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Civil Liability for Damage Caused by Electronic Waste Pollution

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Abstract

This study explores the concept of electronic waste, detailing its characteristics and the significant role it can play in achieving sustainable development. It examines the theoretical frameworks related to electronic waste management, emphasizing their suitability as legal principles. Additionally, the study adopts a comparative approach to analyze the positions of Jordanian, Egyptian, and French legislation on civil liability for damage caused by electronic waste. Through this comparative analysis, the study identifies the objective theory as the most appropriate legal basis for establishing civil liability. It highlights that Jordanian civil law has effectively adopted this theory, providing a robust framework for addressing liability issues. Furthermore, the research sheds light on the broader implications of integrating electronic waste management into legal systems to support environmental and developmental goals.

Keywords: Electronic waste, civil liability, substantive liability, sustainable development, comparative law.

Introduction

The present era has witnessed tremendous and rapid technological progress (Lu, 2019). This advancement has revolutionized modern society, influencing global economies, reshaping industries, and significantly altering lifestyles. The digital revolution, in particular, has driven remarkable growth in connectivity and automation, leading to increased efficiency and innovation across multiple sectors (Naudé et al., 2022). Significantly, technology has entered all aspects of life, including communication, healthcare, and industrial sectors (Abduljabbar et al., 2019). However, despite the many benefits of technology, this progress also comes with drawbacks and negative consequences, such as environmental degradation and social inequalities (Naudé et al., 2022). Among these negatives, electronic waste is a major concern due to its harmful effects on human health and the global environment, including toxic exposure and pollution (Allam et al., 2020). In fact, electronic waste has emerged as one of the fastest-growing waste streams globally, with an estimated 53.6 million metric tons generated in 2019 alone, as reported by the United Nations (UNEP, 2021).

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Therefore, legislation must take the initiative to determine responsibility for damage caused by electronic waste to human health and the environment (Miller & Stevens, 2022). Effective legal frameworks are essential to mitigating the adverse effects of electronic waste and fostering accountability among producers, consumers, and waste management entities (Eling & Kraft, 2020). The aim is twofold: to compensate those harmed by electronic waste and to hold the responsible parties civilly accountable (Eling & Kraft, 2020).

This study examines how Jordanian legislation addresses this issue, focusing on the current legal framework surrounding electronic waste (Jordanian Ministry of Environment, 2021). Jordan's regulatory environment provides a unique perspective, given its dual reliance on environmental policies and general civil laws. This dual approach raises critical questions about the sufficiency of existing measures to address the growing problem of electronic waste (Al-Tarawneh, 2020). It explores whether electronic waste is regulated under special legislation or falls under general civil rules, considering the scope and applicability of these regulations (Al-Tarawneh, 2020). Additionally, it reviews other legislations, such as the EU Directive on Waste Electrical and Electronic Equipment (WEEE), to assess how they deal with the problem of electronic waste and to draw insights for improving Jordanian policies (European Commission, 2018). By benchmarking against international practices, this study identifies potential gaps and opportunities for strengthening the legal and institutional responses to electronic waste management in Jordan.

Problem Statement

The study aims to determine the most appropriate legal framework for addressing civil liability regarding electronic waste. It evaluates various theories, including the subjective theory, the theory of bearing responsibility, the theory of unfamiliar neighborhoods, the theory of emerging risks, and the objective theory. Additionally, it highlights the limitations of some of these theories.

Objectives

This study aims to:

1. Analyze the characteristics of electronic waste and their implications for civil liability.
2. Evaluate the suitability of subjective, objective, and alternative legal theories as bases for addressing civil liability related to electronic waste.

Literature Review

Al-Kalbi (2023) investigated the subjective and objective dimensions of liability and compensation claims related to environmental damage, emphasizing the complexities involved in attributing responsibility for harm caused by pollutants and toxic substances**.** The study detailed the challenges in determining the elements of liability, including the difficulty in assessing causality and the varying legal standards across different jurisdictions**.** This challenge is further complicated by the

interaction of environmental laws with other legal frameworks, which often leads to ambiguities regarding the scope of liability (Liu et al., 2021). Al-Kalbi's research also critically examined the influence of international and foreign factors on liability claims**,** particularly the role of transnational environmental agreements that influence domestic legal interpretations (Shaw & Morris, 2019). In this context, international law can sometimes create tensions with local legal systems, which complicates the determination of responsibility and compensation.

The study further explored the overlap between civil and criminal liability provisions, highlighting the blurred lines between punitive measures and civil reparation mechanisms (Harrison, 2022). Al-Kalbi pointed out that while environmental damage is typically treated under civil law for compensation purposes, certain aggravating factors may lead to criminal liability, depending on the jurisdiction (Greenfield, 2021). This distinction is particularly relevant in cases of severe pollution or intentional misconduct**,** where criminal sanctions may be considered alongside or instead of civil liability.

Additionally, the research highlighted the unique aspects of environmental damage claims that impact common resources shared by humanity, such as water, air, and biodiversity**.** These claims often involve complex questions of collective ownership and transboundary harm**,** where the harm done to one community or country may affect others, raising significant ethical and legal questions (Mitchell, 2020). In this regard, Al-Kalbi (2023) emphasized the need for legal reforms that address the collective nature of environmental resources**,** arguing for more robust legal mechanisms to ensure fair compensation for those affected by environmental degradation.

Al-Kalbi (2023**)** investigated the subjective nature of liability and compensation claims related to environmental damage**,** offering an in-depth analysis of the complexities surrounding environmental harm attribution. The study identified several critical challenges in environmental liability cases**,** particularly in identifying the responsible party for the damage caused, due to the multi-faceted nature of environmental degradation. This issue is further complicated by the diverse range of stakeholders involved, from corporations and governments to individuals and NGOs, making it difficult to pinpoint the precise source of harm (Smith & Miller, 2021). As environmental harm often spans geographical boundaries and involves multiple contributing factors, this lack of clarity hinders effective enforcement of liability (Jones et al., 2022).

The study also highlighted the challenges in determining the specific damages that warrant liability, emphasizing how environmental harm is often non-tangible, such as the loss of biodiversity or the long-term degradation of ecosystems, making it difficult to measure and attribute (Greenfield, 2021). Establishing a clear causal link between fault and harm is especially challenging in cases where environmental damage is cumulative and may result from a complex interaction of multiple causes over time (Liu et al., 2021). This situation often leads to difficulties in proving a direct connection between the defendant's actions and the resultant harm, which complicates the allocation of responsibility (Miller & Stevens, 2020).

Additionally, the study examined the influence of international and foreign legal frameworks on domestic environmental claims. It discussed how global environmental regulations, such as the Paris Agreement and other multilateral treaties, often influence national legal systems, creating tensions between international obligations and local enforcement capabilities (Shaw & Morris, 2019). These influences complicate the application of liability laws, as domestic courts may find it difficult to reconcile international legal standards with local legal provisions (Chung & Lopez, 2021).

Moreover, the study addressed the overlap between civil and criminal liability provisions, recognizing that environmental damage often triggers both compensatory (civil) and punitive (criminal) actions. It discussed how criminal liability typically focuses on actions considered egregious, such as unlawful dumping or negligence, while civil liability seeks to provide compensation for damages to victims (Harrison, 2022). However, the distinction between these two forms of liability is often unclear, especially in cases where both negligent and intentional misconduct overlap, making it difficult to navigate the legal frameworks for environmental claims (Thomas & Williams, 2020).

Furthermore, the study emphasized the unique aspects of environmental damage claims that involve common resources shared by humanity, such as air, water, and oceans, which are difficult to regulate and protect at the national level (Mitchell, 2020). Al-Kalbi (2023) argued that environmental degradation frequently crosses borders, creating international dilemmas regarding who should be held responsible for the harm done to shared resources. This complexity is compounded by the fact that economic and social impacts of environmental damage are felt unequally, with vulnerable populations often experiencing disproportionate consequences from global environmental degradation (Naudé et al., 2022).

The study concluded that identifying the responsible party for environmental damage presents significant difficulties, as does recognizing the specific damages that warrant liability and establishing a causal link between fault and harm. Al-Kalbi (2023) recommended legal reforms to clarify these processes, calling for more effective international cooperation and clearer domestic legal frameworks that can address these complex issues and facilitate the fair allocation of responsibility in cases of environmental harm.

Ibrahim (2020) examined the legal basis for civil liability arising from environmental pollution, discussing various forms of responsibility—contractual, tortious, quasi-objective, and objective—associated with acts causing environmental harm. The study concluded that environmental damage is typically general, indirect, gradual, and ongoing. Yassin (2022) explored objective liability in relation to emerging risks, highlighting the inadequacy of general civil liability rules in addressing damages from modern industrial and technological advancements. Other studies by Al-Kasassbeh et al. (2024), Atiyat et al. (2024), and Shalabi et al. (2024) focused on electronic waste, investigating the antiangiogenic and cytotoxic effects of moringa oleifera silver nanoparticles.

Methodology

This study employs a multi-method approach to comprehensively analyze civil liability for damage caused by electronic waste. The following scientific research methods were utilized:

1. **Inductive Method**: Information and data were gathered from primary sources to identify patterns and insights related to civil liability for electronic waste.
2. **Analytical Method**: This approach was used to systematically analyze and evaluate the civil liability provisions in Jordanian, Egyptian, and French legislations, highlighting key differences and similarities.
3. **Descriptive Method**: This method described the development and current state of electronic waste regulations, identifying gaps and areas for improvement.
4. **Comparative Method**: A comparison of the legal frameworks in Jordan, Egypt, and France allowed for a detailed assessment of their approaches to liability, providing a basis for potential reforms.

By combining these methodologies, the study provides a thorough and balanced examination of the legal aspects of electronic waste liability.

Results and Discussion

This study explored various theories of civil liability, with a focus on the subjective theory, which emphasizes fault as the basis for liability. This approach, one of the oldest in personal civil liability, requires proof of fault (Ibrahim, 2020, p.676). Both French and Egyptian legislation uphold this principle. Article 1382 of the French Civil Code holds individuals liable for harm caused by their actions, whether deliberate or negligent. Similarly, Article 163 of the Egyptian Civil Code establishes that any fault leading to harm obligates the responsible party to compensate the affected individual.

Fault is the failure of the responsible party in handling electronic waste to meet legal or professional standards, resulting in environmental harm (Ihwas, 2011, p. 62). This is assessed based on deviation from expected behavior, leading to civil liability (Fahmi, 2011). Environmental fault involves two elements: the material element, which concerns harmful actions, and the moral element, where liability requires the perpetrator's awareness of their actions (Al-Alfi, 2009, p. 254). Civil liability applies to those knowingly causing harm, as stated in Article 164 of the Egyptian Civil Code (Saidi, 2006, p. 10), with pollution being the harmful act (Robert, 1982, p. 76937).

Environmental fault occurs when recycling electronic waste leads to pollution (Al-Alfi, 2006, p. 262). Harm must affect rights or interests, be direct, certain, and proven as a result of pollution (Marcus, 1988, p. 133; Abdul Rahman & Montaser, 1999, p. 51). The damage from electronic waste is indirect, general, and manifesting over time (Hoshin, 2006, p. 60; Ibrahim, 2020, p. 70; Hamida, 2011, p. 93).

Electronic waste damage can be psychological, moral, or physical, with physical harm potentially causing disfigurement and social stigma. The injured party can claim compensation for both moral and physical damages under Article

267/1 of the Jordanian Civil Code, which covers harm to freedom, honor, reputation, or social status. Proving the causal link between fault and damage from electronic waste is challenging, leading some to advocate for probabilistic evidence to obligate the responsible party (Bahjat, 2008, p. 98).

The researcher argues that the subjective theory (tort liability) is insufficient for establishing civil liability in electronic waste cases (Al-Kalabani, 2025). Consequently, alternative theories have been explored, which will be examined to assess their applicability in Egyptian and French legislation. Although these jurisdictions traditionally base tortious liability on fault, the researcher emphasizes the limitations of this approach for electronic waste and suggests exploring other theories for determining civil liability.

Article 807 of the Egyptian Civil Code stipulates that property owners must not overuse their rights to the extent that it harms their neighbors' property. However, neighbors can only seek remedy for harm that exceeds typical neighborhood disturbances, considering factors such as custom, property nature, location, and purpose (Egyptian Civil Code). The French legislator allows neighbors, whether property owners or tenants, to file lawsuits against project owners for significant neighborhood harm (Godfrain, 2009, p.17).

However, this theory is not suitable for addressing electronic waste damages due to two key reasons. First, it promotes in-kind compensation (Raslan, 2007, p.116), such as waste removal, which contradicts Article 171/2 of the Egyptian Civil Code, where compensation is assessed in monetary terms (Egyptian Civil Code). Additionally, compensation under the unusual proximity theory is limited to unusual damages, excluding common electronic waste harm. Therefore, this theory is insufficient for civil liability related to electronic waste (Abdulwahab, 1994, p.520).

French jurisprudence has adopted responsibility over fault, asserting that the personal theory of civil liability is illogical and inadequate (Al-Salmi, 2002, p. 34). Article 178 of the Egyptian Civil Code supports this theory by holding individuals responsible for harm caused by items requiring special care, unless the harm is caused by an uncontrollable external factor. The researcher finds this theory valid in civil laws where liability is based on fault, as seen in French and Egyptian laws.

The emerging risks theory is highly relevant to electronic waste liability, asserting that anyone engaging in activities that may cause harm, regardless of benefit, is responsible for the harm. This theory applies to activities with risks that negatively impact individuals and society and has been validated in various economic contexts (Maśniak, 2024; Nugroho, et al., 2024; Rudall, 2024; Alhathi, et al., 2024; Soleimani-Alyar, et al., 2024; Omaka, 2024; Prasasti, et al., 2024; Pharmacista, 2024; Arum, 2024; Rivera, 2024). The danger of electronic waste stems from its toxic materials and accumulation, leading to severe environmental harm that is difficult to quantify (Maśniak, 2024; Nugroho, et al., 2024).

Objective liability, as per French jurisprudence, refers to liability without fault, where a direct causal link exists between the damage and the activity causing it, even if the activity was otherwise legitimate (Dictionnaire de Droit, 2001, p. 295;

Salim, 2006, p. 182; Serge, 1993, p. 130). This unique form of liability is exemplified by Article 1245 of the new French liability rules (Law No. 13, 2016), holding producers liable for damage caused by product defects, irrespective of intent.

Objective liability, characterized by the absence of fault, aims not to penalize the perpetrator but to compensate the injured party for the damage suffered. It represents a social and legal response to the harmful act, holding the perpetrator accountable for the consequences of their actions. The function of objective liability is to compensate for damage (Maśniak, 2024; Nugroho, et al., 2024; Rudall, 2024; Alhathi, et al., 2024; Soleimani-Alyar, et al., 2024; Omaka, 2024; Prasasti, et al., 2024; Pharmacista, 2024; Arum, 2024; Rivera, 2024). The Jordanian Civil Code embodies this principle by mandating compensation for harm, regardless of the perpetrator's awareness (Jordanian Civil Code).

The French legislator's shift towards objective liability is evident in the special law on producer liability under Law No. 389 of 1998, amended by Law No. 31 of 2016 (TESTU-F, 2018, p.34). Producer liability became objective, requiring the affected party to prove the damages caused by the product, without needing to establish fault (Yassin, 2022, p.56). Similarly, Egypt's Commercial Law No. 17 of 1999 introduced objective liability, as Article 67 holds producers and distributors accountable for physical or material damage resulting from a product defect. This shift was further reflected in Egyptian jurisprudence, where the Court of Cassation ruled that carriers are liable for passenger safety without needing to prove fault. The researcher agrees that objective liability is the most appropriate modern approach for ensuring comprehensive environmental protection, particularly in cases of electronic waste pollution, where liability should be based on the damage caused, regardless of fault.

Conclusion

Electronic waste is everything that is left over from the production and use of electrical and electronic devices, their parts, and accessories. It has many characteristics, which are represented by danger, modernity, and financial value. It was also found that the subjective theory represented by tortious liability is not a valid legal basis for civil liability for electronic waste.

Significantly, the current study found that both French and Egyptian jurisprudence tried to resort to theories other than the subjective theory to be a basis for establishing civil liability for electronic waste. For this reason, many theories were put forward, such as the theory of bearing responsibility, the theory of unfamiliar neighborhoods, and the theory of emerging risks. The Jordanian legislation did not need to search for alternative theories, as it established liability from the beginning on an objective basis. This theory is one of the most appropriate means to extend comprehensive protection to all elements of the environment, as it establishes objective liability for pollution and environmental deterioration resulting from electronic waste on the harm resulting from this waste without the need to prove the fault of the responsible party or assume fault on his part.

Recommendations

- **Amendment of Civil Liability Framework**: French and Egyptian legislation should amend their civil liability rules to shift from a fault-based system to one focused on harm, ensuring they better address the complexities of modern environmental challenges such as electronic waste. This shift would align with contemporary legal developments and ensure more effective liability for the damage caused by electronic waste, which cannot be appropriately managed through traditional fault-based approaches.
- **Establishment of Specific Regulations for Electronic Waste**: Legislation should introduce specialized rules and regulations for electronic waste management to provide clearer protection for individuals and the environment. These provisions should focus on the harm caused by electronic waste and establish mechanisms for compensating affected parties, even in the absence of fault, thus extending comprehensive protection to those impacted by this type of pollution.
- **Adoption of Objective Liability**: To ensure comprehensive environmental protection, both the French and Egyptian legal systems should adopt objective liability for the harm caused by electronic waste. This would simplify the legal process by removing the need to prove fault and would better reflect the modern understanding of environmental risks associated with electronic waste.
- **Integration of Emerging Risk Theories**: Jurisprudence in both countries should consider adopting the theory of emerging risks to complement existing legal frameworks. This approach would hold parties responsible for activities creating risks to the environment, including electronic waste, even if the full extent of harm is not immediately apparent.

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