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PERSPECTIVE

The Malignant Circle of Circular Economy

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Abstract

While the Circular Economy (CE) is widely regarded as a strategy for sustainability, little research has examined how its principles are distorted and exploited by criminal ecosystems. This study investigates the deviant appropriation of CE practices—such as refurbishing, recycling, and reselling—by organized crime networks, conceptualized as the "malignant circle" of the CE. Using a qualitative approach, the paper synthesizes empirical evidence from global case reports and the literature to analyze how illicit actors distort CE flows to profit and fund criminal activities. The findings reveal six overarching criminal practices that subvert CE principles, including e-fencing, illegal waste dumping, and counterfeit upcycling, perpetuating criminal ecosystems while undermining sustainability goals. A conceptual model and structured typology are introduced to illustrate the feedback loops that sustain this malignant system. The study contributes to the CE and criminology literature by highlighting policy gaps and discussing solutions to disrupt illicit circular flows, with implications for traceability, digital governance, and consumer education.

Keywords Criminal Ecosystems · Illicit Circular Practices · Supply Chain Traceability · E-fencing Networks · Counterfeit Upcycling

1. Introduction

The main idea behind the Circular Economy (CE) is that it can address many sustainability issues related to resource generation, increase overall manufacturing efficiency, manage waste generation, prolong the products' life cycles, and implement renewable energy sources (Stahel, 2016; Ferasso et al., 2023). The CE is primarily conceived through the Rs strategies and presented in a wide array. Most of the definitions aligned in considering R actions such as reducing, reusing, recycling, repairing, remanufacturing, recovering, redesigning, refusing, rethinking, repurposing, and reverse logistics (Manickam & Duraisamy, 2019; MacArthur, 2013; Urbinati et al., 2017; Geissdoerfer et al., 2017; Kirchherr et al., 2017; Kirchherr et al., 2023; Zsakay, 2019). Recently, with the spread of Industry 4.0 and 5.0 and artificial intelligence, digitalization and modern technologies fostered CE implementation by leveraging overall processes' efficiency (Jiang et al., 2022; Lee et al., 2023).

Despite these advancements in CE, its application principles can sometimes take an unexpected turn. Unfortunately, the CE's Rs strategies fostered robberies and other illegal economic activities, leading to a *'malignant CE circle'* within criminal ecosystems. Motivated by recent international reports on robberies,

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counterfeit trade, and illegal waste disposal, this study analyzes how criminal actors exploit CE practices—such as refurbishing and reselling stolen goods—for illicit profit.

The main goal of this article is to analyze the deviant use of CE's strategies to fund criminals and form a malignant circle of such activities. I present some critical problems related to criminal actions, supported by the distorted use of CE actions across entire criminal ecosystems. Then, I present the fundamental ideas of the malignant CE circle, finalizing with suggestions for policymakers, governments, society, and companies to tackle the identified issues.

2. Criminal Subversion of Circular Economy Flows

In transitioning from a linear "take-make-dispose" model to a CE, the 4Rs (Reduce, Reuse, Recycle, Recover) are frequently championed as routes to resource efficiency and sustainability (Stahel, 2016). However, this laudable shift also creates opportunities for illicit actors who appropriate circular flows not as benign reuse of materials but as a *malign cycle of exploitation and crime*. Specifically, refurbishing and reselling stolen goods exemplifies how criminal actors may co-opt legitimate CE practices.

From a criminological perspective, this phenomenon can be understood through the enterprise theory of organized crime: criminal actors enter markets when profit opportunities are high, risks are low, and regulatory or monitoring barriers are weak (Smith, 1980; UNODC, 2018). In the context of a CE, second-hand and refurbished goods markets are gaining legitimacy and demand, reducing the stigma and detection risk for illicit actors.

In this specific illicit-circular dynamics, one may distinguish the following analytical dimensions:

- *Source exploitation*: Goods stolen from licit channels (e.g., vehicles, spare parts, electronics) enter refurbishment circuits masquerading as legitimate reused goods.
- *Transformation/valorization*: The stolen goods are cleaned, lightly modified, or rebranded and reintroduced into reuse markets under the guise of circularity.
- *Market insertion*: The refurbished items are sold legitimately or semi-legitimately (online platforms, second-hand shops, exportations), where they blend with *bona fide* reused goods, making detection difficult.
- *Feedback into the circle*: Profits from this illicit reuse are reinvested by criminal actors into further theft or illegal procurement of goods, thereby perpetuating the malignant reuse circle.

These activities are neither solely illegal waste disposal nor traditional counterfeiting; instead, they involve theft *and* reuse/refurbishment, *and* resale within a CE setting. Conversely, other illicit CE forms, such as illegal waste trafficking or counterfeit "green" goods, require distinct analytical treatment. Considering how these activities interact with CE policy features, many reuse/refurbishment schemes rely on extended producer responsibility (EPR), reverse logistics, and traceability systems. Weak oversight, inadequate chain-of-custody controls, or regulatory gaps in end-of-life markets provide criminal actors with structural opportunities to exploit circular flows, such as institutional failures in collective waste-recovery systems (Yamaguchi, 2023).

Furthermore, the global illicit economy literature highlights how illegal reuse markets may scale when linked to broader organized crime networks (Sutton, 1995; Quinn et al., 2022; Estancona, 2025). For instance, the Global Initiative's report on the global illicit economy emphasizes how commodity flows (including second-hand/refurbished goods) become integrated into transnational criminal value chains (Global Initiative Against Transnational Organized Crime, 2021).

We can theorize a hybrid value chain by linking this to CE pathways: conventional circular-reuse networks converging with stolen-goods networks. The policy and governance implications are considerable, especially in intervention levers by enhancing traceability in reuse markets. Additionally, applying the market reduction approach aims to reduce the opportunity for illicit resale, a concept long used in research on stolen goods (Malakouti & Hazrati, 2025).

The following sections consolidate these forms of illicit circular activity into a conceptual model—the malignant circle of the CE—showing how each practice perpetuates criminal ecosystems.

2.1. Trade of counterfeit products and e-fencing

Counterfeit products are also made from recycled raw materials. One recent example came from China, where authorities dismantled a major counterfeit operation manufacturing fake AirPods using low-cost materials in Sichuan Province. The raid uncovered three production lines, nine counterfeit production sites, and six sales locations, confiscating over 114,000 counterfeit units. Apple lost US$3.2 billion in 2021 due to counterfeit AirPods, while customers faced risks, including poor performance, safety hazards, and privacy concerns from unregulated components (Lovejoy, 2024).

In 2024, US counterfeiters purchased stolen goods and sold them online (called e-fencing) through Amazon and eBay. E-fencing allows criminals to reach a broader customer base while maintaining anonymity. There are cases in which discarded branded clothing is being upcycled by criminals to mimic authentic products (U.S. Department of Justice, 2025).

2.2. Illegal disposal of waste

Companies are increasingly exploiting CE practices to dispose of hazardous waste illegally. In the US, Cosmo Specialty Fibers faced fines for improper hazardous waste management, while Canadian companies were exposed for exporting over 2,300 metric tons of contaminated waste to developing countries in 2022 (Washington State Department of Ecology, 2024; Klean Industries, 2024). In Italy, criminal organizations known as "ecomafia" engage in illegal waste dumping, causing environmental harm. These activities are exacerbated by mislabeling and a lack of transparency, hindering enforcement. The EU is responding with stricter regulations on cross-border waste transportation to address the issue (Bolevich, 2024).

The recycling industry faces challenges from theft and illegal practices due to the high value of recycled materials. Criminals steal recyclable materials and exploit their lack of traceability to profit. Additionally, electronic waste is often illegally exported to developing countries. For example, the US company Executive Recycling falsely claimed to recycle e-waste while exporting it to China (U.S. Immigration and Customs Enforcement, 2024). Similar schemes involve criminals collecting e-waste under the guise of recycling but illegally shipping it abroad under hazardous conditions.

3. Structured Overview of Illicit Circular Economy Practices

To complement the qualitative information from the cases discussed in previous sections and strengthen the analytical depth of this study, Table 1 synthesizes the main criminal activities identified across countries, linking them to their societal impacts and the corresponding CE principles distorted by illicit actions.

Table 1. Illicit CE practices, their societal Impacts, and related CE principles (Source: Own elaboration.)

Type of Criminal Activity	Description / Examples	Main Societal and Policy Impacts	Distorted CE Principles (Rs)
Refurbishing and reselling stolen goods	Theft of vehicles, electronics, and other goods for resale through disassembly companies, informal repair shops, and online platforms (e.g., São Paulo, New York).	– Financial losses for consumers and legitimate businesses. – Growth of informal and criminal economies. – Weakening of tax collection and product traceability systems. – Increased corruption and law-enforcement burden.	Reuse, Repair, Refurbish
E-fencing of stolen or counterfeit products	Online resale of stolen or fake goods via Amazon, eBay, and fraudulent websites; often involving upcycled branded clothing or electronics (e.g., e-commerce in the U.S.).	– Consumer deception and safety risks. – Market distortion and erosion of brand trust. – Challenges for digital-platform governance and international policing.	Reuse, Refurbish, Rethink
Counterfeit upcycling	Use of recycled or discarded materials to manufacture counterfeit products (e.g., fake AirPods factories in China).	– Health and safety hazards for users. – Intellectual-property violations. – Loss of legitimate market value. – Increased environmental waste from substandard products.	Refurbish, Recycle, Rethink
Illegal disposal of hazardous waste	Export or dumping of contaminated or industrial waste by companies (e.g., U.S., Canada, and Italy's "ecomafia").	– Severe environmental degradation and public-health threats. – Burden on developing countries receiving waste. – Regulatory failure and governance challenges.	Reduce, Recover, Recycle
Theft and trade of recyclable materials and e-waste	Theft of valuable recyclables; false claims of recycling while exporting e-waste illegally (e.g., Executive Recycling case, U.S.).	– Environmental and occupational hazards. – Undermining of legitimate recycling industries. – Loss of consumer trust in "green" supply chains.	Recover, Recycle
Unlicensed repair and refurbishment services	Informal workshops repairing stolen or counterfeit goods, often without safety standards or taxes (e.g., São Paulo).	– Consumer exposure to unsafe repairs. – Fiscal evasion and unfair competition. – Loss of traceability in product life cycles.	Repair, Refurbish, Reuse

The table demonstrates that each criminal activity simultaneously undermines multiple Rs of the CE, producing negative ripple effects across society, governance, and legitimate markets. Collectively, these interactions constitute the "malignant circle"—a self-reinforcing system in which profits from illicit CE practices fund further criminal operations.

This structured comparison demonstrates that illicit circular practices—such as the refurbishing and resale of stolen goods, e-fencing of counterfeit products, illegal waste disposal, and unlicensed repair networks—affect economic systems, consumer safety, public policy, and environmental governance. Each criminal

activity exploits one or more of the Rs of the CE, thereby transforming legitimate sustainability strategies into mechanisms that sustain criminal ecosystems.

These patterns illustrate how the "malignant circle" of the CE perpetuates itself through feedback loops between profit generation, market demand, and regulatory weaknesses, reinforcing the need for targeted policy interventions and multi-stakeholder governance responses.

4. The malignant circle of CE

Criminal activities contribute to the perpetuation of each CE Rs identified in the analyses (see Figure 1).

Actions associated with the *'reduce'* principle are driven by illegal waste dumping and exportation, leading to severe health and environmental hazards. The *'recover'* action is promoted by illicit recovery processes, which involve material misuse and result in additional health risks and environmental damage. The 'reuse' principle is reinforced by the resale of stolen goods and by e-fencing, fueled by consumer demand for such products.

Unsafe repair activities on stolen items, unlicensed repair services, and the removal of product ownership and traceability by criminals exacerbate the '*repair*' action. The *'refurbish'* action thrives on refurbishing counterfeit goods and repurposing stolen or discarded original products and byproducts. The *'recycling'* principle is sustained by the theft of valuable recyclable materials, smuggling waste across borders, and the upcycling of counterfeit products and packaging. Finally, the *'rethink'* action is bolstered by the intentional repacking of counterfeit products as originals, consumer demand for counterfeits, and the criminal innovation driving the counterfeiting industry.

These actions perpetuate a malignant circle of criminal activities, undermining CE principles, sustaining criminal ecosystems, and generating profits that further fuel their existence.

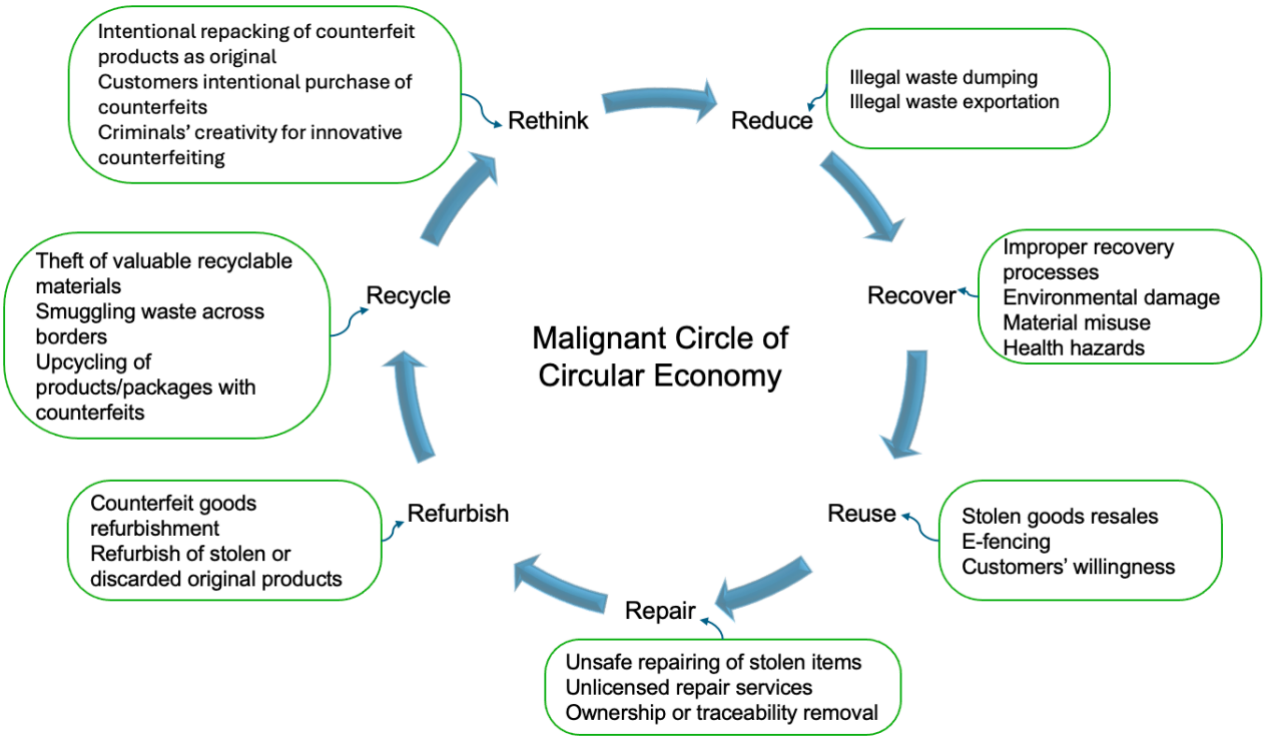

Figure 1. The malignant circle of CE

5. Suggestions for disrupting the malignant circle of CE

To dismantle the malignant circle of criminal activities in the CE, several recommendations are proposed for the involved stakeholders.

Empowering consumers through education is crucial, focusing on the risks of purchasing counterfeit or stolen products, particularly in secondhand markets, the health hazards of improperly refurbished goods, and the importance of secure disposal practices. Consumers should also be educated on how to identify certified dealers to ensure product safety and integrity.

Corporations can significantly contribute by adopting certifications that comply with environmental and ethical standards, such as the R2 certification for electronics recyclers. Another robust measure is implementing traceability through blockchain technology for products, byproducts, and parts within supply chains. This would deter illegal recycling activities and prevent unlicensed repair and refurbishing services. Information-sharing initiatives, such as ScrapTheftAlert.com, should be expanded to encourage collaboration among manufacturers, legal recyclers, law enforcement, and consumers to identify and recover stolen goods from illegal resales.

Government bodies and private companies should promote responsible consumption of upcycled products. At the same time, manufacturers must strengthen take-back programs and ensure responsible waste disposal. Public organizations must invest in effective rehabilitation programs for individuals affected by substance abuse, integrating them into certified recycling and refurbishing jobs.

Policymakers can further enhance the effectiveness of these measures by introducing incentive-based programs, such as rewards for take-back initiatives and certifications for recycling, refurbishing, and waste management organizations. To foster a culture of compliance, businesses committed to ethical recycling practices should be offered tax breaks or grants. Policymakers can also introduce reduced taxes for businesses using recycled parts sourced from authorized and certified dealers.

Combating criminal activities requires national and international cooperation, strengthened law enforcement, and partnerships with companies like eBay to address the sale of counterfeit and stolen goods. Police must track CE-related crimes and improve documentation, while ensuring compliance with international conventions like the Basel Convention for managing hazardous waste.

In conclusion, a multifaceted approach involving consumer education, corporate responsibility, stronger regulations, and enhanced law enforcement collaboration is critical to dismantle criminal ecosystems based on CE.

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Declarations

Competing Interests The authors declare no competing interests.

References

Bolevich, M. (2024, July 16). Waste crime in Italy: The challenge of environmental justice. JusticeInfo. Retrieved July 17, 2025, from https://www.justiceinfo.net/en/134262-waste-crime-in-italy-the-challenge-of-environmental-justice.html

Estancona, C. (2025). From Cocaine to Avocados: Criminal market expansion and violence. International Organization, 79(3), 417-455.

Feltran, G. (2019). (Il)licit Economies in Brazil: An Ethnographic Perspective. Journal of Illicit Economies and Development, 1(2), 145-154. https://doi.org/10.31389/jied.28

Ferasso, M., Tortato, U. & Ikram, M. Mapping the Circular Economy in the Small and Medium-sized Enterprises field: An exploratory network analysis. Cleaner and Responsible Consumption 11, 100149 (2023). https://doi.org/10.1016/j.clrc.2023.100149

Fromm, D., & Motta, L. (2021, August 31). Disputing poverty capital, reproducing urban inequalities: Auto insurance, militias, and car theft in Brazil. PoLAR: Political and Legal Anthropology Review. Retrieved July 17, 2025, from https://polarjournal.org/2021/08/31/disputing-poverty-capital-reproducing-urban-inequalities-auto-insurance-militias-and-car-theft-in-brazil/

Geissdoerfer, M., Savaget, P., Bocken, N. M., & Hultink, E. J. The Circular Economy–A new sustainability paradigm? Journal of Cleaner Production 143, 757-768 (2017). https://doi.org/10.1016/j.jclepro.2016.12.048

Global Initiative Against Transnational Organized Crime. (2021, March 1). The global illicit economy: Trajectories of transnational organized crime. Geneva, Switzerland: Global Initiative. Retrieved October 19, 2025, from https://globalinitiative.net/wp-content/uploads/2021/03/The-Global-Illicit-Economy-GITOC-Low.pdf

InSight Crime. (2024, June 5). Brazil's gangs expand their control over internet services. InSight Crime. Retrieved July 17, 2025, from https://insightcrime.org/news/technology-is-increasingly-at-the-heart-of-criminal-operations-in-brazil/

InterLira Risk Consultancy. (2025, August 5). Urban security in São Paulo: Shifts, gains, and gaps in 2024. InterLira Reports. Retrieved July 17, 2025, from https://interlira-reports.com/security/urban-security-in-sao-paulo-shifts-gains-and-gaps-in-2024/

Jiang, Y., Li, X., Luo, H. et al. Quo vadis artificial intelligence? Discovery Artificial Intelligence 2, 4 (2022). https://doi.org/10.1007/s44163-022-00022-8

Kirchherr, J., Reike, D. & Hekkert, M. Conceptualizing the circular economy: An analysis of 114 definitions. Resources, Conservation and Recycling 127, 221-232 (2017). https://doi.org/10.1016/j.resconrec.2017.09.005.

Kirchherr, J., Yang, N.-H. N., Schulze-Spüntrup, F., Heerink, M. J., & Hartley, K. Conceptualizing the Circular Economy (Revisited): An Analysis of 221 Definitions. Resources, Conservation and Recycling 194, 107001 (2023). https://doi.org/10.1016/j.resconrec.2023.107001.

Klean Industries. (2024, May 13). Canada's waste plastics paper trail. Retrieved July 17, 2025, from https://kleanindustries.com/insights/market-analysis-reports/canada-waste-plastics-paper-trail/

Lee, M. C. M., Scheepers, H., Lui, A. K. H., & Ngai, E. W. T. The implementation of artificial intelligence in organizations: A systematic literature review, Information & Management 60(5), 103816 (2023). https://doi.org/10.1016/j.im.2023.103816

Lovejoy, B. (2024, January 30). Counterfeit AirPods factory was operating three production lines worth $23.5M. 9to5Mac. Retrieved July 17, 2025, from https://9to5mac.com/2024/01/30/counterfeit-airpods-factory-was-operating-three-production-lines-worth-23-5m/

MacArthur, E. Towards the circular economy. Journal of Industrial Ecology 2, 1, 23-44 (2013). https://www.werktrends.nl/app/uploads/2015/06/Rapport_McKinsey-Towards_A_Circular_Economy.pdf

Malakouti, Z., & Hazrati, M. (2025). Interconnected challenges: Examining the nexus of environmental crime and money laundering in the context of energy transition. Journal of Economic Criminology, 8, 100151. https://doi.org/10.1016/j.jeconc.2025.100151

Manickam, P. & Duraisamy, G. 4 - 3Rs and circular economy. In Subramanian Senthilkannan Muthu (Ed.). The Textile Institute Book Series, Circular Economy in Textiles and Apparel, Woodhead Publishing, 77-93 (2019). https://doi.org/10.1016/B978-0-08-102630-4.00004-2

Marcelo, P. (2024, November 26). Shoplifting ring stole $2 M in cosmetics and clothes then resold them abroad, prosecutors say. AP News. Retrieved July 17, 2025, from https://apnews.com/article/stolen-merchandise-ring-new-york-dominican-republic-83f3179a14a1fb0ad5c594df77c33185

Quinn, L., Clare, J., Lindley, J., & Morgan, F. (2022). Demand for and disposal of stolen goods in legitimate second-hand online markets: an explorative online survey. Global Crime, 24(1), 19–48. https://doi.org/10.1080/17440572.2022.2142781

Smith, D. C. Jr. (1980). Paragons, pariahs, and pirates: A spectrum-based theory of enterprise. Crime and Delinquency, 26(3), 358-386.

Stahel, W. R. The circular economy. Nature 531, 7595, 435-438 (2016).

Sutton, M. (1995). Supply by theft: Does the market for second-hand goods play a role in keeping crime figures high? British Journal of Criminology, 35(3), 400-416.

U.S. Department of Justice. (2025, January 30). Hoover brothers sentenced for selling stolen goods online. Retrieved July 17, 2025, from https://www.justice.gov/usao-ndal/pr/hoover-brothers-sentenced-selling-stolen-goods-online

U.S. Immigration and Customs Enforcement. (2024, November 15). Environmental waste recycling company and 2 senior executives indicted for illegal export of hazardous waste. ICE HSI Denver. Retrieved July 17, 2025, from https://www.ice.gov/news/releases/environmental-waste-recycling-company-and-2-senior-executives-indicted-federal-grand

United Nations Office on Drugs and Crime. (2018). Module 7: Enterprise or business model of organised crime (in E4J University Module Series — Organised Crime). Retrieved October 19, 2025, from https://www.unodc.org/e4j/ru/organized-crime/module-7/key-issues/enterprise-or-business-model.html

Urbinati, A., Chiaroni, D., & Chiesa, V. Towards a new taxonomy of circular economy business models. Journal of Cleaner Production 168, 487-498 (2017). https://doi.org/10.1016/j.jclepro.2017.09.047

Washington State Department of Ecology. (2024, September 24). Paper mill issued $42,000 penalty for hazardous waste violations. Retrieved July 17, 2025, from https://ecology.wa.gov/about-us/who-we-are/news/2024/sept-24-cosmo-penalty

Yamaguchi, S. (2023, July 6). The nexus between illegal trade and environmental crime (OECD Trade and Environment Working Papers No. 2023/02). Organization for Economic Co-operation and Development. Retrieved October 19, 2025, from https://www.oecd.org/content/dam/oecd/en/publications/reports/2023/07/the-nexus-between-illegal-trade-and-environmental-crime_a5d90962/8dae4616-en.pdf

Zsakay, A. Achieving the circular economy in Asia. MakintIt: Industry for Development 26, 30-32 (2019). https://www.unido.org/sites/default/files/files/2019-10/makingit_26_web.pdf