are inherent in business activities, requiring the establishment of return mechanisms, traceability of transfers, and the selection of licensed managers with verifiable supervision. The contractual structure between producers and waste managers must specify the waste object, technical standards, reporting, audit rights, prohibition of subcontracting without approval, and consequences of default in order to be in line with environmental obligations. In the relationship between producers and consumers, sales transactions may contain implicit obligations regarding safe disposal information and access to delivery channels, so that proof of receipt becomes the main tool for proving consumer compliance. In disputes, the division of responsibility follows the extent of control and negligence verified by documents, not merely the transfer of ownership of goods. The interpretation of norms is based on the Environmental Protection Law, the Waste Management Law, the Government Regulation on Environmental Protection, and the technical provisions for the management of hazardous waste from electrical and electronic equipment. The findings place documentation as a prerequisite for accountability, including manifests, minutes, and processing reports. Recommendations are directed at standardizing clauses and improving internal oversight capacity. This research is relevant to industry, government, and dispute resolution mechanisms.*

Keywords: e-waste; producer responsibility; hazardous waste; service agreement; traceability; evidence; civil dispute.

INTRODUCTION

The growth of the electronics manufacturing industry over the past two decades has marked a shift in production and consumption patterns that rely on rapid innovation, short product life cycles, and product line diversification. This dynamic has created economic value through market expansion, employment, and increased production capacity. The consequences of this, however, emerge in the post-use phase, when obsolete devices become waste containing both valuable materials and hazardous substances. Electronic waste or e-waste has unique characteristics because it contains a mixture of metals, plastics, glass, and chemical components that need to be treated specially. For electronics manufacturing companies, the issue of e-waste does not stop at disposal, but is related to the entire value chain, from product design, material selection, packaging, product recall, and final processing. The e-waste management in the perspective of business law should be read as a series of corporate obligations that are intertwined with supplier contracts, consumer relations, environmental compliance, and legal risk management (Paminto et al., 2024).

From a corporate governance perspective, e-waste management requires accountable decision-making at both the operational and corporate levels. Electronics manufacturers typically carry out functions ranging from material procurement, production, distribution, and after-sales service to returns management through third-party networks. Each node in the network has the potential to generate e-waste, such as defective components, obsolete inventory, unrepairable warranty units, or devices withdrawn from the market. Decisions on whether waste is processed in-house, handed over to a licensed waste manager, or recovered as secondary raw material will shape different accountability patterns. At the legal level, e-waste management relates to licensing obligations, technical standards for transportation and storage, proof of compliance through documentation, and control of third parties through contracts. Another important aspect is the potential for civil disputes in the event of environmental damage, loss to other parties, or breach of management agreements. E-waste management is therefore a field that requires a doctrinal reading of norms, as well as an assessment of the design of the business relationships established by companies.

In the realm of business law, e-waste raises questions about how companies divide and control responsibility in contractual relationships. Electronic manufacturing companies rarely work alone in the collection and processing of e-waste, but rather involve distributors, service centers, logistics companies, and licensed waste managers as part of the compliance chain (Baldé et al., 2015). In such relationships, contracts serve as the primary instrument for

establishing service specifications, safety standards, traceability, reporting mechanisms, and the allocation of operational and legal risks.

Contracts, however, cannot be used as a shield to transfer all legal responsibility if public norms such as the principle of extended producer responsibility impose obligations on certain businesses. Companies also face strict evidentiary requirements, as environmental compliance is often measured through formal documentation, waste records, transport manifests, and proof of delivery to a legitimate final processor. If such evidence is not organized and traceable, companies become vulnerable to claims of violation, both by regulators and by private parties who have suffered losses. Discussion of the legal aspects of e-waste management must therefore assess how public norms guide corporate behavior and how companies design effective contractual architecture and internal compliance systems (Lifset et al., 2013).

The issue of e-waste also intersects with corporate reputation and value, as the public is increasingly concerned about the environmental footprint of electronic products. Electronics manufacturers are no longer judged solely on product quality and price, but also on responsible production practices and end-of-life product management. In modern trade, many supply chains require certain standards and environmental compliance audits for suppliers. This encourages companies to adopt internal policies, supplier codes of conduct, and standard operating procedures related to waste management. Internal policies, however, must be supported by a proper understanding of applicable legal norms, as misinterpretation can lead to non-compliance or wasted compliance costs. E-waste management often involves the movement of goods and materials between regions, which opens up the potential for cross-jurisdictional issues and chain of custody oversight. A normative legal analysis is therefore necessary to map out corporate obligations, legitimate discretion, and potential points of dispute that arise when e-waste management is carried out through third parties.

On a national scale, e-waste management requires integration between environmental norms, licensing norms, corporate norms, and contractual norms governing business transactions. Electronic manufacturing companies are in a unique position because they are both the source of product design and actors that can influence the collection scheme for obsolete devices. In day-to-day operations, business decisions such as establishing trade-in programs, product return services, or recalling certain products due to defects can change the volume of e-waste generated and the pattern of responsibility. Companies also often manage production waste that is different in nature from consumer e-waste, but both can end up at certain processing facilities. From a business law perspective, this requires clear mapping of waste classification, temporary storage requirements, transportation, and processing. At this point, compliance is not merely a technical issue, but also a matter of documentation management and control of legal relationships with waste management contractors, including compensation arrangements, indemnity, insurance, and vendor audits.

Based on these considerations, legal research on the management of electronic waste (e-waste) by electronics manufacturers should be treated as business law research using normative legal methods. The focus of this study is not on the technical evaluation of processing, but rather on the construction of corporate obligations and responsibilities arising from legislation and their implications for corporate policy design, contract structure, and proof of compliance. The normative approach requires tracing the applicable and still effective norms, then placing them in the framework of business relationships, such as the relationship between producers, collectors, transporters, processors, and end consumers (Gunningham, 2012).

With this approach, the discussion is directed at mapping the standards of conduct expected of companies and identifying how administrative weaknesses, misallocation of responsibilities in contracts, or failure to supervise third parties can lead to civil disputes and significant legal exposure (Craig, 2016). The analysis is therefore narrowed down to the national legal framework governing the environment, hazardous and toxic waste, corporations, and business agreements relevant to the electronics manufacturing sector, so that legal obligations can be understood as part of operational and enforceable corporate governance.

The management of e-waste by electronics manufacturers raises the issue of determining the appropriate scope of responsibility throughout the product life cycle, from pre-production to post-use (Astuti, 2013). The literature shows that e-waste is often understood as a complex material flow, containing both the economic value of material recovery and the environmental risks of mishandling, so that legal regulations and compliance instruments need to anticipate both dimensions (Widmer et al., 2005). In business practice, companies face the choice of establishing their own collection and processing systems or outsourcing them to third parties, each of which has legal consequences regarding due diligence obligations, monitoring standards, and risk allocation. Problems arise when handover documents, records of generation, and evidence of final processing are not organized, making it difficult to show that waste has been managed in accordance with regulations. At this point, the issue under review is not simply whether e-waste is processed, but whether companies can convincingly prove compliance within the framework of public law and in civil disputes. This raises serious questions about the design of compliance governance for electronics manufacturing companies.

The next issue is the mismatch between the goal of safe e-waste management and the economic reality that encourages material recovery through informal channels. Studies on cross-border e-waste flows and processing practices that do not meet safety standards show that there is a strong economic incentive to shift the burden of processing to low-cost locations, which has the potential to cause violations and environmental damage (Lepawsky & McNabb, 2010). Although this paper is not based on field studies, the normative issue remains relevant because electronics manufacturers

that outsource management must still ensure that their business relationships do not result in actions that violate legal obligations. The problem lies in the traceability of the e-waste transfer chain. When waste changes hand several times, companies find it difficult to ensure that e-waste actually ends up with licensed processors. This uncertainty raises questions about the limits of supervisory obligations and the form of adequate proof if claims of violations or compensation lawsuits arise.

Additional issues relate to the design of producer responsibility and its relevance to electronics manufacturers operating in high-consumption markets. The literature on extended producer responsibility explains that producer responsibility can be designed to shift the burden of post-consumer management from government and society to producers through specific legal and economic instruments (Lindhqvist, 2000). In the realm of business law, the issue that arises is how such provisions are translated into company policy, agreements with distributors and service centers, and contracts with waste managers. The problem is not with policy recommendations, but with the construction of liability that can be demanded and proven when there is a dispute. If the norm places manufacturers as actors who are obliged to ensure post-use management, then companies need to understand the forms of legal action that can be considered sufficient, as well as the consequences if such actions are not carried out. Thus, the core issue of this paper lies in mapping the legal obligations attached to electronic manufacturers, as well as the relationship between these obligations and contract design, documentation standards, and the position of the parties when civil disputes arise.

Electronics manufacturing companies currently operate in a business environment characterized by accelerated innovation and shifting business models, such as service-based sales, device replacement programs, and expanded after-sales services. Such business models drive an increase in the return of units, obsolete devices, and unused components, which ultimately must be managed as e-waste or electronics-related production waste. As the volume and variety of e-waste increases, the need for legal certainty becomes important so that companies can develop internal policies that are in line with regulations, define the responsibilities of organizational units, and manage relationships with collectors, transporters, and processors in an orderly manner. A normative legal review at this point serves to organize understanding of the structure of obligations and standards of behavior expected of manufacturing companies. The results of the review can be used to ensure that company actions and compliance documents are consistent, enabling management to assess legal risks more precisely in business decision-making.

This topic is also relevant because environmental compliance is often a requirement in modern business relationships, including compliance with supply chain standards, due diligence of partners, and corporate reporting that requires supporting evidence. In B2B relationships, failure to manage e-waste can lead to contractual disputes, termination of business relationships, or claims for compensation if the other party feels aggrieved by the breach of obligations. At the same time, regulators demand neat administrative proof, so companies must ensure that all waste management transactions are traceable from source to final processing. This situation makes e-waste management an issue that brings together aspects of compliance, business agreements, and corporate governance. A systematic business law review can help clearly define public and private obligations, enabling companies to understand the limits of their actions and draft accountable waste management contracts in the event of civil disputes. Therefore, e-waste management also serves as a vehicle for building environmental awareness and sustainability, as pursued in community-based programmers and precautionary approaches in environmental law (Djaelani, 2022; Hidayat et al., 2024).

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RESEARCH METHODS

This research uses a normative juridical method with a qualitative literature study approach to examine the legal norms governing the management of electronic waste by electronic manufacturing companies. Primary legal materials focus on legislation that is still valid and relevant to waste management, environmental protection and management, licensing, and corporate accountability. Secondary legal materials consist of reputable journal articles and academic books discussing e-waste, producer responsibility, corporate governance, and environmental compliance. The literature search process was conducted through scientific databases and publisher portals, with publication year restrictions to align with the reference list requirements. The source selection process was documented through the recording of the identification, screening, eligibility, and inclusion stages to ensure transparency in source selection for readers (Page et al., 2021; Snyder, 2019).

Synthesis was conducted using thematic synthesis to combine normative findings and academic arguments into analytical themes that answered the research questions. The stages included repeated reading, marking units of meaning, grouping codes into categories, and then formulating themes that were consistent with legal materials and scientific literature. The thematic synthesis model helps ensure that comparisons between sources do not stop at summaries, but rather produce a traceable structure of argumentation from source to theme, then to research answers (Thomas & Harden, 2008). At this stage, primary legal materials are treated as binding normative references, while academic literature is used to enrich interpretation, clarify terms, and assess the implications of business relationships, for example, in the design of contracts with waste transporters and processors. The results of the synthesis are then organized into two sub-discussions in accordance with the problem formulation, so that the line of argument remains focused.

Inclusion criteria include relevance to e-waste and/or hazardous waste related to electronic devices, relevance to producer obligations or waste management by business actors, and publication quality that can be verified through DOI or ISBN and official links to publishers or journals. Exclusion criteria include popular sources without peer review, documents without adequate bibliographic identification, and unverifiable sources. Coding was carried out in stages, starting with descriptive codes that captured the core issues of each source, followed by analytical codes that linked the issues to legal obligations, proof of compliance, and civil liability. To maintain quality, code consistency and audit trails were checked to map the reasons for source selection, summary of findings, and the position of the source in the final theme, referring to qualitative data analysis guidelines and established coding practices (Miles et al., 2014; Saldaña, 2016). Normative claims are paired with relevant regulatory bases, ensuring that conclusions are grounded in legal principles.

RESULTS AND DISCUSSIONS

Construction of Legal Obligations of Electronic Manufacturers in E-Waste Management and Relations with Third Parties

The legal obligations of electronic manufacturing companies in e-waste management are based on environmental protection and management regimes that treat waste as a subject of public regulation with administrative, civil, and criminal consequences. Law No. 32 of 2009 concerning Environmental Protection and Management, as amended by Law No. 11 of 2020 concerning Job Creation, establishes the basic framework of business actors' obligations to prevent pollution and damage, manage the impacts of their activities, and meet the requirements for environmental permits or approvals that are prerequisites for the legality of their operations. For electronics manufacturers, e-waste is linked to two legally relevant sources of generation, namely production process waste and post-consumer waste that is returned through service, warranty, product recall, or return programs. The framework of Law 32/2009 requires companies to establish systems that demonstrate compliance, as waste management is not understood as an incidental action but as an obligation inherent in business operations. The amendment through Law 11/2020 confirms a risk-based licensing architecture and business licensing that requires compliance with environmental standards, so that e-waste management obligations must be interpreted as part of business compliance that affects the continuity of licenses.

At the implementation level, Government Regulation No. 22 of 2021 concerning the Implementation of Environmental Protection and Management details how the obligations in Law 32/2009 are carried out, especially in the management of hazardous waste and its derivatives, including those commonly found in e-waste such as batteries, components containing heavy metals, and certain parts of circuit boards. PP 22/2021 guides companies to organize a series of actions that are commonly summarized as reduction, storage, transportation, utilization, processing, and disposal, subject to relevant licensing requirements and compliance with technical standards. The consequences for electronics manufacturing companies are both operational and legal: operational because they must establish internal procedures and supporting facilities; legal because any deviation from technical standards can be positioned as a violation of legal obligations. This PP also strengthens the dimension of proof through documentation and reporting, because compliance with waste management in practice is assessed based on the traceability and accountability of the waste flow. In relation to third parties, PP 22/2021 encourages companies to choose partners who have permits and the ability to meet standards, because the failure of partners will draw companies into a chain of administrative responsibility and potential disputes.

Outside of the hazardous waste regime, Law No. 18 of 2008 on Waste Management introduces the principle of producer responsibility for non-biodegradable goods and packaging. Article 15 of Law 18/2008 affirms the obligation of producers to manage the packaging and/or goods they produce, so that the burden of waste management is not placed entirely on the government or consumers. In electronics manufacturing, this norm encourages the reading of the product life cycle as a single obligation, including the phase when the device becomes waste. Although e-waste often intersects with hazardous waste, which has a special regime, the principle of producer responsibility in Law 18/2008 remains important because it provides a normative basis for the design of return, take-back, or collection mechanisms initiated by producers. From a business law perspective, Article 15 legitimizes internal policies that require distribution networks, service centers, and logistics partners to take back certain units and channel them to licensed processors. This norm also shifts compliance expectations from mere factory management to control of product flows after marketing, thereby broadening corporate responsibility and demanding written and measurable post-use supply chain governance.

More specific obligations regarding e-waste are reinforced by Regulation of the Minister of Environment and Forestry Number P.4/MENLHK/SETJEN/PLB.3/2/2020 concerning the Management of Hazardous Waste from Electrical and Electronic Equipment. This regulation is important because it specifies the objects and procedures for managing waste that is technically different from general hazardous waste. Through regulations that confirm the classification, collection methods, temporary storage, and handover procedures to licensed managers, Regulation P.4/2020 places producers in a proactive position. In electronic manufacturing practices, this proactive nature means that companies are required to establish take-back or return mechanisms that are accessible to consumers and after-sales networks, and then ensure that the collected units do not end up in unlicensed management. The regulation demands precision at the point of transfer, because the change in status of goods from "products" to "hazardous waste" changes the legal regime and handling standards. The consequences for relationships with third parties are very real: waste management contracts must include statements of authorization, scope of work, safety procedures, and reporting obligations, so that the procedures set out in Regulation P.4/2020 are reflected in the agreement and are easily auditable. The implementation of these strict technical and procedural standards requires an efficient operational management system that adopts waste reduction principles to ensure compliance and cost-effectiveness (Radjawane et al., 2022).

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Contractual relationships with third parties also raise issues of responsibility allocation that are often misunderstood in practice. Companies can appoint licensed third parties, but such appointments do not automatically remove the oversight obligations required by environmental regulations. Under the structure established by PP 22/2021 and Permen P.4/2020, the legality of third parties is a minimum requirement, not a guarantee that all risks will be transferred. The contract draft must therefore lock in verifiable compliance indicators, such as the obligation to submit copies of valid permits, the obligation to provide proof of receipt and processing, the obligation to separate waste types, and the obligation to refuse to accept waste outside the scope of the permit. At the managerial level, companies need to implement due diligence mechanisms prior to appointment, periodic monitoring, and document-based performance evaluations. Each of these mechanisms has a corresponding obligation in the contract, such as audit clauses, data access, and compensation in the event of a breach. Such arrangements also close the moral hazard gap, which is a situation where third parties reduce costs by diverting waste to illegal channels. If this happens, company risk being judged as negligent, especially if they cannot demonstrate reasonable oversight measures. This is why environmental law enforcement and compliance management require systematic monitoring and a comprehensive understanding of the regulatory framework (Nuraini et al., 2021).

as amended by Law 11/2020, together with Government Regulation 22/2021, provides for a series of sanctions for waste management violations. Administrative sanctions such as written warnings, government coercion, suspension of permits, and revocation of business permits are direct in nature, as they are intended to stop violations and restore compliance. For electronics manufacturers, these consequences are very material because the suspension or revocation of licenses can disrupt production, distribution, and the fulfillment of commercial contracts with buyers or principals (Nahor, 2019). This transforms e-waste management from the work of environmental units to a corporate compliance agenda, as the consequences extend to production, procurement, and finance functions. In relation to third parties, the threat of administrative sanctions encourages companies to bind partners to reporting obligations that are in line with regulatory requirements, including the obligation to submit data needed for company reporting. Weak contracts will result in failure to provide administrative evidence, even though the waste has actually been transferred. Administrative compliance must therefore be translated into measurable contractual obligations so that companies have control over the data and processes in the hands of third parties.

The environmental criminal regime in Law 32/2009 adds heavier consequences when e-waste management results in pollution or damage, whether intentional or negligent. For electronics manufacturing companies, criminal risks arise in two forms. First, internal actions that directly violate management standards. Second, failure to supervise third parties who manage e-waste illegally, thereby causing environmental consequences. In this structure, the appointment of a third party cannot be used as a justification if the company initially neglected to check permits, ignored signs of violations, or drafted contracts that clearly encouraged the transfer of waste to illegal channels. The design of legal

relationships with third parties must therefore place oversight as part of the company's obligations, not as a voluntary addition. Doctrinally, this requires companies to treat e-waste as a high-risk area requiring multiple layers of control. From a governance perspective, written and consistently implemented oversight mechanisms can distinguish between systemic negligence and reasonable compliance. The practical implication is that companies need to demonstrate that they have a system for selecting partners, conducting audits, and taking corrective action, because the burden of explanation often shifts to businesses when there are allegations of pollution related to their waste streams.

The construction of corporate legal obligations in e-waste management also intersects with social and environmental responsibilities in limited liability companies. Article 74 of the Limited Liability Company Law emphasizes social and environmental responsibilities for companies that conduct business activities in the field of and/or related to natural resources. Electronics manufacturing may intersect with this provision through the use of hazardous materials, energy and water consumption, and waste management that requires strict control to prevent pollution. An interpretation of Article 74 in the context of e-waste points to a governance obligation that places waste management as part of a company's commitment to the environment and society, with consequences for budgeting, program implementation, and reporting. In relation to third parties, the obligations of Article 74 reinforce the rationale for corporations to choose compliant and transparent partners, because failure to manage e-waste is not merely a technical violation, but also a violation of social and environmental compliance expectations that can damage a company's reputation. Because reputation affects contract sustainability, access to financing, and consumer trust, e-waste management needs to be positioned as a measure of governance integrity, so that waste management agreements must include auditable standards of conduct.

In terms of international trade and cross-border obligations, e-waste management is related to Indonesia's commitment to the Basel Convention on the control of transboundary movements of hazardous wastes and their disposal, which was ratified through Presidential Decree No. 61 of 1993. For electronics manufacturing companies, the normative implications lie in the prohibition and restriction of cross-border movement of hazardous waste without valid approval, including restrictions on the export of e-waste for purposes that can be classified as disposal or management that does not meet the requirements. When companies use third parties for management, they must ensure that the third parties do not engage in illegal cross-border shipments, for example, by declaring used goods as reusable goods when in fact they are waste. This risk affects contract design, particularly clauses on management areas, prohibitions on exports without approval, obligations to comply with customs and environmental regulations, and obligations to disclose subcontractors. At the managerial level, companies need to implement traceability to the final processing stage and prohibit the transfer of work without written consent. Without such arrangements, companies may be exposed to the risk of violations that result in administrative and criminal consequences, as well as disrupt business relationships with partners that require global environmental compliance.

If all of these regulations are combined, the legal obligations of electronic manufacturing companies regarding e-waste can be summarized as inherent, standard-based, and provable obligations. Law 32/2009 and its amendments through Law 11/2020 establish the principles of prevention and management obligations, PP 22/2021 outlines the standards and mechanisms for implementation and supervision, Law 18/2008 provides the basis for producer responsibility for products and packaging, Ministerial Regulation P.4/2020 establishes specific procedures for hazardous waste from electrical and electronic equipment, the Civil Code provides tools for establishing valid and enforceable agreements, Article 74 of the Limited Liability Company Law reinforces social and environmental obligations, and the Basel Convention closes loopholes for illegal cross-border transfers. Consequently, companies cannot view third parties as a means of transferring responsibility, but rather as an extension of their operations that must be controlled through selection, contracts, and audits. Since most obligations are evaluated through documentation, companies need to organize their document architecture from the outset, including SOPs, proof of delivery, records of occurrence, and management reports from third parties that are compatible with regulatory requirements.

At the conceptual level of business law, the relationship between companies and third-party waste managers is a meeting point between public and private norms. Public norms require compliance with permits, technical standards, and reporting, while private norms provide instruments for allocating work, costs, and risks through agreements. The challenge is to ensure that contracts do not reduce public obligations to mere formalities, but rather transform them into measurable, monitorable, and enforceable operational obligations in the event of a violation. The e-waste management contract should ideally contain several layers of clauses: a statement of compliance with Law 32/2009, Government Regulation 22/2021, and Ministerial Regulation P.4/2020; the obligation to maintain permits; the obligation to implement occupational safety and environmental standards; the obligation to submit data for reporting; a prohibition on subcontracting without approval; the right to audit the company; corrective action mechanisms; and termination clauses in the event of material violations. This structure provides companies with a civil basis for demanding performance, while also providing evidence that the company is exercising reasonable control. With this design, the legal relationship with third parties becomes a compliance tool, not just a transportation and processing service transaction.

The obligation of electronic manufacturers to manage e-waste should ultimately be understood as a normative obligation that affects corporate governance, rather than an administrative task separate from business operations. When

companies develop return programs, collection centers, or product recall channels, every decision must be aligned with the provisions of Law 18/2008 and Ministerial Regulation P.4/2020, as well as the hazardous waste standards in Government Regulation 22/2021. When companies select third parties, the decision must be in line with the prevention and control obligations in Law 32/2009, as well as the risk of sanctions that could revoke business licenses. When companies draft contracts, Article 1320 of the Civil Code and the principle of good faith dictate that the purpose of the agreement must be in line with public norms, while Article 74 of the Limited Liability Company Law requires the budgeting and management of accountable social and environmental responsibilities. When there is potential for cross-border movement, Presidential Decree 61/1993 as the basis for ratification of the Basel Convention requires extra vigilance. This entire framework shows that e-waste is an area of compliance that requires integration of internal policies, contracts, and evidence. Ultimately, the success of this system also depends on broader behavioral changes and awareness, not only from companies but also from the public as end users of products, as reflected in efforts to substitute environmentally friendly materials (Hariani & Al Hakim, 2022).

Civil Relationship Structure, Compliance Verification, and Dispute Resolution in E-Waste Management

The structure of civil relations in e-waste management in Indonesia is based on contractual principles involving three main actors, namely electronic manufacturing companies as producers, consumers as product users, and waste management service providers as parties licensed to process electronic waste. These relationships are derived from legal obligations regulated in Law No. 32 of 2009 concerning Environmental Protection and Management, Law No. 18 of 2008 concerning Waste Management, and Government Regulation No. 22 of 2021 concerning the Implementation of Environmental Protection and Management. From a civil law perspective, the three actors operate through a series of agreements with different characteristics, namely sales agreements between producers and consumers, service agreements between producers and waste managers, and factual agreements between consumers and the return system provided by producers or waste managers. This structure affects the proof of compliance because e-waste disputes almost always begin with a simple but crucial question: who controls the object when its status changes from goods to waste, who is required to hand it over to a legitimate manager, and who is required to prove that the flow complies with environmental regulations. When the answers to these questions cannot be proven, disputes can easily escalate into claims of breach of contract, unlawful acts, or compensation disputes framed by environmental norms. Such structures often face challenges in legal coherence and institutional gaps that are also found in the governance of other sectors of waste, which impacts the effectiveness of public protection (Khayru et al., 2024).

Law No. 32 of 2009 establishes waste management as a binding legal obligation for business actors and opens up the possibility of enforcement through administrative instruments and civil liability in the event of losses. In civil disputes, this law is not interpreted as "public law alone," but as a source of compliance standards that assess whether the parties have acted reasonably. For example, when consumers sue manufacturers for the absence of a safe e-waste delivery mechanism, the measure of "reasonableness" is not sufficiently derived from trade practices, but rather from standards arising from Law 32/2009, such as the obligation to prevent pollution and control risks. This law also affects evidence through the need for a paper trail. Manufacturers who claim to have fulfilled their obligations will be tested through waste management policies, e-waste acceptance procedures, delivery records, and evidence that the waste manager has legality and capacity. At this point, civil structure becomes a channel for evidence: contracts and contract implementation documents serve as "measuring tools" to assess whether control has been exercised. If producers cannot show adequate systems and evidence, the court is likely to find negligence, which could strengthen claims for damages based on unlawful acts. The enforcement of criminal law against environmental pollution provides additional context, whereby negligence in proving civil compliance may strengthen allegations of criminal acts (Mahmud et al., 2023).

Changes in the licensing and compliance regime through Law No. 11 of 2020 on Job Creation have an impact on how parties formulate civil obligations and evidence strategies in disputes. Law 11/2020 encourages a risk-based approach to business licensing and strengthens the use of standards and compliance with requirements as key elements of the legality of activities. In the civil sphere, the consequences are evident in two areas. First, electronic manufacturing companies are increasingly encouraged to include standard-based compliance clauses in their agreements with waste managers, as failure to meet standards can have implications for business licensing status and disrupt operations. Second, when disputes arise, the burden of proof no longer rests on "whether or not something has been done," but rather on "whether the procedures comply with the required standards" and "whether risk mitigation has been carried out." Law 11/2020 also affects the position of consumers. When producers claim to have provided a return scheme, consumers will question its accessibility, clarity of information, and feasibility of implementation, because the compliance standards demanded by the new regime emphasize procedural clarity. The structure of civil relations is thus adjusting to the logic of standards-based compliance, while disputes will revolve around the strength of internal documents, contract clauses, and evidence of implementation, rather than mere policy statements.

Law No. 18 of 2008, specifically Article 15, provides the basis for producers' responsibility to manage packaging and/or goods that they produce that cannot or are difficult to decompose naturally. In civil disputes, Article 15 often serves as the basis for the argument that the manufacturer's obligations extend beyond the delivery of goods

to consumers in a sale and purchase transaction. This means that the relationship between the manufacturer and the consumer through a sale and purchase contract contains an implicit obligation to provide a mechanism that enables safe end-of-life management, at least in the form of information, return facilities, or a collection network. The consequence for the burden of proof is that producers need to show that the obligations of Article 15 are translated into operational procedures, such as device return provisions, collection point cooperation, or after-sales services that accept damaged units. Consumers, on the other hand, can prove their compliance by showing evidence that they have followed the procedures provided, or that the procedures are not available or cannot be reasonably accessed. If producers fail to provide appropriate mechanisms, the argument that consumers "should manage themselves" becomes weak because Article 15 places the primary responsibility on producers to design the management of non-biodegradable goods. The civil structure then maps out the division of responsibility based on who is most likely to control the system, and Article 15 is often used as a determinant of that assessment.

Government Regulation No. 22 of 2021 details the technical and administrative obligations that serve as benchmarks in civil disputes related to e-waste, especially when e-waste is classified as hazardous waste or contains hazardous fractions. In civil relations, GR 22/2021 affects the formulation of performance in waste management service contracts. The performance of waste managers cannot be simply defined as "transporting and processing," but must be in line with requirements such as packaging, labeling, temporary storage, transportation in accordance with regulations, processing in accordance with permits, as well as recording and reporting. When disputes arise, PP 22/2021 becomes a reference for assessing whether waste managers have committed a breach of contract, for example, by using vehicles that do not meet the requirements, subcontracting without a permit, or processing at facilities that do not comply with the scope of the permit. For producers, PP 22/2021 imposes a burden of proof in the form of traceability, namely the ability to show the flow of transfers until final processing. For consumers, this regulation is relevant when they submit e-waste to official channels. If the channel processes e-waste without a transfer of ownership document, consumers may suffer losses due to the loss of proof of compliance. Good civil law structures will therefore lock in the obligation to issue receipts and documentation, as PP 22/2021 places documentation as part of verifiable compliance. The obligation to report and ensure transparency of public data in industrial waste management is increasingly becoming a requirement of modern corporate law to ensure accountability (Mamesah et al., 2024).

The specific technical regulation of the Ministry of Environment and Forestry governing hazardous waste from electrical and electronic equipment, namely Regulation of the Minister of Environment and Forestry Number P.4/MENLHK/SETJEN/PLB.3/2/2020, establishes detailed standards that are decisive in determining the direction of evidence in disputes. This regulation confirms the procedures for managing hazardous waste from electrical and electronic equipment, including the regulation of collection, sorting, storage, and delivery to authorized parties. In civil law, the existence of Regulation P.4/2020 requires agreements between producers and waste managers to include technical parameters that are usually omitted if the contract is drafted in a general logistics service format. Disputes may arise when consumers hand over devices to service centers, and the devices then "disappear" from the official flow and reappear in the informal channel. In such situations, Regulation P.4/2020 provides a test point: whether the service center is positioned as a legitimate collection point, whether there is component separation, whether there is recording, and to whom the waste is handed over. If manufacturers do not organize their after-sales networks in accordance with this regulation, they will find it difficult to prove that the loss occurred beyond their control. Waste managers must also prove that they received and processed the waste in accordance with procedures, for example through handover reports and processing reports. Regulation P.4/2020 thus transforms evidence of compliance into layered evidence that connects consumers to processing facilities.

Civil relations between producers and consumers generally take the form of sales contracts, but in e-waste disputes, these contracts are assessed together with the obligations arising from Law 18/2008 and Law 32/2009. The impact of this is evident in the expansion of the dispute: consumers can claim that manufacturers have committed a breach of contract or unlawful acts by not providing sufficient information on safe disposal, not providing return channels, or creating return schemes that are difficult to use in practice. Manufacturers usually defend themselves by stating that the disposal obligation lies with consumers after ownership has been transferred. This argument, however, will be tested against Article 15 of Law 18/2008 on producer responsibility, as well as the principle of impact control obligations under Law 32/2009. The civil structure influences the burden of proof through documents in the producer's possession, such as warranty terms, disposal instructions, take-back program announcements, collection point locations, and receipt records. Consumers prove compliance through proof of delivery, photos, electronic messages, or receipts. If the producer does not provide a mechanism that generates receipts, consumers may lose their main evidence, and this could shift the blame toward the producer for designing an unaccountable system.

The relationship between producers and waste management service providers is based on service agreements that must meet the requirements of a valid agreement under the Civil Code, particularly Article 1320. This article has a direct impact on the division of responsibility in the event of a dispute, because contracts that are unclear in their object or unlawful in their cause will weaken the producer's position in proving their case. The object of the agreement must be sufficiently specified, for example, the type of e-waste managed, the collection point, frequency, packaging method, and

final output in the form of utilization, processing, or storage. “Lawful cause” encourages agreements to be in line with PP 22/2021 and Permen P.4/2020, including the obligation to use licensed parties. If a producer signs a contract with a party that turns out to be unlicensed or exceeds the scope of its license, the dispute does not stop at default. The producer faces allegations of negligence in choosing a partner, while the liability transfer clause may be deemed ineffective because it conflicts with public order protected by environmental norms (Sutisna, 2024). In proving their case, producers need to demonstrate due diligence in licensing, performance monitoring, and audit mechanisms. Waste managers must demonstrate performance in accordance with the contract and license. A well-structured agreement makes the map of responsibilities easier to follow, while a generic contract creates a fog of proof that usually disadvantages producers.

In disputes involving three parties, proof of compliance usually follows the chain of custody and control. Law 32/2009 and Government Regulation 22/2021 emphasize the ability of parties to demonstrate the traceability of waste flows. Producers prove compliance by providing evidence that they provide official channels, appoint licensed managers, and ensure recorded transfers. Consumers prove compliance by demonstrating that they have submitted e-waste to official channels or followed announced procedures. Waste managers prove compliance through licenses, manifests or transport documents, receipt reports, and processing records. When one of the links in the chain lacks documentation, disputes often turn into arguments about the burden of proof (Widmer et al., 2015). The civil structure is crucial here because contracts can regulate who is required to issue documents, when documents are created, the form of documents, and the consequences if documents are not available. If the contract states that the waste manager is required to provide a handover report and processing certificate, then failure to provide these documents becomes an indicator of default, making it easier for producers to file a claim. If the contract does not regulate this, it is difficult for producers to prove that they have exercised due control. The design of the agreement therefore becomes a strategy for proving the division of responsibility.

The division of responsibility in civil disputes is often debated through two avenues, namely breach of contract and unlawful acts. The structure of civil relations allows for more precise mapping. If the waste manager violates technical clauses or violates the scope of the permit that has been made part of the contractual performance, then breach of contract becomes the main avenue. If consumers or the community suffer losses due to pollution, claims can be filed as unlawful acts with reference to the control obligation standards of Law 32/2009, as well as the technical standards of PP 22/2021 and Permen P.4/2020. In this pattern, a proportional division of responsibility can be established based on evidence regarding the level of control and the level of negligence. Producers are responsible for system design and partner selection, consumers for compliance with proper disposal channels, and waste managers for transportation and processing in accordance with permits. Article 15 of Law 18/2008 reinforces that producer cannot turn a blind eye to the final phase. Government Regulation 22/2021 reinforces that technical implementation must comply with standards. With a complete evidence structure, the court can separate system failure from implementation failure. Conversely, without documentation, the division of responsibility becomes speculative and risks placing the greatest burden on the party deemed most capable of exercising control, usually the producer.

The interaction between administrative law and civil relations is evident when administrative sanctions are imposed based on Law 32/2009 and Government Regulation 22/2021, and these sanctions trigger or reinforce civil disputes. For example, the suspension or revocation of permits related to waste management can cause producers to fail to fulfill their obligations to consumers or business partners, giving rise to claims for compensation. In such circumstances, producers may seek to sue waste managers for breach of contract, arguing that the waste manager's violation caused compliance risks that led to administrative action. The success of such a lawsuit is greatly influenced by the structure of the agreement, particularly clauses linking permit compliance and technical standards as key performance indicators and clauses on compensation for regulatory consequences. The waste manager, on the other hand, can defend itself by stating that the producer did not provide accurate information about the type of waste or mixed waste outside the scope of the contract, which, if proven, would shift the responsibility back to the producer. Consumers can also use the existence of administrative sanctions as an indication of the failure of the producer's system, especially if consumers have tried to use official channels but were rejected or not served. Administrative evidence arising from the enforcement of Law 32/2009 and Government Regulation 22/2021 often becomes indirect evidence in civil cases, as well as influencing the assessment of fault and the amount of compensation.

Environmental criminal liability is always a factor in assessing reasonableness, even though the dispute in question is in the civil realm. Law 32/2009 opens up the possibility of criminal liability if negligence in e-waste management causes pollution or damage, and this fact influences the behavior of the parties in drafting contracts and managing evidence. In civil disputes, the parties often try to show that they have complied in order to refute allegations of gross negligence. Producers will emphasize the existence of a reception system, internal training, and supervision of waste managers. Waste managers will emphasize compliance with permits and technical procedures. Consumers will emphasize that they handed over waste through official channels. PP 22/2021 and Permen P.4/2020 reinforce the need for evidence because both assume documented management. Law 11/2020 reinforces the logic of auditable standards and compliance. In this situation, a well-structured civil relationship serves as a preventive measure: agreements and SOPs create a clear chain of evidence, preventing civil disputes from escalating into more serious allegations. This prevention, however, does not stem solely from contractual language. It arises from the alignment of contracts with environmental

norms and documentation discipline at every point of handover, including when consumers submit devices to official channels. This compliance and accountability are an integral part of achieving sustainability in public policy, which balances economic, social and environmental aspects (Mardikaningsih & Hariani, 2021).

Finally, the structure of civil relations in e-waste management determines the quality of proof of compliance and the direction of responsibility sharing in disputes because it forms the architecture of control, oversight, and documentation. Law 18/2008 Article 15 places producers as the main responsible parties for the management of non-biodegradable goods, so producers need to prove that a return system is actually available and can be used. Law 32/2009 establishes standards for impact control obligations that influence negligence assessments, so that the evidence sought is not merely commercial transactions, but rather a trail of compliance. Government Regulation 22/2021 sets technical and administrative standards that measure whether waste managers have fulfilled their obligations, while Ministerial Regulation P.4/2020 establishes specific procedures for e-waste, which is often a point of contention. Civil Code Article 1320 ensures that contracts have a valid basis for demanding fulfillment, compensation, or termination, while Law 11/2020 frames compliance as part of licensing sustainability and risk-based standards. With this combination of norms, disputes between producers, consumers, and waste managers are ultimately decided by each party's ability to demonstrate that they have acted in accordance with their legal obligations and clearly defined contractual performance. Essentially, responsible waste management requires an approach that not only complies with legal requirements but also harnesses the economic value of recycled materials, creating a broader cycle of sustainability (Nurmalasari & Mardikaningsih, 2022).

CONCLUSIONS

The legal obligations of electronic manufacturing companies regarding e-waste are derived from environmental protection regimes, waste management, and technical provisions on hazardous waste, which place producers as the main responsible parties in the final phase of a product's life cycle. These obligations require the availability of return mechanisms, delivery through legal channels, and document-based traceability from the point of receipt to final processing. In civil relations, sales and after-sales service contracts intersect with the manufacturer's obligation to provide information and delivery facilities, while service contracts with waste managers must formulate performance in line with permits, technical standards, and reporting. When disputes arise between manufacturers, consumers, and waste managers, the main determining factor is the ability of each party to demonstrate compliance through proof of delivery, permit documents, and processing reports, so that the division of responsibility follows the extent of proven control and negligence.

The contractual structure in e-waste management transforms compliance into an issue of proof that depends on document design and contract governance, so that any administrative weakness has the potential to increase the risk of civil disputes and open the way for administrative and criminal sanctions. For producers, traceability is an operational necessity that determines their position of defense when claims arise from consumers or the public, as courts tend to assess the reasonableness of the existence or absence of a system for receiving, recording, and supervising partners. For consumers, receipts of delivery and procedural information serve as legal protection to demonstrate that disposal has been carried out through the proper channels. For waste managers, compliance with the scope of permits and technical standards is not merely a public obligation, but a contractual achievement whose failure can trigger claims for breach of contract and compensation. Private relations and environmental norms are thus interlocked through written evidence.

Electronics manufacturing companies need to establish an easily accessible e-waste return scheme, accompanied by acceptance procedures that always generate receipts, tracking numbers, and inventory records. Contracts with waste managers should include definitions of waste objects, permit compliance obligations, technical service parameters, reporting schedules, audit rights, prohibitions on subcontracting without approval, and termination and compensation clauses in the event of violations. Waste managers need to prepare a standard evidence package consisting of valid permits, handover reports, manifests, and consistent processing reports. Consumers should be provided with concise information regarding drop-off points, safe packaging procedures, and the obligation to retain receipts. The government can promote standardized handover document formats and clear complaint channels to expedite the clarification of e-waste flows before disputes escalate.

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