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MORALITY BEFORE KNOWLEDGE

# Examining the implementation of extended producer responsibility within the palm oil industry: Challenges and opportunities for sustainable practices

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## ABSTRACT

**Background:** Indonesia, as the world's leading palm oil producer, significantly contributes to the global supply and national GDP. However, the industry's expansion has led to increased plastic waste generation, exacerbating environmental and health concerns due to inefficient waste management. Extended Producer Responsibility (EPR) has been proposed as a strategic solution to improve sustainability in the sector. **Method:** This study conducts a systematic review of sustainability reports from Indonesian palm oil companies, analyzing corporate approaches to plastic pollution, sustainable packaging, and EPR. Data were collected from company websites and linked packaging-related sections, followed by a content analysis to assess commitments to these key areas. **Findings:** The analysis reveals a divide within the sector: while half of the major companies acknowledge plastic pollution in their reports, the other half lack awareness or action. Sustainable packaging initiatives remain insufficient to meet Indonesia's target of reducing plastic usage by 30% by 2029. Additionally, corporate commitment to EPR is limited to only a small portion of the industry. **Conclusion:** The study highlights the need for stronger regulatory enforcement and corporate accountability in addressing plastic waste management. A broader adoption of EPR and sustainable packaging practices is crucial for the palm oil sector to align with national and global environmental goals. **Novelty/Originality of this Study:** This study provides a critical assessment of plastic waste management in the Indonesian palm oil sector, offering insights into corporate sustainability commitments. By evaluating EPR adoption and sustainable packaging practices, it identifies gaps and areas for policy and industry improvement.

**KEYWORDS**: awareness; extended producer responsibility; plastic pollution; plastic reduction; sustainable packaging.

## 1. Introduction

The palm oil sector in Indonesia has experienced significant growth and transformation. Indonesia is the world's largest producer of palm oil, accounting for 59% of total global production in 2024. Consequently, the palm oil industry is a crucial factor in Indonesia's GDP and plays a vital role in the country's economy. This growth has led to an increase in the use of plastic and packaging in the palm oil sector. Plastic and packaging have become essential components in the palm oil sector in Indonesia (Shigetomi et al., 2020). During the production of palm oil, a significant amount of waste is generated. However, because of inefficient handling and utilization, this waste is becoming a more prominent issue (Yaro et al., 2022). All plastic contains additives. Once in the environment, these will start to leach out and will expose and harm aquatic biota, causing potentially lethal and sub-

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lethal toxic effects. Even though life cycle assessment covers the toxic impacts of several thousands of chemicals, models to assess the toxic impacts of plastic additives are only emerging (Casagrande et al., 2024). Depositing plastic waste has long been a prevalent method of utilization, persisting today. Plastic waste within municipal waste landfills (MWL) undergoes diverse (bio-)degradation processes, which may be a potential source of chemicals and microorganisms harmful to the environment and human health (Redko et al., 2024).

Extended producer responsibility (EPR) is an environmental policy strategy that makes producers responsible for the waste management of their products and packages. A key goal of EPR is to incentivize producers to (re)design their products and packages to improve their environmental performance, especially at the end of life (Lifset et al., 2023). Packaging waste has been managed following the polluter pay principle, whereby the polluter is responsible for the environmental impacts caused by the waste (pollution). However, other agents involved in the packaging waste life cycle, namely, the packaging producer, should bear co-responsibility and contribute to reducing the pollution caused by packaging waste. Such an extension of the responsibility is called 'extended producer responsibility' (EPR) (Pires et al., 2015). The increase in plastic solid waste (PSW) volume continues to challenge the global plastic waste management system, disposal regulators, and infrastructure (Tumu et al., 2023). in accordance with the regulations of the minister of environment and forestry of the Republic of Indonesia number p.75/menlhk/setjen/kum.1/10/2019 about road map for waste reduction by producers The waste reduction Roadmap for the period 2020 to 2029 is implemented to achieve the target of reducing waste by Producers in each business sector by 30% (thirty percent), compared to the Baseline of Waste Generation in the form of goods, product packaging, and/or containers produced and/or used by Producers in their business in 2029. Collective-physical form of EPR holds the most promise in supporting circular economic transitions. It is therefore recommended that the development of EPR focuses on creating inter-organizational bodies that can enhance collection of household waste and the repurpose of plastic material into new products. It is also noted that resolving data uncertainties through precise measurement and proper input from government and stakeholders would enhance the reliability of the assessment of circular strategies undertaken under the EPR legislation. This is why more transparency in the EPR strategy design process in Indonesia is called for, so that more accurate and informed analysis of different EPR strategies is possible. It is critical to note that the inclusion of more economic, environmental and social assessment criteria is strongly recommended. Through cocreation techniques and incorporation of the approach into professional decision-support-tools, the applicability of the proposed tactic can be justified (Amin et al., 2022).

Extending the responsibility of producers to the entire lifecycle of their products requires additional incentives for the companies to align the efforts of all stakeholders in production and consumption (Peng et al., 2023). Because of the dangers of plastic waste, it is necessary to have producer responsibility for the plastic waste produced to prevent damage to the environment. Given the importance of the contribution of the palm oil industry as a producer that produces plastic waste, it is necessary to do research for the current conditions regarding producer responsibility in the palm oil industry for plastic waste. From the analysis and previous research, the research question arises, how do the largest palm oil companies implement EPR policies? And what is the EPR strategy of the largest palm oil company? With the assumption that there are no palm oil companies implementing end-to-end EPR in Indonesia and waste management strategies are only limited to corporate sustainability report. From previous research, no one has examined producer responsibility in the palm oil sector, therefore, to find out the situation in Indonesia in the palm oil sector, further studies are needed to analyze readiness and evaluate company policies for plastic waste processing in Indonesia.

## 2. Methods

This study uses a systematic review of corporate sustainable reports to examine how consumer packaged goods companies in the palm oil sector are addressing plastic pollution and plastic packaging. We used the following steps to systematically select the set of companies for the study. First, we identified the largest palm oil company according to Green Peace's processing of area data (https://kepohutan.greenpeace.org/). We then used the Corporate Register database to download, in pdf format, the most recent corporate sustainability reports, ranging from 2018 to 2022, for all top 24 companies. We obtained the corporate sustainability reports directly from company websites. Additional information provided like hyperlinks in the packaging section of corporate reports was obtained from company websites and compiled in a separate pdf document for each company. Code mapping approaches have been used in previous studies of corporate sustainability reports (Phelan et al., 2022), including (Given, 2008; Roca & Searcy, 2012; Kozlowski et al., 2015; Stewart & Niero, 2018).

Table 1. Keywords used in content analysis

| Key themes | Keywords |
|---|---|
| Plastic pollution | Marine plastic pollutants, plastic consumption, plastic solid waste, plastic waste, plastic waste reduction, single-use plastic, waste management, waste reduction, conventional plastic, plastic pollution, plastic materials |
| Sustainable packaging strategy | Reduce packaging, packaging design, packaging, sustainable packaging |
| Producer responsibility | Extended producer responsibility, ocean clean-ups, plastic waste utilization, recycling, reuse, waste bank, waste recycling |

Content analysis was then used to identify explicit references to the key themes formulated in the three research questions - plastic pollution, sustainable packaging strategies, and producer responsibility. Content analysis is used to examine the characteristics of a text to interpret meaning based on the frequency of concepts, such as words or phrases (Landrum & Ohsowski, 2018). Content analysis methodology has been used by others to examine CS reports, including (Dobbs & van Staden, 2016; Lock & Seele, 2016; Kozlowski et al., 2015; Stewart & Niero, 2018; Roca & Searcy, 2012). First, we identified where the company makes explicit reference to “plastic pollution”, “sustainable packaging strategies”, and “producer responsibility”. Then we conducted searches with the following keywords inductively derived from the data: “marine plastic pollutans”, “reduce packaging”, “extended producer responsibility”, “plastic consumption”, “waste recycling”, “sustainable packaging”, “waste management”, “packaging design”. The full list of keywords used is shown in Table 1.

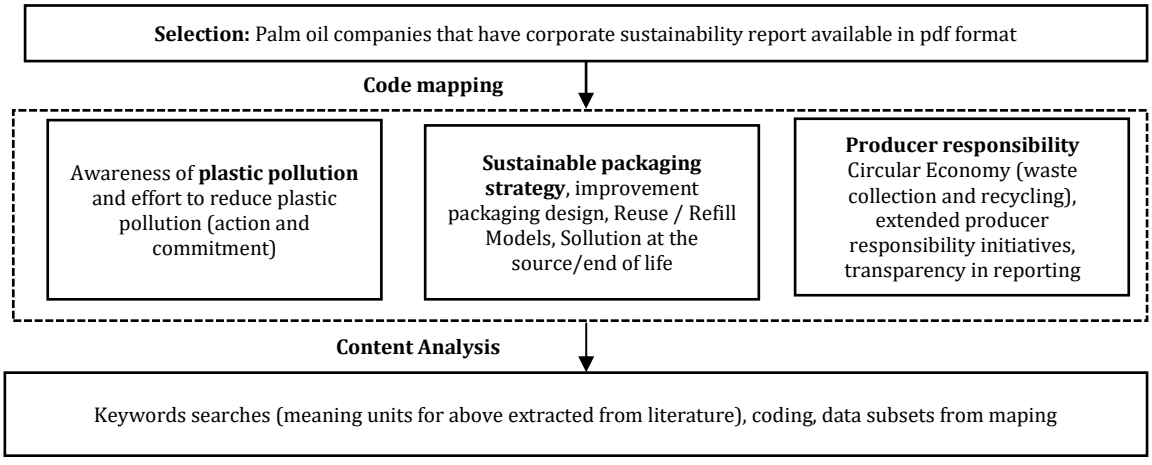


Fig. 1. Stepwise procedure and methodological approach used to answer the three research questions

Several steps were taken to ensure validity and reliability across the code mapping and content analysis. Corporate sustainability reports were initially divided between three researchers, and following a first round of coding based on agreed instructions and criteria, each researcher's coding was checked for consistency by another researcher. Regular discussions amongst the three researchers responsible for coding occurred to ensure codes were clearly defined and that each researcher applied the codes in the same manner. Coding therefore occurred over several iterations supported by researcher triangulation to enhance the validity and credibility of this study.

## 3. Results and Discussion

The policy of responsible plastic use has been implemented across various countries. In this paper, the researchers aim to delve deeper into the dynamics of responsible plastic packaging usage. This study explores how well companies are committed to transitioning from the use of single-use plastics to the utilization of environmentally friendly plastics. Data processed from the 50 largest palm oil companies, according to the GIS analysis by Greenpeace, revealed that approximately 24 companies officially have publications on sustainability reports. Most of these reports originate from the year 2022, with no more than two companies having publications in 2021, and only one company with the latest publication in 2018.

Companies operating and engaging in trade within Indonesia are not all registered within the nation. Some palm oil firms have their headquarters situated outside of Indonesia. The analysis of sustainability reports examined in this paper reveals that approximately 20.8% of these companies are headquartered in Singapore, and 4.2% have their principal offices in Malaysia. The remaining majority, around 75%, are domiciled within Indonesia itself. This distribution highlights the transnational nature of the palm oil industry, where the locus of corporate governance may not align geographically with the primary operations and impacts of the business. The sustainability reporting practices of these companies, therefore, offer insight into how multinational corporate entities navigate the environmental standards and expectations set forth by their host countries, as well as the international community.

The variation in the location of headquarters among palm oil companies could potentially influence their commitment to responsible plastic use. Nonetheless, this research aims to further elucidate and deepen the understanding of how corporations are taking responsibility for producing palm oil products with responsible plastic use and are committed to reducing the environmental burden of plastic waste. The study will assess the policies and practices implemented by these corporations across different headquarters locations, analyzing the extent to which geographical and regulatory environments shape their sustainability strategies. It seeks to provide a comparative perspective on the environmental commitments of companies headquartered in Singapore, Malaysia, and Indonesia, focusing on the palm oil industry's approach to managing plastic use in the product lifecycle and waste management practices. Through this analysis, the research will contribute to the discourse on corporate environmental responsibility and the role of transnational governance in fostering sustainable industry practices.

### *3.1 Plastic pollution*

The heightened sense of corporate responsibility towards the use of plastics is becoming increasingly evident across corporate activities. An evaluation of the 24 largest palm oil companies in Indonesia reveals a spectrum of awareness that varies according to the corporate character and the social approaches undertaken. For instance, Cargill has exemplified an awareness program focused on plastic pollution. The corporation has heightened its environmental responsibility through actions such as organizing beach clean-up activities to remove marine plastic pollutants. This initiative involves the active

participation of Cargill's employees and is part of a volunteering effort to commemorate The Earth Day Program.

Such actions reflect a growing acknowledgment within corporations that they bear a significant portion of the responsibility for the end-of-life impact of their products. By recognizing that plastics used by consumers have a high likelihood of reaching marine environments, Cargill and similar companies are acknowledging the need for producer responsibility in waste management. The beach clean-up activities are not just about removing waste but also serve as a powerful symbol of the company's commitment to environmental stewardship. It is an understanding that as producers and contributors to plastic waste, there is an imperative to mitigate the environmental footprint of their products.

Cargill's Earth Day initiative is a part of a larger narrative where corporations are increasingly viewing environmental awareness as integral to their business operations. By engaging their workforce in environm(b) actions, they are fostering a culture of sustainability within their organizations while contributing to the broader societal goal of reducing plastic pollution. This corporate social responsibility extends beyond the immediate business impact to encompass a broader ecological perspective, reflecting an evolving corporate ethos that places a premium on environmental awareness and action.

The research on corporate environmental consciousness within Indonesia's palm oil industry reveals a bifurcation in the awareness of plastic pollution. The depicted pie chart illustrates the distribution of corporate awareness regarding Extended Producer Responsibility (EPR), a policy framework obligating producers to manage the lifecycle of their products, particularly at the post-consumer stage. The 'Y' (Yes) category, represented ir(a) nd comprising 54.2% of the chart, denc(b) e proportion of companies that are c(a) t of their EPR obligations, suggesting that a majority of the surveyed cohort acknowledges, and is possibly implementing or planning to implement, EPR practices within their operational strategies. Conversely, the 'N' (No) category, shown in blue with 45.8%, indicates the companies that remain unaware of EPR concepts, highlighting that nearly half of the surveyed entities have not yet integrated or understood the significance of EPR in their business operations. This chart is of critical relevance for policymakers, industry regulators, or environmental organizations that may utilize this data to devise educational programs, incentives, or regulations aimed at augmenting corporate engagement with EPR initiatives. Musim Mas, a leading palm oil producer, has not only recognized the gravity of this issue but has also pledged to support the Indonesian government's targets on plastic waste reduction. This commitment aligns with the company's corporate strategy to enforce.

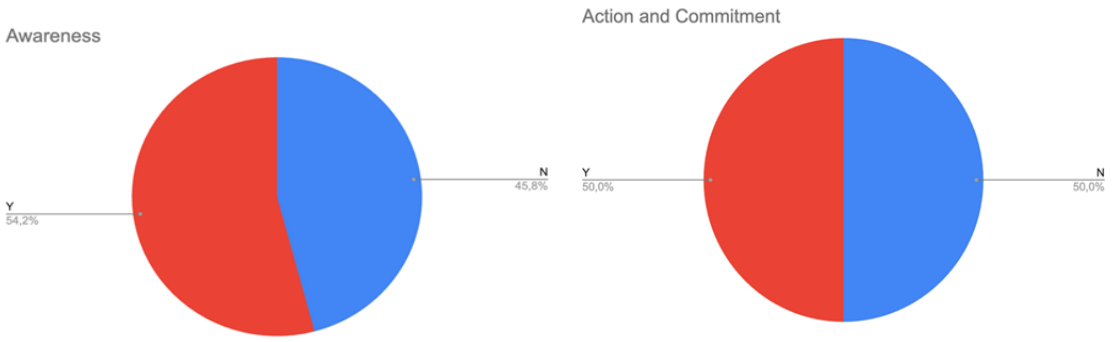


Fig. 2 (a) Plastic pollution awareness; (b) Plastic pollution action
(CSR data processing)

Product Packaging that Complies with the Indonesian Policy on Extended Producer Responsibility. A pivotal element of their action plan includes the exploration of fully recyclable packaging alternatives that do not compromise food quality. In a pioneering venture, Musim Mas is currently testing a recyclable, transparent, multilayer standing pouch, which, if successful, would represent a world-first in packaging innovation.

Additionally, actions and commitments toward sustainable plastic use are evident in half of the companies surveyed. PT. Astra Agro Lestari, for example, has initiated community mobilization against waste by distributing environmentally friendly shopping bags, a move that both addresses the plastic waste issue and promotes a culture of sustainability among consumers. Beyond this, corporate campaigns are also fostering a spirit of plastic reduction, such as the assistance provided to three target schools predominantly attended by children of the Bunggu tribe, which includes the provision of trash receptacles as a tangible support in waste management education.

Further cementing the industry's dedication to environmental stewardship, groups like Apikal have committed to the principles of Reduce, Reuse, and Recycle to address the National Waste Issue. They are determined to ensure that all materials are managed responsibly from production to disposal. Apikal's strategy involves active collaboration with suppliers to embrace best practices in waste management, thereby promoting a unified approach to environmental sustainability.

Collectively, these corporate narratives illustrate a growing trend in the Indonesian palm oil industry towards integrating sustainability into core business practices. By taking proactive steps in waste management and packaging innovation, these companies are contributing to the reduction of plastic pollutants, reflecting a shift towards more responsible production processes and a commitment to global environmental standards. Further details on the diverse awareness, actions, and collective commitments of companies in transforming into healthier and more responsible entities are elaborated in Table 2.

Table 2. List of companies and corporate sustainability reports in alphabetical order

| No | Company | Source/Report name | Country (Location of headquarters) |
|---|---|---|---|
| 1. | Apical | Sustainability Report 2022 | Indonesia |
| 2. | Asian Agri | Sustainability Report 2022 | Indonesia |
| 3. | Bakrie Sumatera Plantations | Sustainability Report 2022 | Indonesia |
| 4. | Bumitama Agri Ltd. | Sustainability Report 2022 | Singapore |
| 5. | Cargill | Corporate Responsibility and Sustainable Development 2017-18 | Indonesia |
| 6. | Citra Borneo Utama | Sustainability Report 2022 | Indonesia |
| 7. | Ecogreen Oleochemicals | Sustainability Report 2022 | Indonesia |
| 8. | First Resources | Sustainability Report 2022 | Singapore |
| 9. | Golden Agri-Resources Ltd | Sustainability Report 2022 | Singapore |
| 10. | Goodhope | Sustainability Journey 2022 | Singapore |
| 11. | Korindo | Sustainability Report 2021 | Indonesia |
| 12. | Musimas | Sustainability Report 2022 | Indonesia |
| 13. | PT Astra Agro Lestari Tbk | Sustainability Report 2022 | Indonesia |
| 14. | PT Austindo Nusantara Jaya Tbk. | Sustainability Report 2022 | Indonesia |
| 15. | PT Dharma Satya Nusantara Tbk | Laporan Keberlanjutan 2022 | Indonesia |
| 16. | PT Mahkota Group Tbk | Annual Report - Sustainability Report 2022 | Indonesia |
| 17. | PT Perkebunan Nusantara III (Persero) | Sustainability Report 2022 | Indonesia |
| 18. | PT PP London Sumatra Indonesia Tbk | Sustainability Report 2022 | Indonesia |
| 19. | PT Salim Ivomas Pratama Tbk | Annual Report 2022 | Indonesia |
| 20. | Sampoerna Agro | Annual Report 2022 | Indonesia |
| 21. | Sawit Sumbermas Sarana | Sustainability Report 2022 | Indonesia |
| 22. | Sime Darby | Annual Report 2023 | Malaysia |
| 23. | Triputra Agro Persada | Sustainability Report 2022 | Indonesia |
| 24. | Wilmar | Annual Sustainability Report 2022 | Singapore |

Plastic pollution has been recognized as a principal issue concerning the packaging of palm oil products sold to consumers. Some producers acknowledge that the use of palm oil is not confined to downstream processes alone but is also prevalent in upstream activities for packaging. In this research, eleven key terms were evaluated. Out of the 24 large corporations studied, the majority consider plastic pollution and plastic waste reduction as important elements that they mention in their sustainability reports. This indicates that plastic pollution has been recognized as a matter of awareness within sustainability reports, and plastic waste reduction is an action taken by corporations to reduce plastic waste.

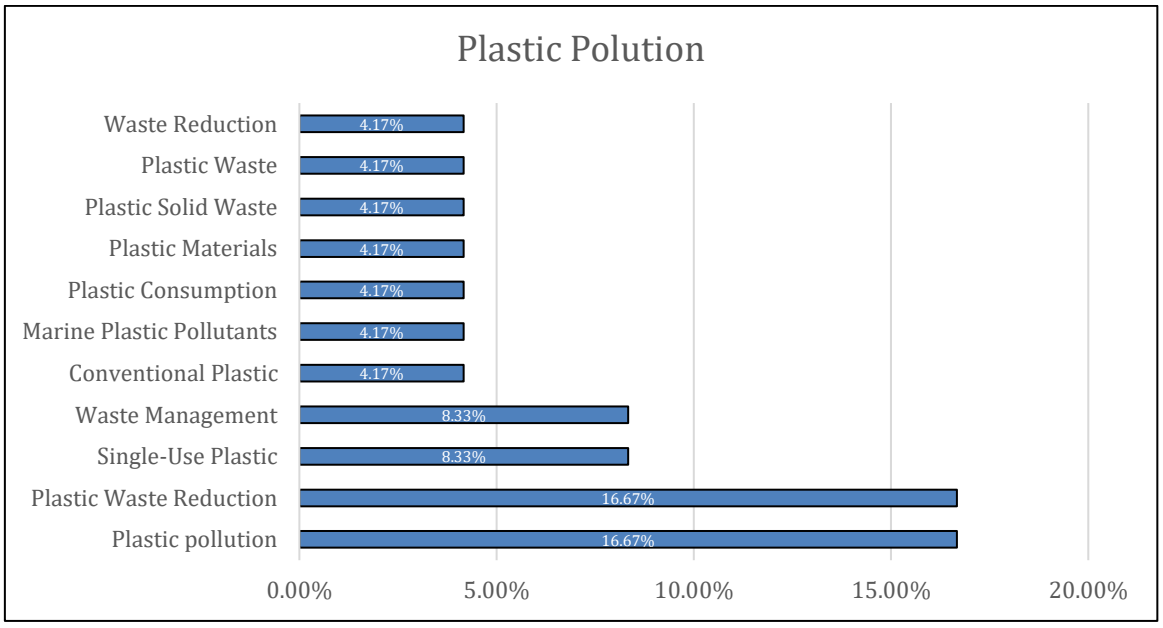


Fig. 3. Corporate implementation and awareness due to plastic pollution (CSR Data Processing)

Approximately 15% of corporations mention plastic waste reduction and plastic pollution, with 8% acknowledging single-use plastic and waste management, and only 4% referencing waste reduction, plastic waste, plastic solid waste, plastic materials, plastic consumption, marine plastic pollutants, and conventional plastic. The low frequency of these keywords within sustainability reports suggests that the engagement with the issue of plastic pollution remains quite limited in Indonesia. There is a need for increased awareness as well as action and commitment from corporations to ensure that support for reducing plastic waste is reflected in sustainability reports. This study illustrates that corporate implementation and awareness of these issues are still at a nascent stage.

### *3.2 Sustainable packaging strategy*

The critical role of corporations in supporting plastic waste reduction is evident through the packaging strategies they employ. To move towards sustainability, companies are adopting a three-pronged approach to packaging. First, they ensure that the packaging design of their plastic products is environmentally friendly. This involves evaluating the environmental impact of packaging materials and design choices to minimize waste and improve the ecological footprint. Second, they examine the feasibility of implementing reuse or refill models that can significantly cut down on single-use plastic consumption. Such models not only reduce the volume of plastic entering waste streams but also encourage circular economy principles. Lastly, they assess how their contributions to plastic waste reduction materialized, whether by altering raw material inputs "at the source" or by recycling materials at the "end of life" stage. Understanding these contributions is crucial for gauging the efficacy of corporate strategies in mitigating plastic pollution and advancing environmental sustainability.

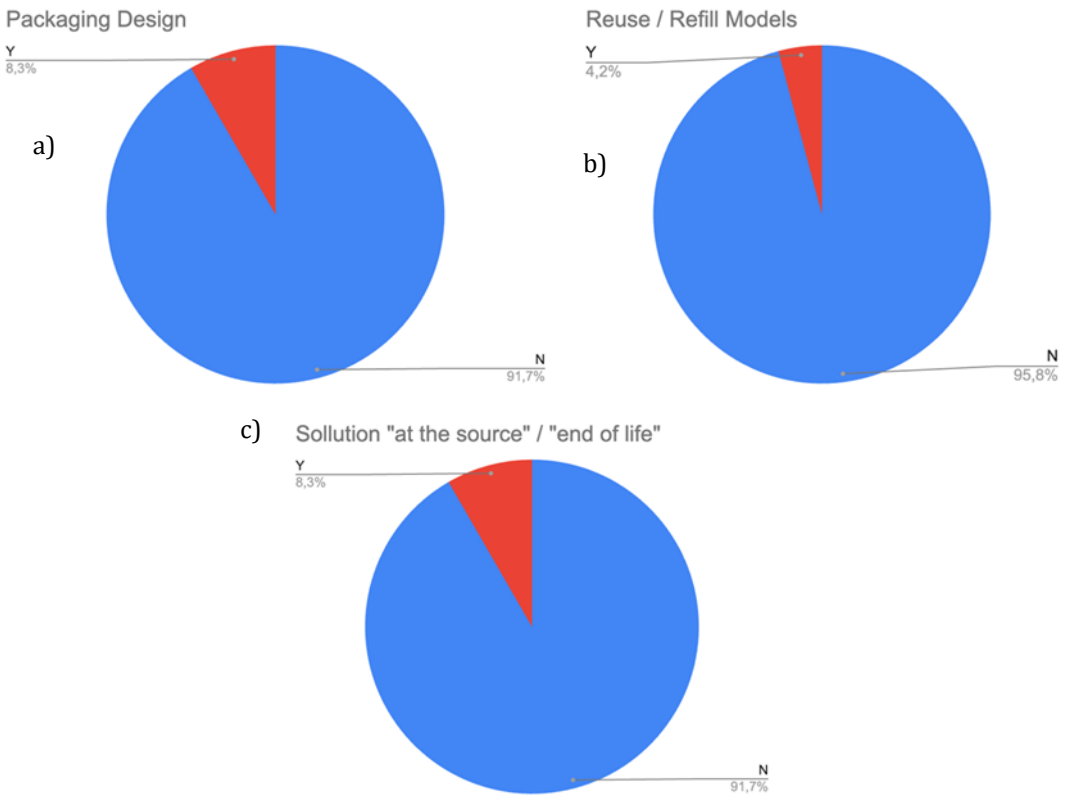


Fig. 4 (a) Implementation of sustainable packaging design; (b) Implementation reuse/refill models; (c) Implementation of solution "at source/end of life"
(CSR data processing)

Based on the evaluation, only two corporations have demonstrated a commitment to sustainable packaging, namely PT. Salim Ivomas Pratama Tbk and Wilmar. For instance, PT Salim Ivomas Pratama Tbk has committed to reducing packaging by transitioning from traditional plastic materials to more sustainable alternatives. Their strategy involves a collaborative effort with Indofood's packaging division to enhance product packaging design. This collaboration aims to introduce auto-sealing mechanisms, which are expected to contribute to improvements in packaging sustainability. This commitment by PT Salim Ivomas Pratama Tbk indicates a strategic approach to addressing environmental concerns through innovation in packaging technology (auto-sealing mechanisms).

In addition to PT. Salim Ivomas Pratama Tbk, Wilmar has also been advocating for sustainable packaging, as evidenced in their reports on sustainable packaging for the years 2021 and 2022. However, Wilmar's sustainability reports do not detail the specific strategies related to packaging within Indonesia. As noted, Wilmar operates on a global scale, which has heightened the company's awareness of various international policies aimed at reducing plastic waste. This global perspective positions Wilmar to potentially adopt and implement a wide array of best practices in sustainable packaging, reflective of a commitment to environmental stewardship across its international operations.

The limited implementation and planning regarding sustainable packaging in the palm oil industry indicate a significant need for progress within this sector. From the analysis of sustainability reports focused on sustainable packaging, packaging reduction, and the design of sustainable packaging, only about 4% of companies mention these strategies in their sustainability reports. This finding highlights a substantial gap and a pressing need for industry-wide enhancements in sustainable practices. The low percentage of companies with stated strategies for sustainable packaging suggests that the palm oil industry is at a nascent stage in addressing the environmental impacts of its packaging. It underscores the importance of developing comprehensive sustainability plans that include packaging as a

critical component of corporate environmental responsibility. For the palm oil industry to meet global sustainability standards and respond to increasing consumer and regulatory demands for environmental stewardship, a concerted effort to elevate the role of sustainable packaging is essential.

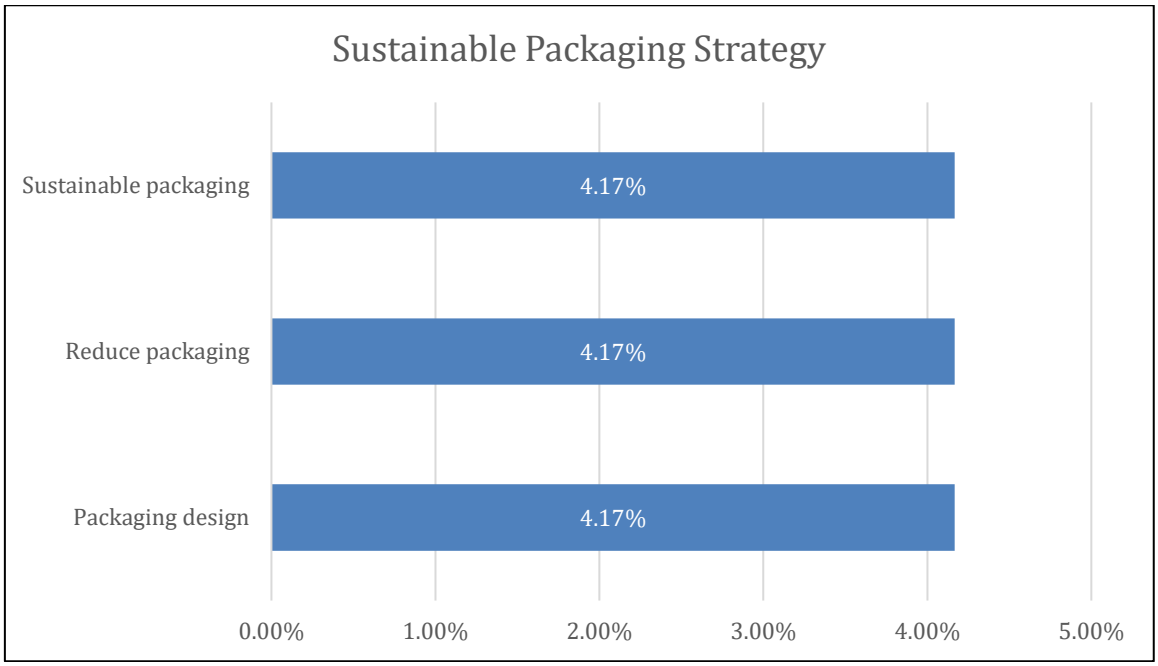


Fig. 5. Corporate implementation due to sustainable packaging strategy (CSR Data Processing)

PT. Astra Agro Lestari Tbk has established a robust environmental education framework through its Astra Environmental Cadre Training program. In 2022, this initiative reached a commendable milestone by providing training to 1,180 environmental cadres, engaging a diverse group of participants including PKK mothers, Posyandu cadres, and residents from surrounding villages. The adoption of online platforms for training, in collaboration with the Environment Agency, enabled widespread dissemination of knowledge despite the challenges posed by physical distancing measures. The program's curriculum emphasized the Socialization of Plastic Waste Utilization Programs and the enhancement of home yard management capacities. This proactive approach to environmental education underscores the company's dedication to fostering community-based environmental stewardship, thereby amplifying the impact of sustainable living practices.

### *3.3 Producer responsibility*

The image presents three pie charts, each reflecting the status of adoption in different sustainability practices as reported in company sustainability reports, specifically in the context of Extended Producer Responsibility (EPR). Circular Economy Implementation (Figure 6a) illustrates that only 29.2% of the companies have reported the implementation of circular economy practices which aim to minimize waste and maximize the reuse of resources. The remaining 70.8% have not implemented these practices indicating a substantial gap in the adoption of circular economic principles. EPR Implementation (Figure 6b) shows 12.5% of companies reporting that they have implemented EPR, which assigns responsibility to producers for the treatment or disposal of post-consumer products. The same majority of 87.5% have not adopted EPR practices. Transparency in Plastic Waste Management Implementation (Figure 6c) shows that a smaller fraction of companies, 4.2%, have reported implementing transparency in their plastic waste management practices. This indicates that few companies are openly sharing information about their plastic waste

handling. A much larger majority, 95.8%, are not reporting transparency in plastic waste management, suggesting a significant lack of openness in this area.

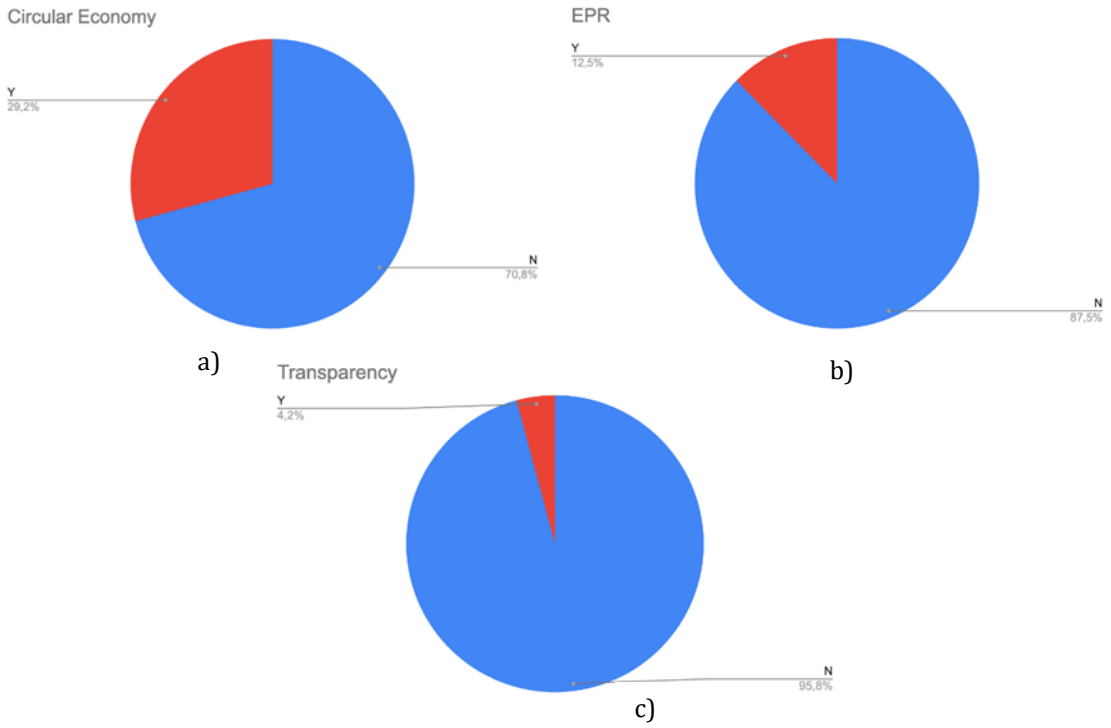


Fig. 6 (a) Implementation of circular economy; (b) Implementation of EPR; (c) Implementation of transparency plastic waste management
(CSR data processing)

Musim Mas presents a forward-thinking approach to product packaging, aligning its operations with the Indonesian Policy on Extended Producer Responsibility. The company is at the vanguard of packaging innovation, actively engaging with suppliers to identify fully recyclable packaging solutions that maintain food quality. The development and testing of a recyclable, transparent, multilayer standing pouch — potentially a pioneering achievement in packaging technology — underscores the company's commitment to sustainability. By setting a target of 2025 for the realization of a viable product, Musim Mas is not only adhering to environmental policies but also anticipating regulatory changes. The strategic move to phase out bagged oil products further demonstrates a proactive alignment with expected shifts in environmental legislation.

Golden Agri-Resources Ltd (GAR) has embarked on a pioneering initiative through the implementation of the Waste Bank Program in the regions of Siak and Kampar, Riau, Indonesia. This innovative waste management project seeks to galvanize the local communities towards environmentally responsible behavior by offering economic incentives. The program encourages the populace to engage in the collection, segregation, and conversion of waste materials into commercially viable resources. By focusing on recyclable commodities such as plastic pellets, paper, and metals, GAR is promoting a circular economy model that adds value to what would otherwise be considered refuse. This project is particularly pertinent in the context of Corporate Sustainability discussions, which often center on plastic pollution and packaging issues. GAR's approach not only addresses environmental concerns but also fosters community involvement and economic development, thereby creating a multifaceted impact that transcends mere waste reduction.

Concurrently, PT Perkebunan Nusantara III is forging its path towards environmental stewardship by adopting and promoting the 3R Principle—Reduce, Reuse, Recycle. By incorporating these principles into their operational ethos, the company is demonstrating a commitment to minimizing waste generation. Although the Corporate Sustainability

Report does not explicitly detail the plastic waste produced, the adherence to the 3R framework implicitly suggests a systemic approach to waste management. This approach is indicative of a broader, holistic strategy aimed at diminishing the overall environmental footprint of the company's activities. The reduction of waste, coupled with initiatives to reuse and recycle materials, reflects a conscientious effort to mitigate the environmental impact of their operations.

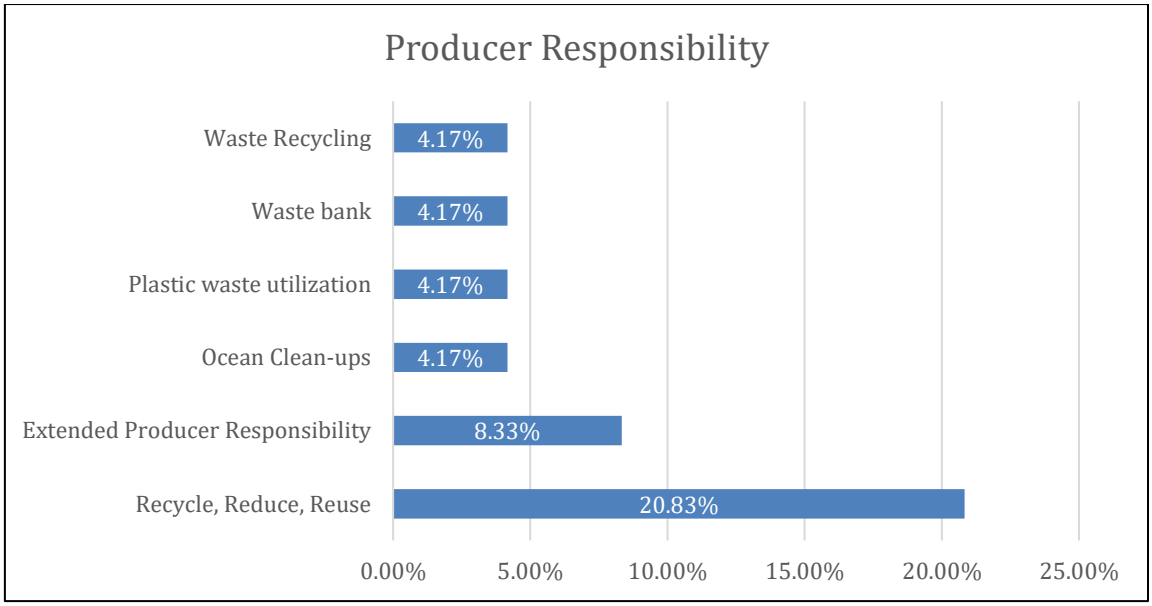


Fig. 7. Corporate implementation due to producer responsibility
(CSR Data Processing)

At the forefront of reported responsibilities is "Recycle, Reduce, Reuse," a triad of practices that encapsulate the circular economy ethos, drawing the highest percentage among the categories, signifying its prominence in corporate environmental strategies. This is indicative of a widespread corporate recognition of the importance of minimizing waste and extending the lifecycle of resources. The concept of "Extended Producer Responsibility" (EPR) also receives considerable attention, aligning with global trends that hold producers accountable for the entire lifecycle of their products, including post-consumer stages. The visibility of EPR in CSR disclosures underscores a shift towards producer accountability in mitigating environmental impact.

"Ocean Clean ups" feature as a significant area of corporate responsibility, reflecting an acute awareness of the marine pollution crisis and the need for interventions to preserve ocean health. Conversely, the responsibilities of "Waste Recycling," "Waste bank," and "Plastic waste utilization" manifest to a lesser extent. While still acknowledged, these areas might indicate either a nascent stage of adoption or perhaps a narrower scope of impact in corporate sustainability programs. The emphasis on recycling and EPR may signal a paradigm shift towards sustainable production and consumption patterns, in alignment with global sustainability goals.

## 4. Conclusions

This study's findings indicate that half of a major market palm oil corporations in a Indonesia are aware of plastic pollution as evidenced in their sustainability reports. However, the remaining half appear to entirely lack such awareness within their sustainability documentation. Similarly, action and commitment toward addressing this issue mirror this division, with half of the corporations showing no action or commitment whatsoever. Additionally, strategies for sustainable packaging, which are essential for meeting the policy goal of reducing plastic usage by 30% by 2029, are not adequately reflected in corporate sustainability reports. Furthermore, while there is some commitment

towards Extended Producer Responsibility among a few companies, it is apparent that only a small fraction has taken such commitments. This indicates that in the palm oil sector, there is a crucial need to significantly bolster awareness, action, commitment, and the monitoring of sustainable plastic usage implementations to ensure effective national execution.

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## Author Contribution
Conceptualization, A.A.K.; Methodology, A.A.K.; Data Analysis, M.N.; Original Draft Preparation, A.A.K.; Visualization, A.A.K, M.N.

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## Conflicts of Interest
The authors declare no conflict of interest.



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