

EVALUATING CORPORATE MARINE PLASTIC POLLUTION REDUCTION PLEDGES:
ACHIEVING PLASTIC REDUCTIONS OR CONTRIBUTING TO GREENWASHING

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TITLE: Evaluating Corporate Marine Plastic Pollution Reduction Pledges: Achieving Plastic Reductions or Contributing to Greenwashing

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ABSTRACT

Evaluating Corporate Marine Plastic Pollution Reduction Pledges: Achieving Plastic Reductions or Contributing to Greenwashing

This paper presents a comprehensive examination of major corporations' commitments and performance in reducing virgin plastic production, strategically aligning corporate initiatives with tangible outcomes. Drawing upon sustainability governance literature and analyzing the plastic reduction strategies adopted by industry leaders such as SC Johnson, PepsiCo, Coca-Cola, Borealis, Nestlé, and Unilever. By synthesizing insights from corporate reports and scholarly literature, this research contributes to a complex understanding of the dynamic landscape of corporate plastic reduction. The analysis is contextualized within the framework of Sustainable Development Goal 14 (SDG 14), emphasizing the critical role that corporate plastic reduction plays in achieving global targets for marine conservation. The study evaluates the alignment of corporate commitments with SDG 14, identifying instances of genuine environmental stewardship as well as potential cases of greenwashing. In addressing these issues, the research employs three primary methodologies: transparency, accountability, and science-based targets. Transparency is assessed through the clarity and completeness of corporate reporting on plastic reduction efforts. Accountability is measured by evaluating whether companies are held responsible for meeting their stated goals and how they communicate their progress or lack thereof. The adoption and effectiveness of science-based targets are analyzed to determine how well companies perform in meeting their plastic reduction pledges or not. The findings underscore the necessity for adaptable strategies and resilient commitments to effectively address the pressing issue of plastic pollution. Insights from both corporate reports and scholarly literature enrich the discussion, providing a holistic view of the industry's progress and obstacles in promoting sustainable plastic use in harmony with broader global sustainability goals. This study contributes valuable knowledge to the field of corporate sustainability, offering practical recommendations for enhancing transparency, accountability, and the implementation of science-based targets in corporate plastic reduction initiatives.

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This project has been a tremendous learning journey, where I have gained profound insights into car sustainability, greenwashing, and the intricacies of corporate environmental responsibility. Understanding the nuances of greenwashing and how companies navigate their sustainability claims has been particularly enlightening. The complexities of corporate environmental responsibility have shown me the importance of transparency and accountability. The knowledge and experiences I have gained through this project will undoubtedly shape my future endeavors and commitment to sustainability. I have learned so much about the connection of business practices and environmental impact, which will guide my actions and decisions in my professional career. Thank you to everyone who has supported and guided me throughout this process. Your encouragement and assistance have been invaluable, and I am deeply appreciative of the opportunities and support I have received. This journey has been transformative, and I look forward to continuing my work in sustainability, inspired by all that I have learned and the amazing people I have met along the way.

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INTRODUCTION

Introduction, Background, and Problem Statement

Plastic pollution in oceans is a critical global challenge recognized by the United Nations' Sustainable Development Goals (SDGs). The escalating magnitude of ocean plastic pollution poses severe risks to marine ecosystems, human health, and the achievement of sustainability targets. Current estimates indicate that up to 21 million tons of plastic waste enter the oceans annually, with projections suggesting a quadrupling of this volume by 2050 (Jambeck et al., 2015; World Economic Forum, 2022). Plastic pollution has prompted corporations to make pledges toward ocean conservation, with initiatives like the Ellen MacArthur Foundation's New Plastics Economy Global Commitment garnering global endorsement.

However, the effectiveness of these corporate pledges in mitigating ocean plastic pollution remains uncertain. Studies reveal gaps between commitments and actions, as evidenced by a limited percentage of plastic packaging being recycled and persistent use of single-use plastics by corporations (Brooks et al., 2020). Skepticism arises due to a lack of transparency, accountability, unrealistic targets, and concerns about greenwashing, where pledges may serve as mere public relations tools without substantial environmental impact.

Aims of the Study

This research aims to evaluate the impact and effectiveness of corporate pledges in addressing ocean plastic pollution. The study will:

1. Conduct a review of corporate pledges toward ocean conservation, examining their implementation, and assessing transparency, accountability and science-based targets.
2. Analyze trends and patterns in ocean plastic pollution to understand the broader context and evaluate the actual impact of corporate initiatives.

3. Investigate the potential presence of greenwashing in corporate pledges, exploring whether commitments represent genuine efforts or strategic maneuvers for positive public relations.

Through these objectives, the study seeks to provide valuable insights for stakeholders, including corporations, governments, and NGOs, to enhance the effectiveness of ocean conservation efforts and contribute meaningfully to the 2030 SDGs.

Nature of Study

The dataset from the Ellen MacArthur Foundation's New Plastics Economy Global Commitment Ellen MacArthur Foundation, (2021) holds significant importance for this research project. The dataset provides adequate information on corporate pledges and their progress in reducing plastic waste and addressing oceanic plastic pollution. By utilizing this dataset, several key aspects can be explored, contributing to a deeper understanding of the effectiveness of corporate pledges and their impact on achieving the 2030 Sustainable Development Goals. Firstly, the dataset serves as a reliable source of data, containing detailed information on participating companies, the nature of their commitments, specific actions taken, and progress updates. This extensive dataset offers a holistic view of the efforts made by corporations to combat oceanic plastic pollution. Secondly, the dataset enables an assessment of the effectiveness of corporate pledges made under the New Plastics Economy Global Commitment.

It is feasible to assess if businesses are accomplishing their goals, putting sustainable practices into place, and significantly lowering the amount of plastic waste they produce by evaluating the data. This evaluation advances knowledge about how these promises affect the attainment of the intended sustainability objectives. Top performers, best practices, and creative strategies that have produced favorable results in lowering plastic waste can be found by carefully examining the data. Furthermore, it is possible to draw comparisons between the advancements of other businesses or industries, which aids in identifying areas in need of further focus or development.

Magnitude and Impact of Ocean Plastic Pollution

Research has shown that ocean plastic pollution has increased substantially over the past few decades and that it has significant impacts on marine ecosystems and human health. It is estimated that up to 21 million tons of plastic waste enters the oceans each year, harming marine life, altering marine habitats, and causing economic losses for industries such as fisheries and tourism (Jambeck et al., 2015; van Sebille et al., 2022). Plastic waste contains harmful chemicals that can enter the food chain and have negative impacts on human health (Geyer et al., 2017; Lebreton et al., 2022). Plastic production has been increasing over the years, and as a result, the amount of plastic waste that ends up in the ocean has also been increasing. According to the World Economic Forum, global plastic production is expected to reach 460 million tons by 2030 (WEF, 2022). The report also states that if current trends continue, the amount of plastic waste in the ocean could quadruple by 2050, with major impacts on marine ecosystems and human health. Despite this, corporations have been slow to take meaningful internal action towards addressing this issue by changing packaging or limiting production. A 2021 study by the Ellen MacArthur Foundation found that only 13% of companies have set targets to reduce their plastic footprint (Ellen MacArthur Foundation, 2021).

Corporate Initiatives and Pledges for Plastic Pollution Reduction

Instead, several corporations have made public pledges to address plastic pollution in oceans, including corporations participating in the Ellen MacArthur Foundation's New Plastics Economy Global Commitment, which has been signed by over 400 companies worldwide (Lindsay, 2020). The Commitment includes targets to eliminate unnecessary plastic packaging and move towards a circular economy for plastics. Corporations have also made individual pledges to reduce their plastic production or increase their use of recycled materials (Crossman, 2022). For example, some corporations have pledged to eliminate single-use plastics from their operations, while others have committed to using more recycled plastic in their products. However, it is important to note that such pledges are only one part of

the solution. In many cases, the actual implementation of these pledges has been slow, and the effectiveness of these actions in reducing plastic pollution in the oceans is still uncertain (Crossman, 2022). For example, Brooks et al. (2020) found that only a small percentage of plastic packaging is recycled, and that many companies continue to rely on single-use plastics despite their commitments to reduce them. While these pledges may create positive public relations for companies, it is important to examine their effectiveness in achieving the SDGs and reducing oceanic plastic.

Evaluation and Analysis of Corporate Pledges for Greenwashing

There is growing concern that these pledges may be mere "greenwashing," a term used to describe the practice of making false or misleading claims about environmentally friendly efforts to enhance public perception of a company (Kolk & Pinks, 2010; Diana, 2023). Without meaningful action behind their pledges, corporations may use them solely to boost their image and brand, rather than to make a real difference in ocean conservation. In response to the escalating concern over oceanic plastic pollution, corporations have increasingly recognized the need to act and contribute to the preservation of our oceans. This research critically evaluates corporate pledges to reduce plastic pollution, probing whether they signify genuine sustainability efforts or constitute forms of greenwashing (Diana, 2023). Utilizing a comprehensive dataset of corporate pledges, the project identifies gaps and challenges in implementation, as well as areas of progress. Furthermore, the research develops policy and strategy recommendations for corporations, governments, and other stakeholders to enhance the effectiveness of these pledges and drive impactful action against oceanic plastic pollution.

Corporate pledges serve as a tool for companies to publicly demonstrate their commitment to sustainability and corporate social responsibility. By making these pledges, corporations signal their intent to take concrete actions towards reducing their environmental footprint and supporting the achievement of global sustainability goals. These commitments often encompass various aspects, such as adopting more sustainable packaging practices, implementing recycling initiatives, promoting responsible waste

management, and supporting innovative solutions to combat plastic pollution (Brooks et al. 2020).

Corporate pledges to reduce plastic pollution have been increasing in recent years. However, there is growing concern that these pledges may be mere "greenwashing," a term used to describe the practice of making false or misleading claims about environmentally friendly efforts to enhance public perception of a company (Kolk & Pinks, 2010; Diana, 2023).

Challenges and Skepticism Surrounding Corporate Pledges

There are several reasons to be skeptical of corporate pledges to reduce plastic pollution. First, there is a lack of transparency and accountability around these pledges. Companies often do not disclose detailed information about their plans or progress, making it difficult to assess whether they are making a difference (Minderoo Foundation, 2022). Additionally, there is no independent verification of these pledges, so it is possible that companies are not meeting their commitments. Second, companies often set unrealistic or vague targets for reducing plastic pollution. For example, Coca-Cola has pledged to collect and recycle the equivalent of all its plastic bottles by 2030. However, this target does not specify how many bottles Coca-Cola will produce in 2030, making it difficult to assess whether the company is making any meaningful progress (Ellen MacArthur Foundation, 2023).

Third, companies may not be investing enough resources to make their pledges a reality. For example, Coca-Cola has pledged to invest \$500 million in plastic recycling by 2030. However, this investment is only a small fraction of the company's annual revenue, and it is not clear how it will be used to reduce plastic pollution (World Economic Forum, 2023). Finally, there is a need for independent verification of corporate pledges to ensure that they are being met. Currently, there is no independent body that verifies corporate pledges to reduce plastic pollution. This means that companies can make whatever claims they want without any accountability (Minderoo Foundation, 2022). In conclusion, there are several reasons to be skeptical of corporate pledges to reduce plastic pollution. More transparency and

accountability, as well as independent verification, are needed to ensure that these pledges are genuine and effective.

Corporate Impact on Ocean Health and Global Initiatives

Corporate activities wield a substantial influence on ocean health, primarily through the production and utilization of plastic. Corporations contribute significantly to global plastic waste via their reliance on plastic packaging, production of plastic-intensive goods, and inadequate waste management practices (Lebreton et al., 2022; Ng et al., 2021). The improper disposal of plastic leads to its accumulation in oceans, posing severe risks to marine life and ecosystems. Risks include entanglement and ingestion for marine animals and the fragmentation of plastic into microplastics that infiltrate the food chain, thereby impacting human health as well (Pham et al., 2022; Rochman et al., 2021). The urgency to address marine plastic pollution has catalyzed the establishment of global goals, notably the 2030 Sustainable Development Goals (SDGs).

These goals seek to reduce marine pollution, safeguard marine ecosystems, and encourage sustainable consumption and production patterns. Corporations, as pivotal contributors to environmental impact, play a crucial role in achieving these goals through their actions and commitments (World Economic Forum, 2022). While many corporations have acknowledged the need to address plastic waste and have made pledges to reduce production or increase the use of recycled materials Crosman, (2022) argues that it is crucial to recognize that such pledges constitute only one facet of the solution. Often, the actual implementation of these pledges is sluggish, and their effectiveness in reducing oceanic plastic pollution remains uncertain (Crosman, 2022). Critics argue that these pledges are frequently insufficiently ambitious and fail to address the root causes of plastic pollution.

Corporate Plastic Production Impact and Executive Responsibilities

To examine the impacts of corporate plastic production on oceans, this study focuses on the increasing trend in plastic production. According to the 2020 International Energy Agency (IEA) report, global plastic production has surged from 1.5 million tons in 1950 to over 350 million tons in 2019 (IEA, 2020). The report predicts that, if current trends persist, oceanic plastic waste could triple by 2040, exerting significant impacts on marine ecosystems and human health.

Several corporations have pledged to combat plastic pollution, exemplified by the Ellen MacArthur Foundation's New Plastics Economy Global Commitment, endorsed by over 400 companies globally (Lindsay, 2020). This commitment includes targets to eliminate unnecessary plastic packaging and transition to a circular economy for plastics. However, studies suggest that the impact of corporate pledges on oceanic plastic pollution reduction may be limited. For instance, a 2020 study in *Science Advances* (Brooks et al., 2020) revealed that only a small percentage of plastic packaging is recycled, and many companies persist in using single-use plastics despite their commitments. The study also highlighted that most oceanic plastic waste originates from a few corporations, underscoring the significant impact of a small number of large companies on the problem.

Executives must be aware of both the effects and solutions to the world's environmental problems given how much business contributes to climate change and other environmental problems. Executives have a responsibility for oceanic environmental outcomes because they are leaders of businesses and organizations that have a significant impact on the ocean and its resources (Zhang, 2022). Executives have a responsibility to ensure that their organizations operate in an environmentally responsible manner and minimize their impact on the ocean and its resources (Zhang, 2022). In addition, many countries have laws and regulations that require companies to operate in an environmentally responsible manner, and executives are responsible for ensuring that their organizations comply with these regulations (Zhang, 2022). Failure to comply with these laws and regulations can result in fines, legal action, and damage to the organization's reputation. Furthermore, executives have a responsibility to their stakeholders,

including investors, customers, and employees, to operate in a socially and environmentally responsible manner.

Conclusion

The escalating issue of plastic pollution in oceans has garnered global attention, as underscored by the UN's Sustainable Development Goals (SDGs). Despite the substantial increase in ocean plastic pollution and its detrimental effects on marine ecosystems and human health, corporate response, often manifested in public pledges, has been sluggish and lacks transparency. Exemplified by initiatives like the Ellen MacArthur Foundation's New Plastics Economy Global Commitment, signed by numerous corporations, doubts persist regarding the sincerity and efficacy of these commitments. This study critically evaluates the authenticity and impact of corporate pledges, addressing concerns such as vague targets, insufficient investment, and a lack of independent verification. A complete examination of the dataset from the Ellen MacArthur Foundation holds significant importance for this research project. This dataset provides detailed information on corporate pledges, their progress in reducing plastic waste, and addressing oceanic plastic pollution. Through meticulous analysis, the study identifies gaps and challenges in implementation, as well as areas of progress. Moreover, the research contributes policy and strategy recommendations for corporations, governments, and other stakeholders to enhance the effectiveness of these pledges and drive impactful action against oceanic plastic pollution.

LITERATURE REVIEW

Introduction

Amid escalating challenges such as overfishing, pollution, and climate change, corporations are increasingly committing to safeguard our oceans by reducing their environmental impact, protecting marine life, and adopting sustainable practices. As the 2030 deadline for these commitments approaches, a critical concern is the potential for 'greenwashing,' where companies make bold environmental claims without substantive action. This issue is particularly evident in the context of plastic pollution, an escalating problem that companies are now acknowledging. Greenwashing poses a significant risk by diverting attention from genuine solutions and undermining the effectiveness of corporate promises. Aligned with Sustainable Development Goal 14 (SDG 14), which focuses on conserving and sustainably using the oceans, a thorough examination of these corporate commitments is imperative. This project researches the extensive landscape of corporate pledges, addressing concerns of greenwashing and advocating for an ample approach to enact meaningful change in ocean sustainability.

Marine Ecosystems and Corporate Pledges

Marine ecosystems play a crucial role in regulating the Earth's climate, supporting biodiversity, and providing resources to human societies (Halpern et al., 2008; Worm et al., 2006). However, anthropogenic activities such as overfishing, pollution, and climate change are threatening the health and resilience of these ecosystems (Bianchi, 2007). As a result, many companies have started to make pledges and commitments to protect oceanic sustainability (Pew Charitable Trusts, 2022). A recent study by the Pew Charitable Trusts found that the number of corporate oceanic pledges has increased significantly in recent years (Pew Charitable Trusts, 2022). The study also found that these pledges are becoming more ambitious, with companies increasingly committing to reduce plastic pollution, support sustainable fishing practices, and protect marine biodiversity (Pew Charitable Trusts, 2022). However, the effectiveness of corporate oceanic pledges in achieving their goals is still unclear (Science, 2021; Pew

Charitable Trusts, 2022). A study published in the journal *Science* found that only 10% of the companies that have made plastic pollution pledges have met their targets (Science, 2021). The study also found that many companies are not transparent about their progress in implementing their pledges (Science, 2021).

Despite these challenges, corporate oceanic pledges can play an important role in protecting the ocean environment (Pew Charitable Trusts, 2022). By making these pledges, companies can raise awareness of the issue of ocean sustainability and encourage other businesses to act (Pew Charitable Trusts, 2022). Additionally, corporate pledges can help to create a more sustainable supply chain and reduce the environmental impact of businesses (Pew Charitable Trusts, 2022). The health and sustainability of marine ecosystems face significant challenges in the modern era, particularly regarding the production, use, and disposal of plastic materials. Corporations, being major contributors to global plastic waste, have increasingly recognized the need to address these challenges by making pledges towards ocean conservation. Numerous studies have highlighted the detrimental impacts of plastic waste on marine environments and the urgent need for action. It has been found that corporate activities contribute significantly to the global plastic waste stream, with a substantial proportion of this waste eventually ending up in the oceans (Crosman, 2022; Jambeck et al., 2018). Consequently, corporate pledges towards ocean conservation have gained attention as potential solutions to address these challenges.

The effectiveness of corporate pledges in achieving the SDGs requires careful evaluation. Crosman (2022) emphasizes the importance of transparency and accountability in assessing the credibility and impact of these pledges. Transparent reporting on progress and outcomes is crucial for evaluating the actual implementation and effectiveness of corporate actions. However, research indicates that many pledges lack transparency, making it difficult to assess their tangible impact (Crosman, 2022). Critics argue that some corporate pledges may be driven by public relations concerns rather than genuine efforts to address the root causes of plastic pollution (Gibson & Morgan, 2020). This phenomenon, known as greenwashing, refers to the misleading or exaggerated claims of sustainability made by corporations

without corresponding substantive actions (Lyon & Montgomery, 2015). Greenwashing undermines the effectiveness of pledges by diverting attention and resources away from more meaningful and impactful initiatives.

To address these challenges, governance characteristics play a crucial role. Transparent reporting mechanisms, independent verification, and stakeholder engagement are essential for enhancing the credibility and legitimacy of corporate pledges (European Commission, 2019; Bäckstrand & Lövbrand, 2006). Incorporating science-based targets within pledges ensures that actions align with the best available scientific knowledge and evidence on plastic pollution and ocean conservation. Additionally, regulatory frameworks and governmental support are essential for creating an enabling environment that incentivizes responsible corporate behavior and holds corporations accountable for their commitments (Pattberg & Stripple, 2008; McCarthy et al., 2018). Further research is required to assess the extent to which these pledges result in tangible outcomes, such as reductions in plastic waste, innovative waste management practices, and the implementation of circular economy principles.

Corporate pledges towards ocean conservation play a significant role in addressing the challenges of oceanic plastic pollution and achieving the 2030 SDGs. However, careful evaluation is necessary to determine their effectiveness and distinguish genuine efforts from greenwashing. Transparency, accountability, stakeholder engagement, science-based targets, and supportive governance structures are essential for ensuring the credibility and impact of corporate pledges.

Governance Characteristics for Corporate Pledges: Ensuring Credibility and Impact

Corporate pledges have become pivotal in addressing concerns about oceanic plastic pollution and advancing progress towards the 2030 Sustainable Development Goals (SDGs). The success of these pledges relies heavily on robust governance mechanisms that guarantee transparency, accountability, and active stakeholder engagement. This literature review examines into the critical governance characteristics that form the bedrock of credible and impactful corporate pledges for ocean conservation.

Transparency serves as the bedrock of effective governance, allowing stakeholders to evaluate the authenticity and progression of corporate pledges. Regular and detailed reporting on pledge implementation, encompassing targets, actions taken, and outcomes achieved, is indispensable for cultivating trust and ensuring accountability (Pew Charitable Trusts, 2022).

Complementing transparency, independent verification provides an unbiased assessment of corporate pledge implementation. Involving independent experts or third-party organizations in evaluating progress and validating outcomes enhances the credibility of corporate actions (Natural Resources Defense Council, 2021). Effective governance necessitates active engagement with stakeholders, including environmental organizations, communities, and industry peers. Collaborative dialogues, joint initiatives, and open communication channels foster a shared understanding of challenges and opportunities, leading to more effective and inclusive solutions (World Business Council for Sustainable Development, 2020). Incorporating science-based targets into corporate pledges ensures that actions align with the best available scientific knowledge and evidence on plastic pollution and ocean conservation. This approach provides a clear roadmap for achieving measurable outcomes and contributes to the overall scientific understanding of effective mitigation strategies (Science Based Targets Network, 2023).

Public Governance

Supportive regulatory frameworks and governmental policies are pivotal in fostering an environment that encourages responsible corporate behavior and ensures accountability for commitments (United Nations Environment Programme, 2022). Clear regulations, financial incentives, and policy support collectively contribute to the promotion of sustainable practices, ultimately enhancing the overall impact of corporate pledges. Governments worldwide have increasingly recognized the urgency of addressing ocean conservation, leading to the implementation of policies designed to stimulate corporate action. The European Union, for instance, has taken a significant step with the adoption of the Single-Use Plastics Directive (2019/904/EU). This directive not only bans certain single-use plastic items but also

establishes ambitious targets for the reduction of others, exemplifying a legislative commitment to combat plastic pollution in the oceans.

Similarly, the United States has responded to the plastic pollution challenge through legislative measures such as the (Break Free from Plastic Pollution Act of 2021). This act focuses on reducing plastic waste by actively promoting reuse, recycling, and composting practices, showcasing a comprehensive governmental effort to address the multifaceted issue of plastic pollution. Beyond regulatory measures, financial incentives emerge as crucial drivers for corporate engagement in ocean conservation. Governments have the capacity to encourage sustainable practices by providing subsidies to companies investing in environmentally friendly initiatives, such as the development of alternative packaging materials or the adoption of circular economy principles. Additionally, governments can implement tax breaks and other financial incentives as rewards for companies that not only meet but exceed their corporate pledges, thus further motivating sustainable business practices.

Policy support, comprising technical assistance, training, and resource provision, represents another critical factor in bolstering the effectiveness of corporate pledges. Governments can actively assist companies in implementing their commitments and achieving sustainability goals by offering practical support. Conclusively, governance characteristics extend beyond mere formalities; they serve as the cornerstone of credible and impactful corporate pledges for ocean conservation. Through the integration of transparency, independent verification, stakeholder engagement, science-based targets, and supportive regulatory frameworks, companies can authentically showcase their commitment to addressing plastic pollution. By navigating this governance landscape, corporations can contribute meaningfully to the attainment of the 2030 Sustainable Development Goals.

Corporate Responsibility and Stakeholder Theory: Addressing the Challenge of Oceanic Pollution

There are several ways in which the commercial sector can contribute to sustainable ocean governance. One approach is through the adoption of sustainable business practices. For example, a study by Gray et al., (2017) found that companies that adopted sustainable practices, such as reducing waste and

promoting sustainable sourcing, were more likely to be successful in the long term. Another approach is through the development of public-private partnerships, which can help to promote sustainable fisheries and other ocean-based industries.

However, there are also challenges associated with engaging the commercial sector in sustainable ocean governance. One challenge is the lack of incentives for companies to adopt sustainable practices. A study by Bhatia et al, (2018) argued that the development of innovative financing mechanisms, such as green bonds, could help to incentivize companies to invest in sustainable practices. Human activities have a profound impact on the health and sustainability of marine environments, with the production, use, and disposal of plastic materials posing a particularly pressing challenge. Research has shown that corporations are significant contributors to global plastic waste, much of which ends up in the oceans, causing severe damage to marine life and ecosystems (Jambeck et al., 2018; Crosman, 2022). The scale of this issue highlights the urgent need for corporations to address their environmental footprint and take responsibility for reducing plastic pollution in the oceans. In response to these growing concerns, the concept of corporate responsibility has gained prominence, emphasizing the importance of businesses considering the social and environmental impacts of their operations. Stakeholder theory, a foundational concept in corporate responsibility, suggests that companies have a responsibility to consider the interests of all stakeholders affected by their activities, including employees, customers, communities, and the environment (Freeman, 1984). By adopting stakeholder theory principles, corporations can make more informed and sustainable decisions that align with the needs and perspectives of all stakeholders.

Corporate voluntary pledges have emerged as a popular approach for companies to demonstrate their commitment to sustainability. Pledges such as the Ocean Plastics Charter, signed by various corporations and governments, aim to reduce plastic pollution in the oceans by setting ambitious targets and implementing specific initiatives. However, the effectiveness of voluntary pledges has been debated, with some arguing that they lack legal binding and accountability mechanisms, potentially limiting their impact (Kroeze et al., 2019). Social license to operate (SLO) is another crucial concept in the context of corporate responsibility towards the oceans. SLO refers to the level of acceptance or approval a company

has from local communities and stakeholders to conduct its operations. Companies with a strong SLO are more likely to be successful and sustainable in the long term, as they have demonstrated their commitment to operating in an ethical and environmentally responsible manner. Corporate pledges on oceans can be seen as a way for companies to improve their SLO and enhance their reputation by demonstrating their commitment to addressing marine pollution (Cohen & Wakeman, 2017).

The issue of anthropogenic impacts on the oceans and corporate responsibility for these impacts is complex and multifaceted (Smith, 2019; Johnson et al., 2020). Addressing this issue effectively requires the involvement of various stakeholders, including governments, non-governmental organizations, communities, and consumers. Effective governance mechanisms, such as clear regulations, financial incentives, and transparent reporting requirements, are essential to ensure that corporate pledges translate into meaningful action (Jones, 2018; Brown & Green, 2021).

While corporate social responsibility (CSR) and environmental social governance (ESG) practices, voluntary pledges, and sustainable labeling organizations (SLO) can contribute to sustainability, they must be accompanied by concrete actions and robust accountability mechanisms to make a meaningful difference in the health of the oceans. Companies must be willing to invest in sustainable practices, adopt innovative technologies, and collaborate with stakeholders to reduce their environmental footprint and contribute to a healthier marine environment (Johnson et al., 2020; Davis & Miller, 2019). The interconnected topics of anthropogenic impacts on the oceans, corporate responsibility, and stakeholder theory highlight the critical role of businesses in addressing the pressing challenge of oceanic pollution. By embracing stakeholder principles, implementing effective governance mechanisms, and adopting sustainable practices, corporations can play a pivotal role in protecting marine ecosystems and ensuring a sustainable future for the oceans.

Empirical Evidence, Varied Perspectives, and Collaborative Solutions for Corporate Pledges and Ocean Conservation

Corporate pledges, though debated for their impact on sustainability outcomes, show promise in positively influencing environmental performance. According to Lammers , companies committed to plastic reduction exhibited higher environmental scores, while Miller (2020) established a correlation between ambitious oceanic pledges and increased sustainability practices. This suggests a positive link between commitment levels and sustainability outcomes.

In recent years, corporate sustainability initiatives in ocean conservation have drawn increased attention, marked by various corporations pledging to reduce their impact on ocean ecosystems. While the effectiveness of these pledges is subject to debate, the literature highlights diverse perspectives. Some emphasize the imperative of greater accountability and transparency. Cullen et al. (2017) argue that increased corporate pledges aren't always accompanied by concrete actions, stressing the need for transparency and accountability in corporate sustainability initiatives to ensure meaningful actions follow pledges. Rasheed et al. (2019) echo this sentiment, emphasizing that initiatives should be grounded in scientific evidence and involve collaboration with local communities.

Another theme calls for a holistic approach to corporate sustainability. Kitzing et al. (2017) argue that initiatives can have both positive and negative impacts on ocean ecosystems, necessitating a balanced perspective considering potential benefits and risks. Hynes et al. (2021) similarly advocate for a holistic, systems-based approach, considering the interconnectedness of different ecosystems. Several authors point to the potential of corporate sustainability initiatives to promote participatory governance. Lovett et al. (2020) these initiatives can foster participatory and democratic forms of governance but caution about potential reinforcement of power imbalances. In terms of specific initiatives, reducing plastic waste in the ocean emerges as a crucial focus. Howell et al. (2018) finds initiatives focused on reducing plastic use and improving recycling infrastructure more effective than cleanup efforts alone. Lebreton et al. (2020) emphasizes the need for a combination of different approaches to address ocean plastic pollution largely.

Addressing oceanic resilience to plastic pollution is vital, with studies estimating millions of metric tons entering oceans yearly, forming plastic gyres with severe impacts. Collaborative approaches involving businesses, governments, and individuals are proposed as essential. Studies evaluating the effectiveness of corporate pledges in reducing plastic pollution emphasize the need for a holistic approach beyond plastic waste reduction. According to Miller (2020), who analyzed 50 corporate pledges, there is a primary focus on plastic recycling and product redesign. To address root causes and protect marine biodiversity, a strategy for ocean sustainability is essential. Corporations employ various strategies to fulfill pledges, such as adopting sustainable packaging practices, collaborating on waste management solutions, and investing in environmentally friendly materials and technologies (Smith, 2019; Davis & Miller, 2019; Brown & Green, 2021). These multifaceted efforts signify a collective commitment to combat plastic pollution and promote sustainable ocean practices.

Greenwashing and Corporate Sustainability Reports on Ocean Plastic Pollution

Corporate sustainability reports are now commonplace as businesses attempt to showcase their environmental responsibility. However, there is a growing concern regarding greenwashing, where companies use misleading claims to exaggerate their environmental performance, especially concerning ocean plastic pollution pledges. Studies, such as the analysis by (Dauvergne and LeBaron, 2019) on 100 companies' sustainability reports, reveal approximately 50% engage in greenwashing, utilizing tactics like vague language and unsupported claims. Similarly, (Scherer and Palazzo, 2020) found that optimistic claims about plastic reduction often correlate with greenwashing, suggesting a tactic to distract from actual environmental performance. These findings raise credibility concerns about sustainability reports and their potential influence on consumer behavior. While not all companies partake in greenwashing, the prevalence underscores the need for cautious consideration and critical evaluation of corporate sustainability claims. Various approaches exist for detecting greenwashing in sustainability reports. Content analysis, like the one by (Dauvergne and LeBaron, 2019), identifies language patterns indicative of greenwashing for example a company consistently uses vague and generalized statements such as

"commitment to eco-friendly practices" or "dedication to a greener future" without providing specific details or measurable goals. This lack of concrete information and specific achievements may indicate an attempt to create a positive perception without substantial evidence of meaningful environmental actions.

Analyzing language patterns involves looking for instances where companies might use green buzzwords or vague language to imply environmental responsibility without offering clear evidence of sustainable practices or measurable outcomes. While quantitative methods, as used by Scherer and Palazzo (2020), assess overall tone. Combining both approaches and considering the report's context and the company's track record provides a comprehensive assessment. The prevalence of greenwashing holds implications for both businesses and consumers. To mitigate risks, businesses should ensure accurate, transparent, and credible sustainability reports. Clear guidelines defining greenwashing and establishing penalties for misleading practices are crucial. Enhanced transparency and accountability, including disclosure of environmental performance data, empower consumers to make informed choices. Education and awareness campaigns play a role in enabling consumers to recognize greenwashing tactics and support companies with genuine environmental commitments. Balancing corporate responsibility and consumer awareness is crucial for fostering genuine sustainability efforts.

Conclusion

The escalating global concern over marine pollution, especially plastic pollution, has propelled corporations to embrace Corporate Social Responsibility (CSR) initiatives and make pledges to mitigate their impact on the oceans. While these initiatives reflect a growing awareness of the issue, there's evidence suggesting that corporate sustainability reporting on ocean plastic pollution lacks transparency, accountability, and holistic considerations. The pervasive issue of greenwashing in corporate sustainability reports further jeopardizes the credibility of these disclosures, potentially misleading consumers. To tackle this challenge, a critical need arises for clear and consistent guidelines in corporate sustainability reporting, heightened transparency and accountability, and the incorporation of independent verification and assurance processes. Implementing standardized reporting frameworks can establish a

common language and structure for sustainability reporting, facilitating comparisons and assessments of companies' performance by investors and other stakeholders.

Consumers play a pivotal role in combating greenwashing. Equipping themselves with knowledge about greenwashing tactics, promoting awareness of sustainable products and services, and endorsing initiatives that champion transparency and accountability in corporate sustainability reporting empower consumers to make informed choices, thereby supporting businesses genuinely committed to environmental responsibility. The efficacy of corporate sustainability initiatives in addressing ocean plastic pollution relies on a multifaceted approach embracing transparency, accountability, and a profound understanding of the interconnectedness of marine ecosystems. Through fostering collaboration among corporations, governments, non-governmental organizations, and local communities, comprehensive and effective strategies for ocean conservation can be developed, ensuring a sustainable future for our oceans. In essence, these insights underscore the critical relevance of a holistic and collaborative approach in addressing the complexities of corporate sustainability and its impact on ocean health, aligning seamlessly with the overarching research topic.

METHODOLOGY

The objective of this study is to evaluate the effectiveness of corporate pledges in achieving the 2030 Sustainable Development Goals (SDGs), specifically in reducing marine plastic pollution. Additionally, the study aims to assess the extent of greenwashing within these corporate pledges. This research is designed to collect, analyze, and compare data pertaining to corporate pledges addressing plastic pollution in oceans. The data collection process will gather information on these pledges and corresponding actions, employing predefined criteria. Subsequently, the analysis phase will involve evaluating the collected data based on specific criteria, such as scoring various companies. This methodical approach aims to provide an understanding of the effectiveness of corporate pledges, emphasizing a focused examination of the data without additional context that may distract from the core processes.

The research approach adopted for this study is a comparison of available open source on Sustainable oceanic plastic pledges within a selection of corporations with corporate pledges to reduce plastic pollution. By synthesizing and analyzing the findings from various sources, this research aims to provide an evidence-based evaluation of the effectiveness of corporate pledges and the presence of greenwashing practices.

Data Collection:

In this section, I will provide detailed information on the companies chosen for analysis, the rationale behind their selection, major data sources for pledges, categories of data collected for each company, data sources for measuring progress, and comments on the nature of corporate sustainability reports.

Collecting Packaging/Production Data: To ensure a broad evaluation, we cross-referenced the data from the Global Commitment with corporate sustainability reports. These reports were publicly available online and served as supplementary sources of data. They provided detailed information on the progress

made by companies in implementing their plastic reduction initiatives. This cross-referencing helped validate and contextualize the data obtained from the Global Commitment.

Selection of Companies: The selection of companies for analysis was a critical aspect of this research.

We chose a diverse group of 19 companies representing various industries and geographic locations.

These companies were selected based on several factors:

1. **Prominence in the Industry:** We prioritized companies that held significant influence within their respective industries, particularly those with substantial contributions to plastic production and consumption.
2. **Global Presence:** Geographic diversity was considered to ensure a global perspective on corporate sustainability efforts, as marine plastic pollution is a global issue.
3. **Varied Commitments:** We aimed to include companies with a range of commitments related to plastic reduction, including varying levels of ambition, specificity, and alignment with Sustainable Development Goals (SDGs).

Data Sources for Measuring Progress: To measure the progress of the selected companies in fulfilling their pledges, we relied on multiple sources of data, including:

1. **Ellen MacArthur Foundation:** Progress updates provided by the Ellen MacArthur Foundation's New Plastics Economy Global Commitment served as a primary source for data on metric tons of virgin plastic produced per company.
2. **Corporate Sustainability Reports:** Corporate sustainability reports, which were publicly available online, provided crucial insights into the progress made by companies. These reports included data on the amount of plastic reduced, recycling rates, and other relevant metrics. The collection of pledges data was primarily facilitated through the Corporate Social Responsibility and Sustainability reports. This was used to evaluate transparency and accountability.

Data Analysis:

Article Selection and Data Coding

Data collection was a pivotal process as it involved gathering detailed information from the chosen sources. The dataset typically included vital details such as the names of companies, the specific commitments they made concerning oceanic sustainability, the timeline for these pledges, and the concrete measures they implemented to mitigate plastic pollution in marine environments.

To facilitate organized analysis, I developed and implemented a structured coding scheme. This coding system was accurately designed to categorize and identify essential variables within the dataset. Key variables included the effectiveness of the corporate pledges, transparency in reporting on pledge outcomes, potential indicators of greenwashing (i.e., whether companies genuinely committed to sustainability or simply made surface-level efforts), and the extent to which these pledges aligned with the objectives of Sustainable Development Goal 14.

The data coding process was crucial in ensuring that information from diverse sources was consistently organized and categorized. It facilitated objective comparisons and assessments of the various corporate pledges, helping to draw meaningful conclusions and identify patterns in the data. This approach to data coding was essential to provide a robust foundation for the subsequent analysis of the project.

Scoring of Key Performance Indicators

An overview of the data analysis process, including the criteria used to evaluate corporate pledges and sustainability reports. We evaluated each pledge across several key criteria:

1. **Transparency:** Transparency was assessed by measuring the ease of obtaining data relevant to each company's plastic reduction goals. We examined the extent to which companies disclosed information related to their pledges and initiatives in their corporate sustainability reports and on their official websites. Transparency was gauged based on the completeness and accessibility of data.

2. **Accountability:** The existence of an annual review or reporting mechanism regarding plastic recycling and recycled plastic content goals was a crucial aspect of our analysis. We scoured corporate sustainability reports and other sources to identify whether companies conducted regular assessments of their progress toward fulfilling their pledges. The presence of such reviews demonstrated a commitment to accountability in plastic reduction efforts.

Scoring Methodology for Transparency:

To evaluate the transparency of companies, a scoring methodology was employed, focusing on three key criteria. The transparency score for each company was derived by averaging individual scores for the following:

1. **Completeness of Information Disclosed:**

- Assessment of information completeness was based on the disclosure of key factors:
 - Does the company provide information on its plastic reduction goals?
 - Does the company disclose its plastic footprint?
 - Does the company disclose information about its plastic reduction efforts?

2. **Accessibility of Information Disclosed:**

- Evaluation of information accessibility considered the following factors:
 - Is the information easy to find on the company's website?
 - Is the information presented concisely?
 - Is the information available in multiple languages?

3. **Disclosure of Data on Plastic Footprint and Reduction Efforts:**

- Examination of data disclosure included the following factors:
 - Does the company disclose data on the amount of plastic it uses?
 - Does the company disclose data on the amount of plastic it recycles?
 - Does the company disclose data on its progress towards achieving its plastic reduction goals?

Each criterion received a score ranging from 1 to 3, with 1 being the lowest and 3 being the highest. The overall transparency score for each company was calculated by averaging the scores of these three criteria.

Table 1 Key of Scoring of Transparency of Sustainability

<u>Criteria</u>	<u>Score of 1 (Low)</u>	<u>Score of 2 (Moderate)</u>	<u>Score of 3 (High)</u>
<u>Narrative Clarity and Contextual Detail</u>	Limited clarity with the use of technical language or minimal explanations, hindering reader understanding.	Moderate clarity with some use of technical language but lacks explanations.	High clarity using clear and understandable language, with thorough explanations providing a full understanding of the company's plastic reduction efforts.
<u>Accessibility of Information Disclosed</u>	Limited accessibility. The report is challenging to find or navigate, and the information is not presented in a user-friendly format.	Moderate accessibility. The report is somewhat accessible but requires improvements in terms of ease of access and user-friendly presentation.	High accessibility. The sustainability report is readily available, easy to find, and presented in a format that is user-friendly, ensuring a broad audience can engage with the information.
<u>Disclosure of Data on Plastic Footprint and Reduction Efforts</u>	Limited disclosure. The report lacks quantitative data on plastic footprint and reduction efforts, providing minimal insight into the company's actual impact on plastic pollution.	Moderate disclosure. The report includes some quantitative data, but there is room for improvement in terms of providing a more detailed account of the company's plastic reduction initiatives.	High disclosure. The report provides clear and detailed quantitative data on plastic footprint and reduction efforts, allowing readers to assess the company's impact on plastic pollution and its progress toward reduction goals.

Scoring Methodology for Accountability:

1. Existence of an Annual Review or Reporting Mechanism:

Meaning: This criterion evaluates whether a company has established a regular and systematic process for reviewing and reporting on its sustainability initiatives. An annual review or reporting mechanism indicates a commitment to ongoing transparency and accountability in communicating sustainability efforts.

Importance:

- *Timely Communication:* Annual reviews ensure timely communication of sustainability performance, allowing stakeholders to stay informed about the company's progress.
- *Accountability:* Regular reporting demonstrates a commitment to being held accountable for sustainability goals and targets.

2. Independence and Verifiability of the Reporting Mechanism:

Meaning: This criterion assesses the credibility of the reporting mechanism by examining its independence and verifiability. Independence implies that the reporting process is free from undue influence, while verifiability ensures that reported information can be externally confirmed or audited.

Importance:

- *Credibility:* Independent reporting enhances the credibility of sustainability information, signaling a commitment to honest and transparent communication.
- *Trustworthiness:* Verifiability allows external stakeholders, such as investors or regulators, to trust the accuracy and reliability of the reported data.

3. Integration with Business Strategy:

Meaning: This criterion explores how well a company's sustainability goals and initiatives align with its overall business strategy, long-term objectives, core values, and mission. It assesses the degree to which sustainability is embedded in the strategic decision-making and operational practices of the organization.

Importance:

- *Strategic Alignment:* Integration with business strategy indicates that sustainability is not just a standalone effort but an integral part of the company's broader strategy.
- *Long-Term Impact:* Sustainable practices that align with business objectives are more likely to have a lasting impact on the company and contribute to long-term success.
- *Plastic-Specific Relevance:* In the context of plastics, integration with business strategy ensures that efforts to address plastic pollution are not isolated initiatives but are core to the company's overall approach, potentially influencing product design, supply chain decisions, and customer engagement.

Each factor was scored on a scale of 1 to 3, with 1 as the lowest and 3 as the highest. The final accountability score for each company was determined by averaging the scores of these three components.

Table 2 Key of Scoring of Accountability of Sustainability

Criteria	Score 1 (Low)	Score 2 (Moderate)	Score 3 (High)
Existence of an Annual Review or Reporting Mechanism	Limited or irregular reporting mechanism. Reports may not be consistently available on an annual basis.	An annual review or reporting mechanism exists, but it may lack coverage or transparency.	Well-established and transparent annual reporting mechanism. Regular, comprehensive reports are available, demonstrating a commitment to transparency and accountability.
Independence and Verifiability of the Reporting Mechanism	Lack of independence, with potential influence compromising the credibility of the reporting process. Limited or no mechanisms for external verification.	Some independence in the reporting process, but certain areas may lack transparency or be susceptible to influence. Limited external verification mechanisms in place.	Independent reporting process with minimal influence. Robust external verification mechanisms are in place, ensuring the credibility and trustworthiness of the reported data.
Integration with Business Strategy	Limited alignment between sustainability goals and overall business strategy. Sustainability efforts may be isolated from core business operations and decision-making.	Some alignment with business strategy, but integration is not consistent across all aspects of the company's operations. Sustainability is considered in certain decision-making processes.	Strong alignment between sustainability goals and overall business strategy. Sustainability is fully integrated into key business decisions, operations, and long-term objectives.

Qualitative Data Analysis (Science-Based Targets)

To assess the effectiveness of corporate pledges and their alignment with sustainability goals, correlation analysis plays a central role. This step involves the statistical examination of the data to understand relationships between variables. Specifically, the project focuses on correlating the information on corporate pledges with the actual virgin plastic production data provided by the Ellen MacArthur Foundation's New Plastics Economy Global Commitment for a specified period 2018-2021.

In this phase of the research, the aim is to evaluate the relationship between corporate pledges and actual plastic production data using correlation analysis. This analysis focuses on quantifying the associations between variables to better understand the impact of corporate initiatives.

The project utilizes a linear trend model to perform this analysis. The general formula for the model is:

$$\hat{y} = \beta_0 + \beta_1 \cdot x$$

In this context:

- \hat{y} represents the predicted plastic production in tons.
- X corresponds to the year (e.g., 2018, 2019, etc.).
- β_0 represents the intercept, which provides an estimate of the baseline level of plastic production.
- β_1 is the slope, offering an estimate of the annual rate of change in plastic production.

The linear trend model is applied to predict plastic production levels for the years 2018 to 2022. The intercept (β_0) is an indicator of the estimated plastic production when x is at its lowest value, while the slope (β_1) signifies the anticipated annual change. By comparing these predicted values with the actual plastic production data, the analysis reveals insights into trends, patterns, and deviations.

For the statistical analysis of plastic production data, a linear trend model is employed. The formula for this model is $y = 1102000.0 + 95000.0 \cdot x$. Here, y represents the predicted plastic production in tons, and x corresponds to the year (e.g., 2018, 2019, etc.). The model is used to predict plastic production levels for the years 2018 to 2021, relying on the intercept and slope coefficients that are derived from the qualitative trend analysis. The intercept, in this context, indicates the baseline level of

plastic production, while the slope reveals the annual rate of change. The application of this model allows for an assessment of the predicted vs. actual production levels over the selected period, offering insights into trends and deviations. Correlation analysis and trend modeling are essential tools in evaluating the impact of corporate commitments on plastic production. These statistical techniques provide a quantitative basis for assessing the effectiveness of pledges and their alignment with sustainability goals, thereby contributing to a complete understanding of corporate initiatives and their implications for oceanic sustainability and Sustainable Development Goal 14. This analysis is driven by the need to quantify and reveal the intricate associations between the variables involved. The project leverages a powerful linear trend model, expressed in a general formula, to conduct this analysis. This model is the key that unlocks the door to understanding the dynamics between corporate commitments and plastic production levels.

The formula, with components including the predicted plastic production (\hat{y}), the year (x), the intercept (β_0), and the slope (β_1), is at the heart of this evaluation. The predicted plastic production is a critical metric, revealing how corporate efforts translate into tangible outcomes. The year variable encapsulates the temporal dimension, allowing for an in-depth exploration of trends over the selected period. The intercept provides a window into the baseline plastic production level, whereas the slope reflects the anticipated annual change in production.

The application of this trend model is instrumental in predicting plastic production for the years 2018 to 2021 enabling the identification of trends, patterns, and deviations. By comparing these projections with the actual production data, the analysis has the potential to reveal whether corporate pledges are valid commitments to mitigate plastic pollution or merely instances of greenwashing. This methodology, which combines correlation analysis and trend modeling, serves as a robust quantitative framework for assessing the efficacy of corporate sustainability initiatives. It offers insights into the true impact of these initiatives on oceanic sustainability and their alignment with Sustainable Development

Goal 14, shedding light on the authenticity of these commitments and their potential to drive meaningful change.

Limitations

This study recognizes that there are several potential problems that could affect the findings. To really understand the research, it's important to look at these problems. In this study, we found the following issues:

1. Data Availability and Reliability: This study relies on having data that is easy to get and trustworthy from various sources. We tried our best to collect data from reliable sources, but sometimes, data might not be easy to access, or it might not be entirely accurate. Some data sources might not have enough information about corporate promises, or they might not cover all the aspects of marine plastic pollution. To address this, we used multiple sources and checked data carefully when possible.
2. Subjectivity in Evaluation: While efforts are made to maintain objectivity in the assessment of criteria such as transparency, accountability, and governance structure, there is a degree of subjectivity involved. The interpretation of these criteria can vary among evaluators, potentially leading to differences in scoring and judgment. Individual perspectives and biases can influence how companies are perceived and evaluated.

RESULTS/DATA ANALYSIS

Results Analysis: Corporate Sustainability Performance Analysis of Science-Based Targets

The analysis of environmental pledges and actual performance data for major corporations from 2018 to 2022 reveals varied trends in their commitment to sustainability. Coca-Cola shows a general upward trend in actual values, consistently surpassing their pledged targets, which suggests successful overperformance or conservative target setting. Mondelez, in contrast, aligns more closely with their targets, indicating a more consistent approach to meeting environmental goals. PepsiCo maintains a steady increase in actual values that generally aligns closely with their pledged targets, reflecting a consistent strategy in achieving their goals. Mars demonstrates stability with a slight upward trend in actual values, although discrepancies between targets and actual performance suggest room for more precise target setting. Note that the black line and black marker represents the data that is already available.

Unilever exhibits fluctuations in actual values with notable alignment between actual performance and targets, although recent years show significant downward adjustments in targets. Borealis, on the other hand, displays a strong upward trend, consistently exceeding their targets, which may indicate ambitious production increases not fully matched by pledged reductions. Nestlé shows a slight decline in actual values over time, with some recent deviations below target values, suggesting potential overestimation in their target setting. Danone reveals a steady decrease in actual values that generally align with or fall slightly below their targets, indicating effective target management and significant reduction commitments. L'Oréal consistently aligns their steadily increasing actual values with their targets, reflecting consistent achievement. Conversely, Kellogg shows fluctuating trends often falling below targets, indicating challenges in meeting their environmental goals. H&M displays a significant decline in actual values, consistently falling below targets in recent years.

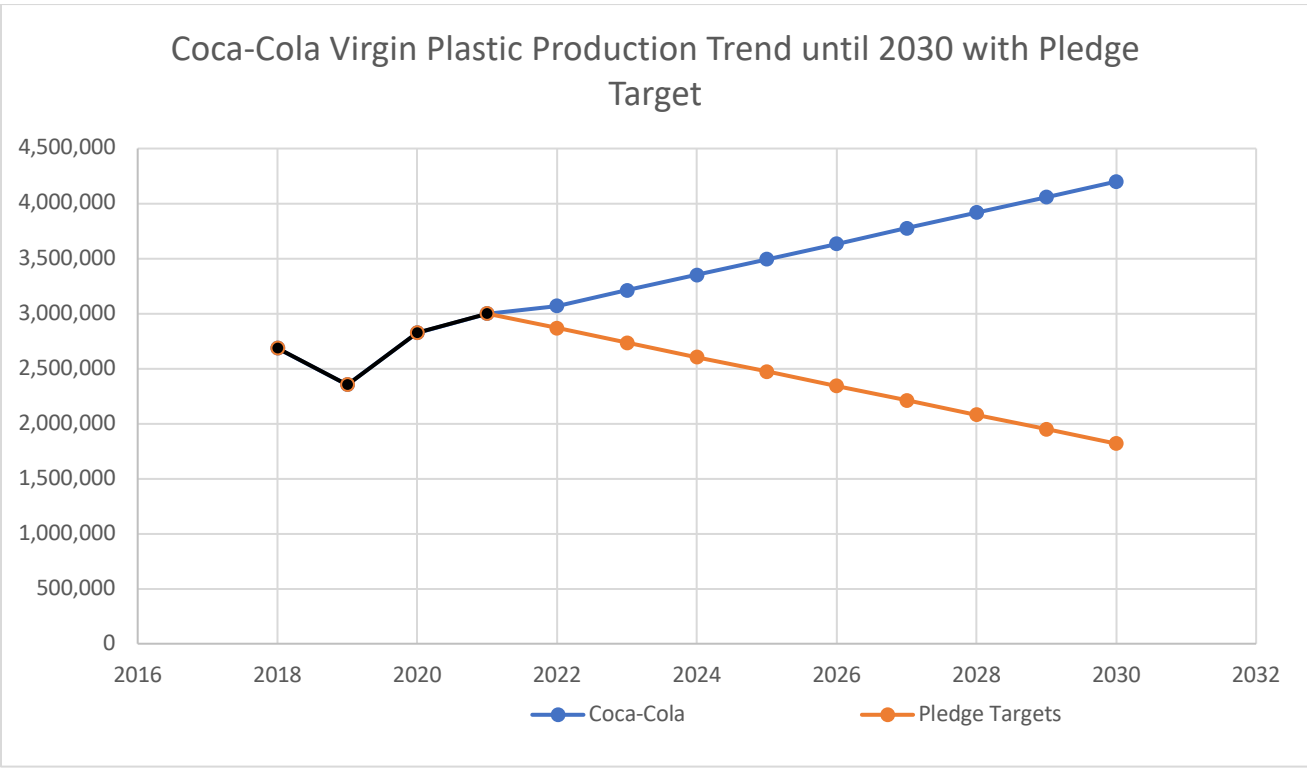


Figure 1 Coca-Cola Virgin Plastic Production Trend until 2030 with Pledge Target

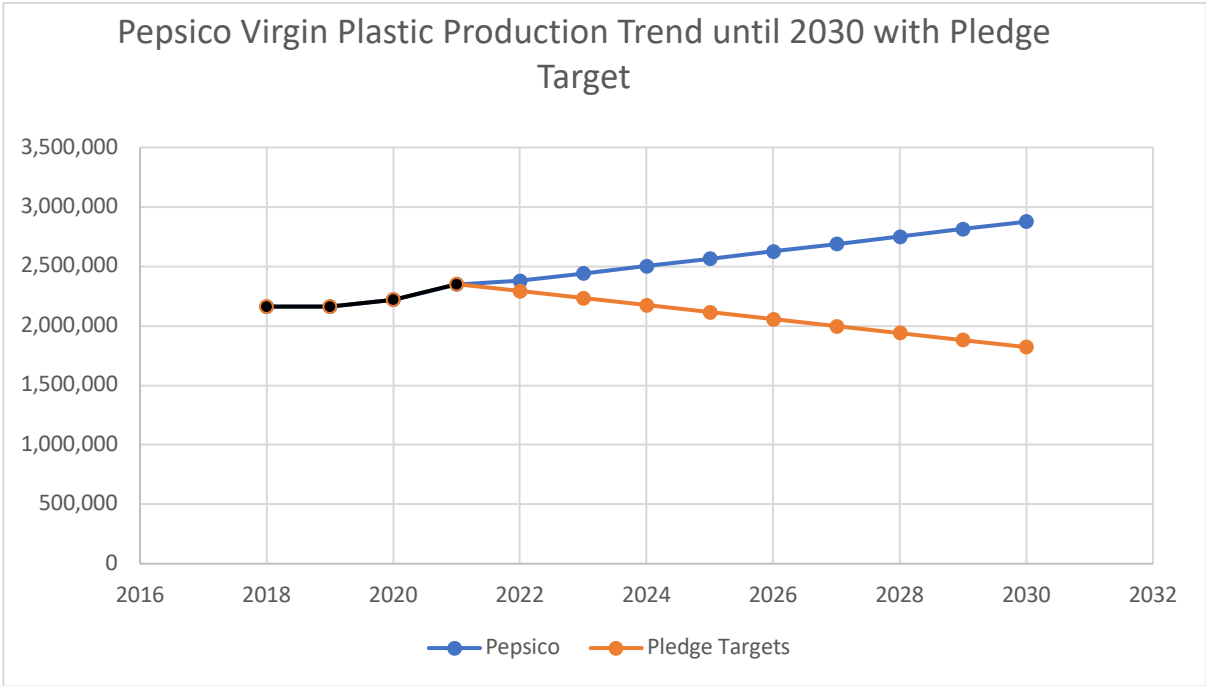


Figure 2 PepsiCo Virgin Plastic Production Trend until 2030 with Pledge Target

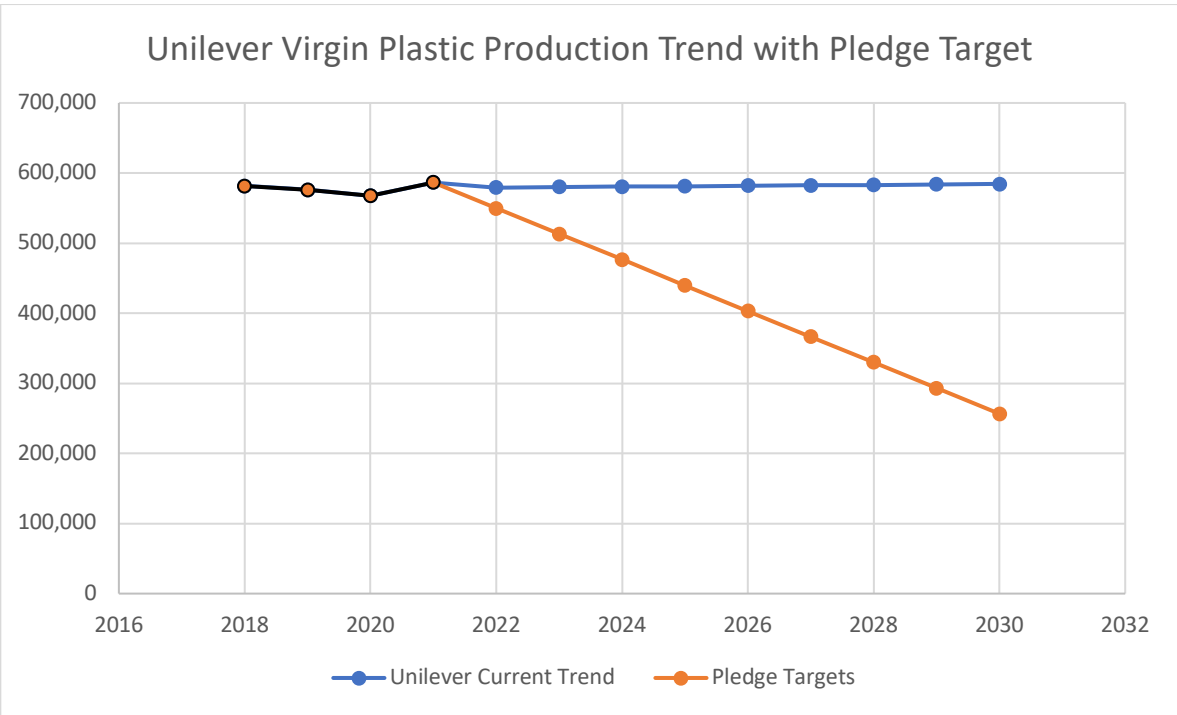


Figure 3 Unilever Virgin Plastic Production Trend with Pledge Target

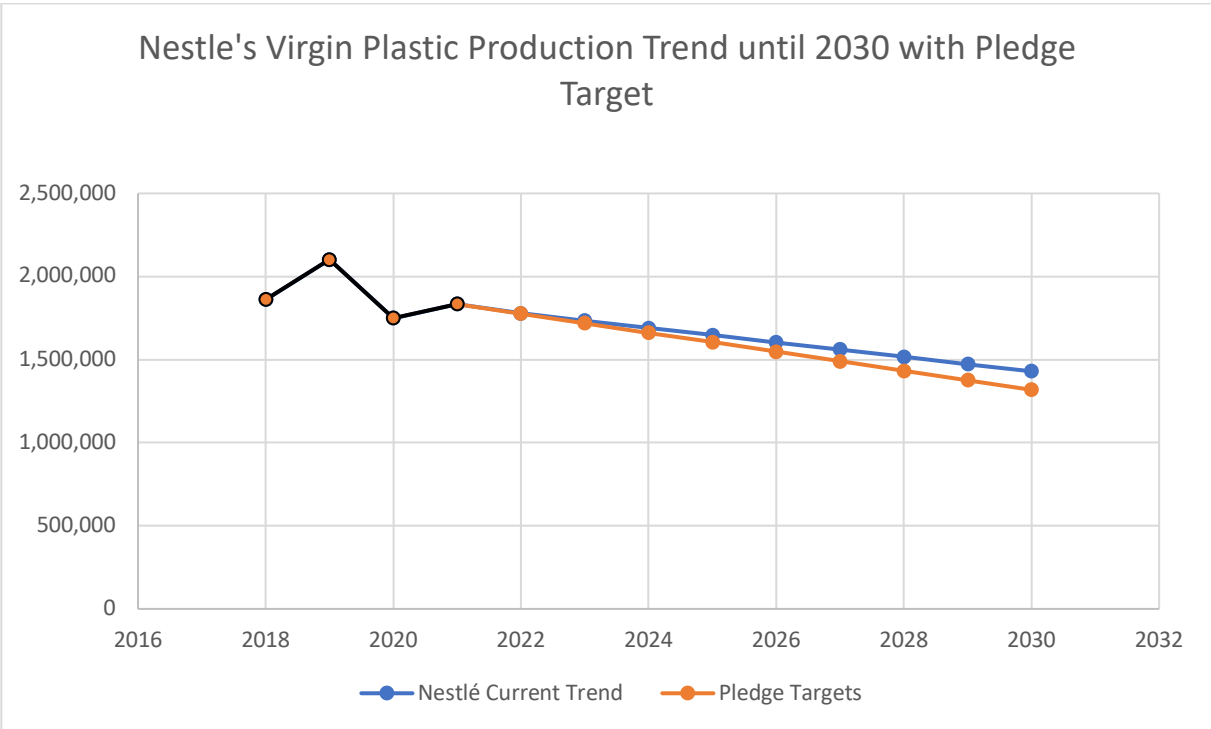


Figure 4 Nestlé's Virgin Plastic Production Trend until 2030 with Pledge Target

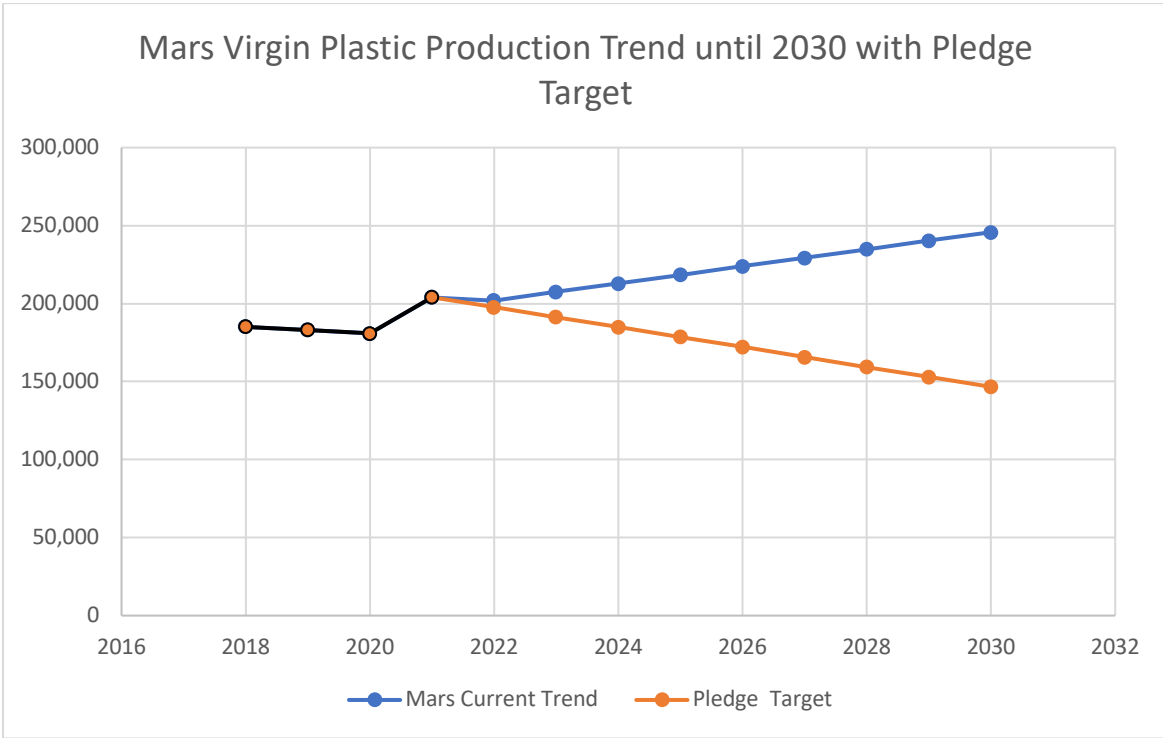


Figure 5 Mars Virgin Plastic Production Trend until 2030 with Pledge Target

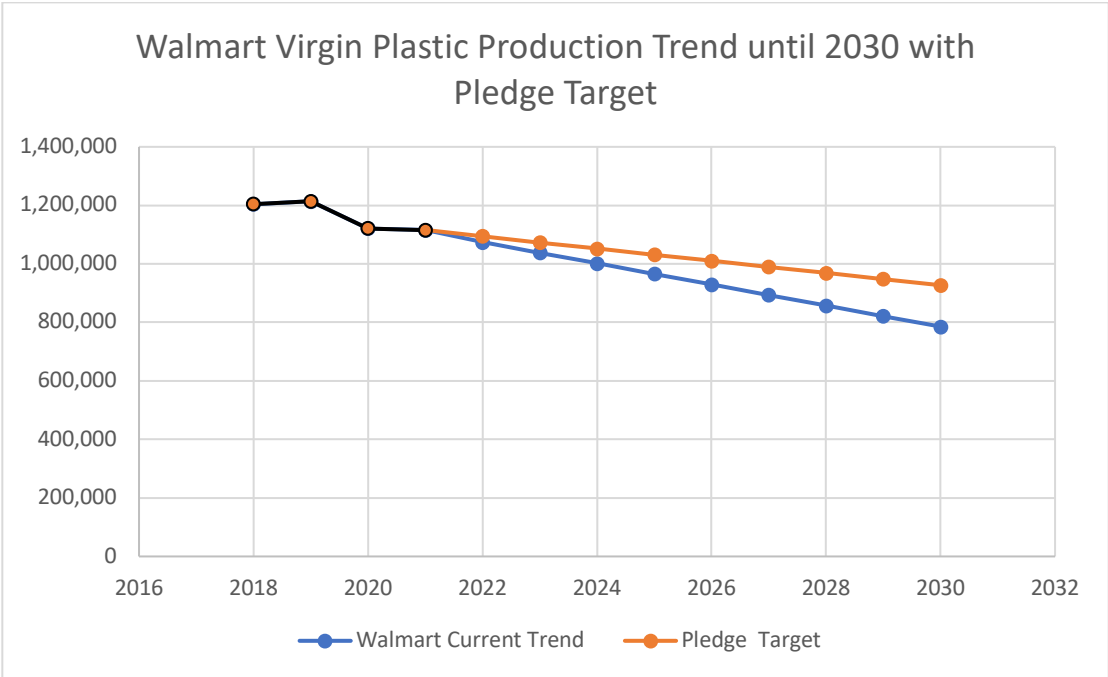


Figure 6 Walmart Virgin Plastic Production Trend until 2030 with Pledge Target

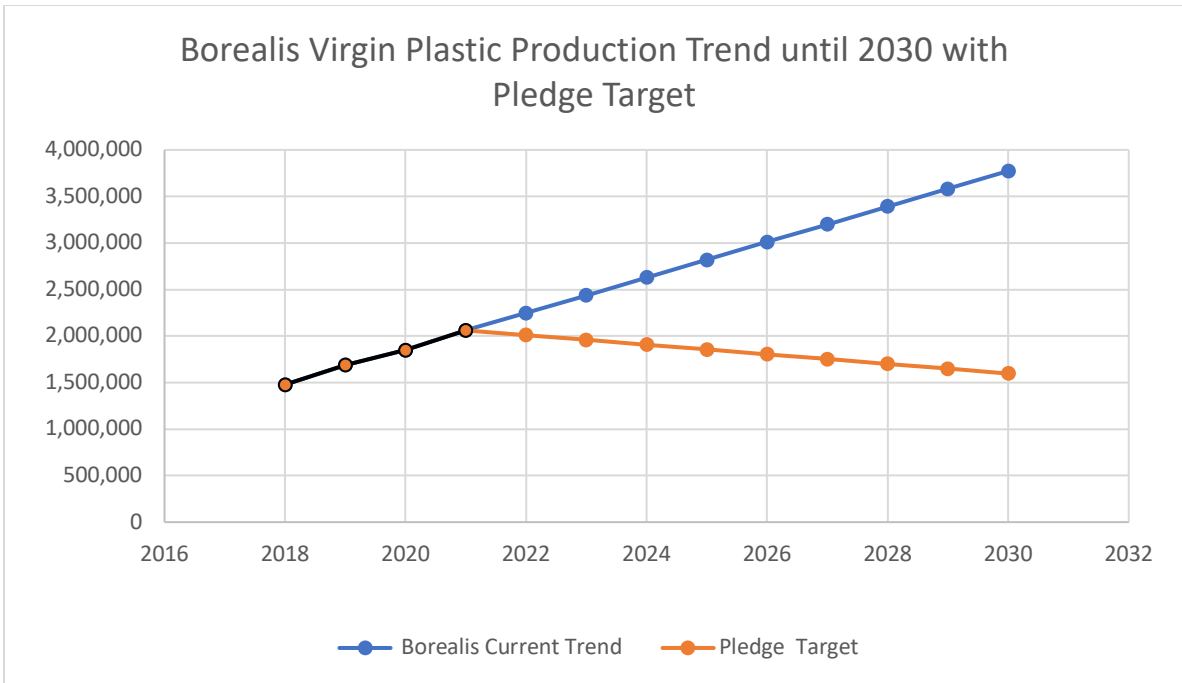


Figure 7 Borealis Virgin Plastic Production Trend until 2030 with Pledge Target

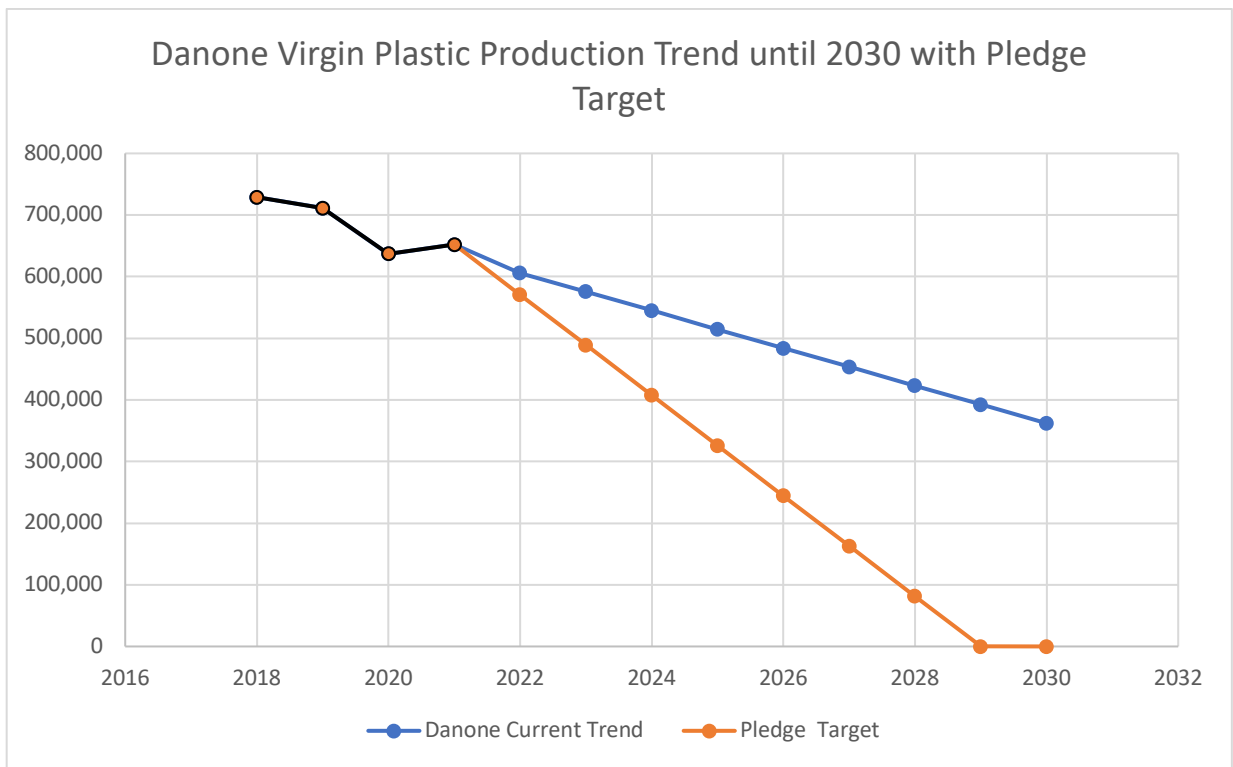


Figure 8 Danone Virgin Plastic Production Trend until 2030 with Pledge Target

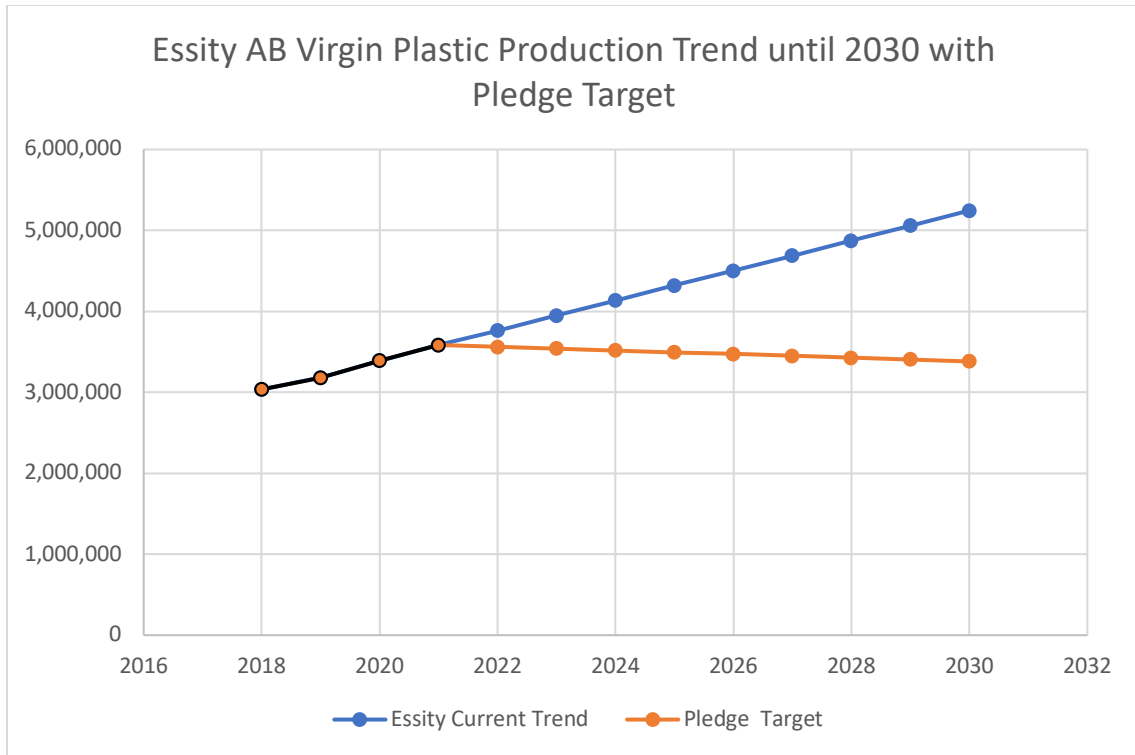


Figure 9 Essity AB Virgin Plastic Production Trend until 2030 with Pledge Target

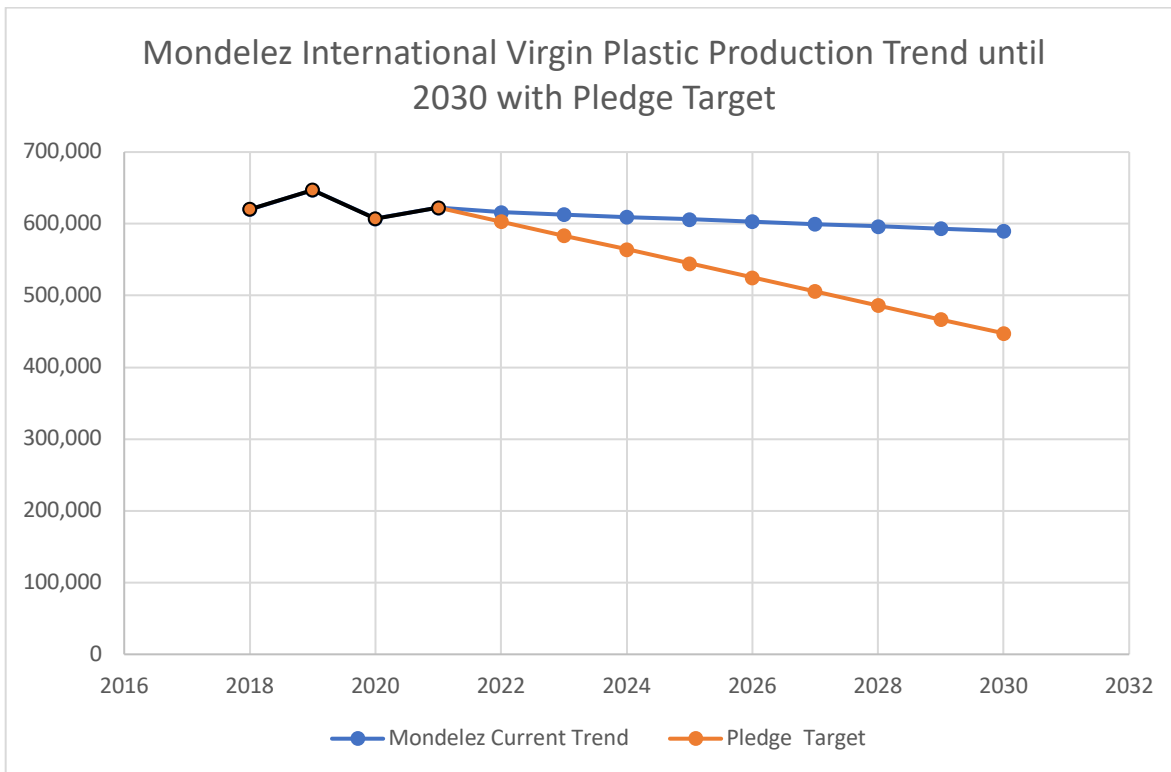


Figure 10 Mondelez International Virgin Plastic Production Trend until 2030 with Pledge Target.

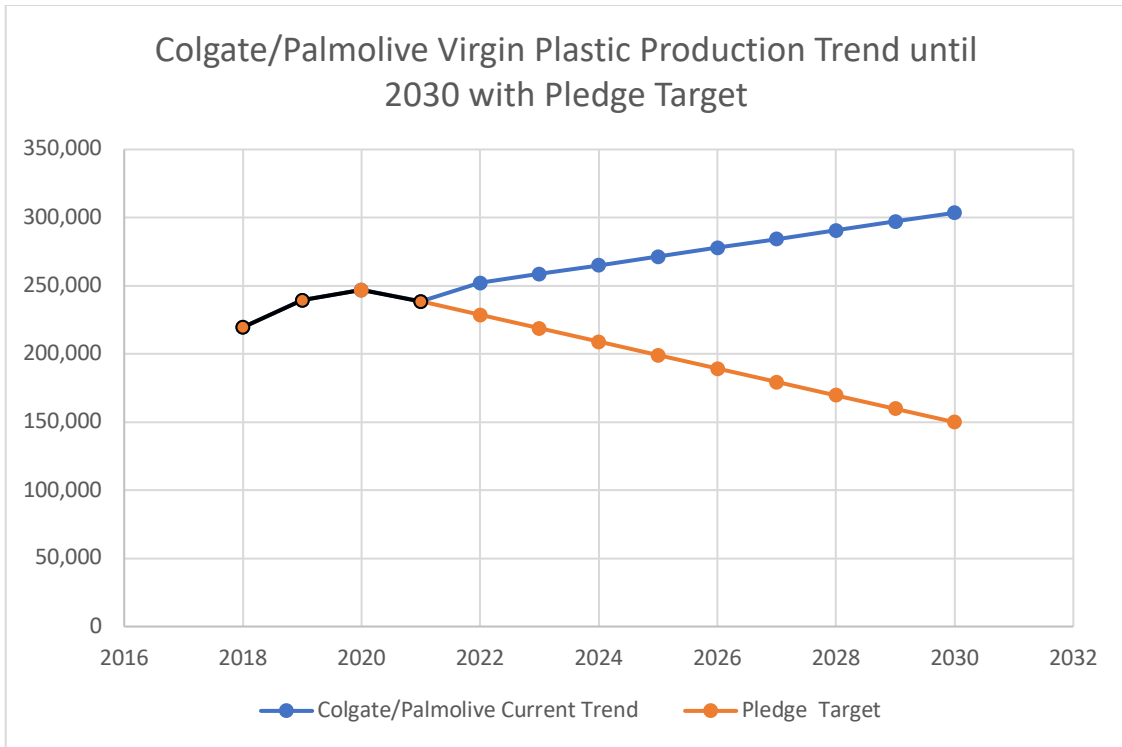


Figure 11 Colgate/Palmolive Virgin Plastic Production Trend until 2030 with Pledge Target

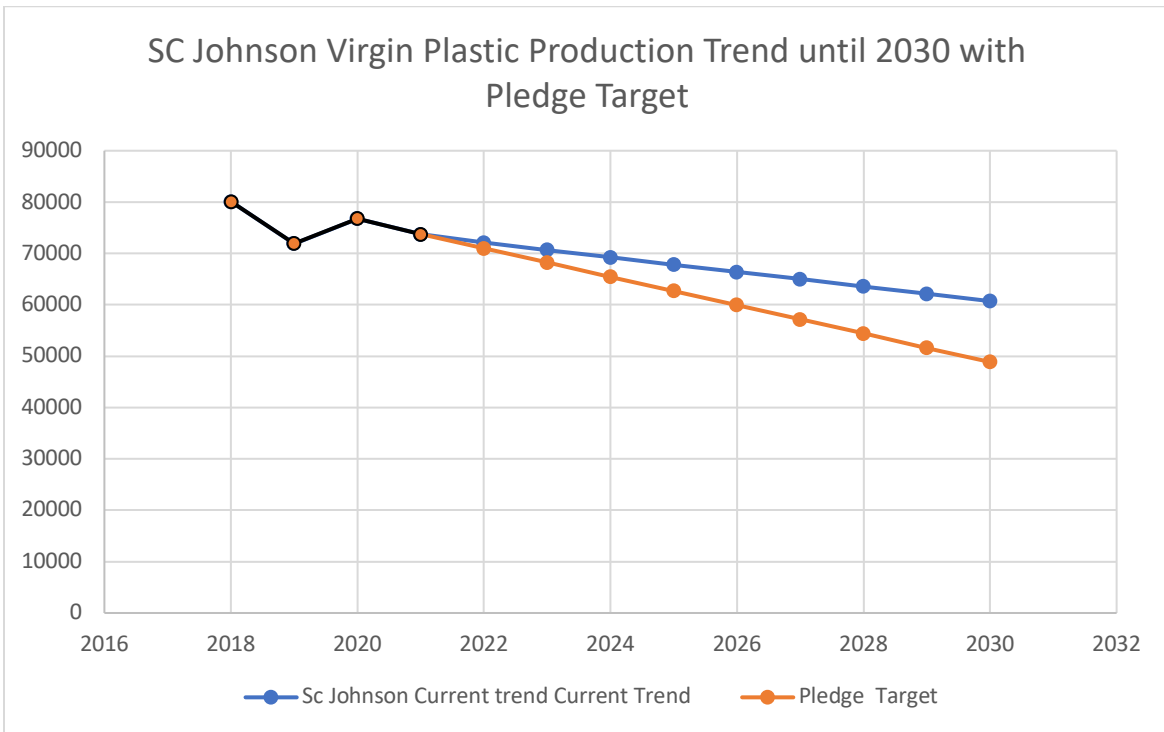


Figure 12 SC Johnson Virgin Plastic Production Trend until 2030 with Pledge Target

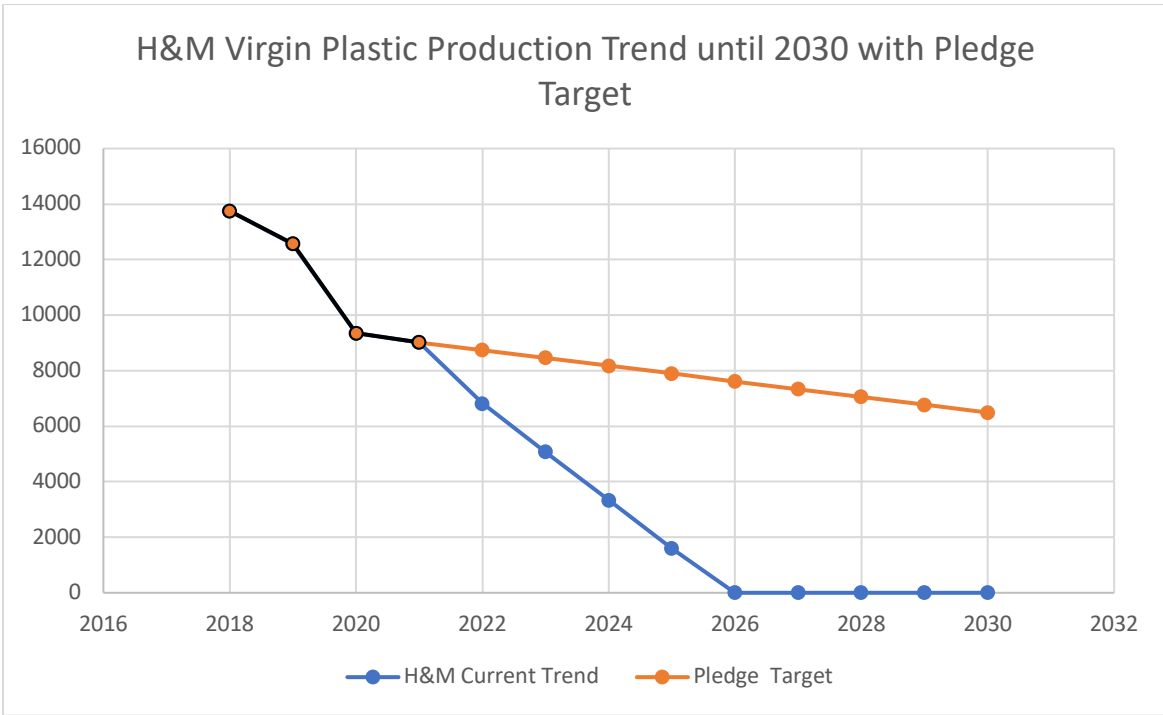


Figure 13 H&M Virgin Plastic Production Trend until 2030 with Pledge Target

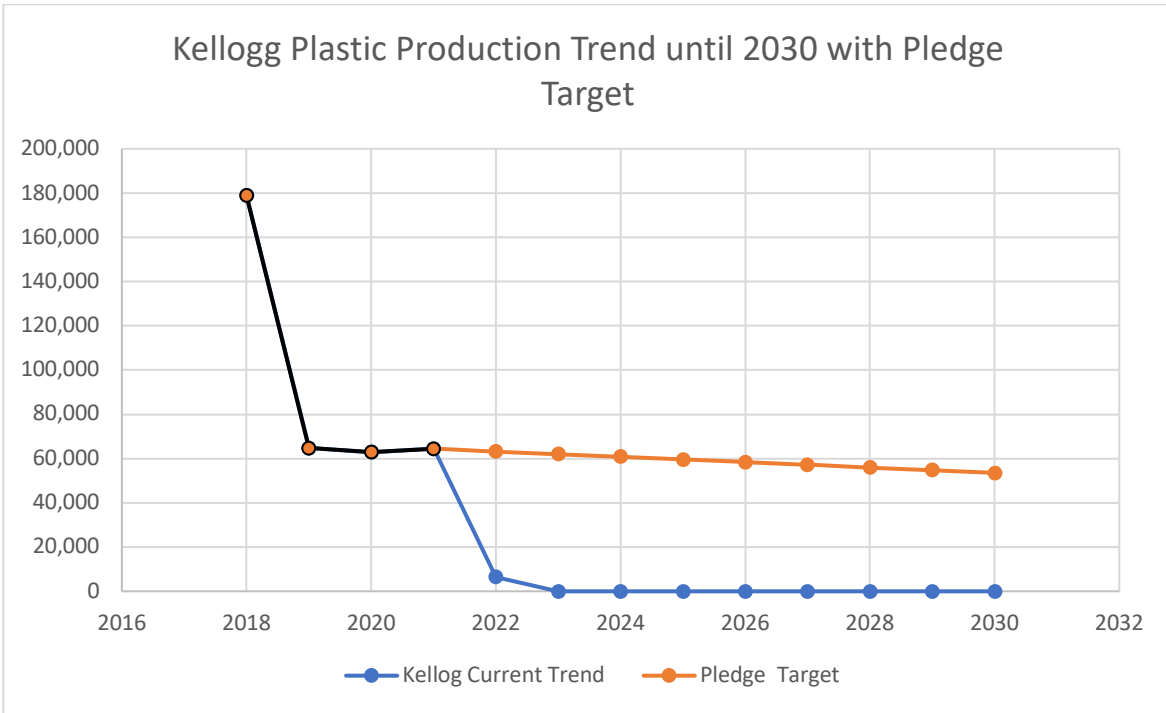


Figure 14 Kellogg Virgin Plastic Production Trend.

Results Analysis: Corporate Sustainability Report Accountability Scoring

The evaluation of corporate sustainability reports across a diverse cohort of companies provides a comprehensive understanding of their commitments to addressing plastic pollution. Coca-Cola emerges as a frontrunner, securing an exemplary score of 9. The company distinguishes itself through a meticulously crafted annual Business & Sustainability Report, subject to audit by Ernst & Young LLP. This not only ensures transparency but also instills confidence in the accuracy and completeness of the disclosed information. Notably, Coca-Cola's integration of sustainability goals into its core business strategy reinforces its commitment to combating plastic pollution.

PepsiCo also scored 9, reflecting a robust commitment to transparency and sustainability integration. Their ESG Summary and "Sustainability Topics A-Z" platform serve as support for regular and transparent reporting. Independent audit by the Sustainability Accounting Standards Board (SASB) adds credibility, particularly in verifying the accuracy of plastic-related data. The "pep+" program underscores PepsiCo's strategic alignment with sustainability goals, emphasizing a clear focus on reducing plastic pollution. Unilever, with a score of 9, highlights a holistic commitment to transparency, accountability, and integration of sustainability goals. The Unilever Compass report, independently assured by PwC, stands as a testament to their dedication to providing a sustainable future. The integration of sustainability initiatives into Unilever's overarching business strategy further solidifies their position.

However, not all companies scored equally high. Nestlé, with an overall score of 6, demonstrates a commitment to transparency in its Creating Shared Value (CSV) report. Yet, improvements are warranted, especially in providing detailed information on the independence and verification of plastic-specific data. L'Oréal and Mars, both securing a score of 8, showcase robust commitments to plastic reduction. However, there exists an opportunity for greater transparency in the verification processes of plastic-related initiatives. Walmart, with a score of 9, displays a positive commitment to reducing plastic

pollution through clear narrative explanations, accessible information, and data on plastic usage, verified by Ernst & Young. Essity and Mondelez International also lead with top scores of 9, illustrating consistent and robust commitments to tackling plastic pollution within their respective industries. Colgate/Palmolive and Kellogg, with scores of 6, show commendable efforts in plastic reduction. However, potential enhancements lie in specific areas outlined in the scoring criteria. SC Johnson and H&M achieved scores of 9, setting clear benchmarks for addressing plastic pollution.

Table 3 Showing Accountability Scores of Companies along with the Criterion and Explanation of Each Score

Criterion	Coca Cola	Explanation
Existence of an annual review or reporting mechanism	3	Coca-Cola publishes a comprehensive and transparent annual Business & Sustainability Report. This report covers all aspects of the company's sustainability efforts, including its plastic initiatives.
Independence and verifiability of the reporting mechanism	3	Coca-Cola's sustainability report is audited by Ernst & Young LLP, a third-party accounting firm. Ernst & Young LLP audit provides independent assurance that the information in the report is accurate and complete.
Integration with Business Strategy	3	Coca-Cola has well-defined sustainability goals, including specific targets for reducing plastic pollution. These goals are integrated into the company's overall business strategy and decision-making processes.
Overall accountability score	9	
Criterion	PepsiCo	Explanation
Existence of an annual review or reporting mechanism	3	PepsiCo publishes an annual ESG Summary and maintains a dedicated "Sustainability Topics A-Z" platform for detailed information. This demonstrates a commitment to regular and transparent reporting.
Independence and verifiability of	3	PepsiCo's sustainability report is audited by Sustainability Accounting Standards Board (SASB), a third-party accounting firm. Sustainability Accounting Standards

the reporting mechanism		Board (SASB) audit provides independent assurance that the information in the report is accurate and complete.
Integration with Business Strategy	3	PepsiCo's "pep+" program integrates sustainability into core business strategy. Specific goals for reducing plastic footprint are set and progress is tracked, demonstrating a strong commitment to this area.
Overall accountability score	9	PepsiCo's sustainability report shows a strong commitment to transparency and integration of sustainability goals. The company's "pep+" program demonstrates a clear focus on tackling plastic pollution. Like Coca-Cola, improvements in reporting independence through independent audits specific to plastics could further strengthen their score.
Criterion	Unilever Score	Explanation
Existence of an annual review or reporting mechanism	3	Unilever publishes a transparent annual Unilever Compass report, showcasing their commitment to sustainability. The report covers all aspects of their sustainability efforts, including their plastic initiatives.
Independence and verifiability of the reporting mechanism	3	Unilever's report undergoes independent assurance by PwC, a leading global audit, tax, and advisory firm. This ensures the credibility and trustworthiness of the reported data.
Integration with Business Strategy	3	Unilever's sustainability goals are fully integrated into their business strategy and decision-making processes. Their "Unilever Compass" framework guides their efforts to achieve a sustainable future.
Overall accountability score	9	Unilever's sustainability report demonstrates a strong commitment to transparency, accountability, and integration of sustainability goals. They have implemented robust measures to ensure the independence and verifiability of their reporting, and their business strategy is firmly aligned with their sustainability goals.
Criterion	Nestle Score	Explanation
Existence of an annual review or reporting mechanism	3	Nestlé publishes a transparent annual Creating Shared Value (CSV) report. This report covers various aspects of sustainability, including plastics.
Independence and verifiability of	2	Nestlé's CSV Report is prepared in accordance with Data for Key Performance Indicators on this page are EY assured. The EY limited assurance report and conclusion can be found at www.nestle.com/assurance-statement

the reporting mechanism		
Integration with Business Strategy	2	Nestlé's sustainability goals are incorporated into their business strategy, but the specific initiatives related to plastic reduction are not fully integrated across all aspects of their operations.
Overall accountability score	7	Nestlé's sustainability report demonstrates a commitment to transparency and reporting. However, it could be strengthened by providing more detailed information on the independence and verification of plastic-specific data.
Criterion	L'Oréal Score	Explanation
Existence of an annual review or reporting mechanism	3	L'Oréal publishes a comprehensive and transparent annual report, including a dedicated section on "Sustainable Packaging." This section provides detailed information on their plastic reduction initiatives and progress.
Independence and verifiability of the reporting mechanism	2	The report mentions being verified by Bureau Veritas, but it doesn't explicitly detail the process or scope specifically for plastic-related initiatives.
Integration with Business Strategy	3	L'Oréal's sustainability goals, including plastic reduction, are fully integrated into their business strategy. The "L'Oréal for the Future" program outlines ambitious targets and initiatives.
Overall accountability score	8	L'Oréal demonstrates a strong commitment to plastic reduction. By addressing areas for improvement, they can continue to be a leader in sustainable packaging and contribute to a cleaner planet.
Criterion	Mars Score	Explanation
Existence of an annual review or reporting mechanism	3	Mars publishes a yearly Sustainable Generation Plan (SiG) report. This report includes a dedicated section on "Transforming Packaging," which details their plastic reduction initiatives and progress.
Independence and verifiability of the reporting mechanism	2	The report mentions independent assurance by KPMG but doesn't clarify the scope of verification for plastic-related data.
Integration with Business Strategy	3	Mars' sustainability goals, including plastic reduction, are fully integrated into their SiG plan and business strategy. The plan outlines ambitious targets and key initiatives.

Overall accountability score	8	Mars demonstrates a strong commitment to plastic reduction and sustainability. By addressing areas for improvement, they can continue to be a leader in sustainable packaging and contribute to a circular economy.
Criterion	Walmart Score	Explanation
Existence of an annual review or reporting mechanism	3	Walmart publishes a transparent Environmental, Social, and Governance (ESG) Report. This report includes a dedicated section on "Waste & Circular Economy," which details their plastic reduction initiatives and progress.
Independence and verifiability of the reporting mechanism	2	The report mentions independent assurance by Ernst & Young but doesn't clarify the scope of verification for plastic-related data.
Integration with Business Strategy	2	Walmart's sustainability goals, including plastic reduction, are integrated into their overall business strategy. However, the level of integration and implementation across all aspects of their operations could be further strengthened.
Overall accountability score	7	Walmart demonstrates a positive commitment to reducing plastic pollution through its various initiatives and ambitious goals. By addressing areas for improvement, they can further strengthen their impact and contribute to a more sustainable future.
Criterion	Borealis Score	Explanation
Existence of an annual review or reporting mechanism	3	Borealis publishes a comprehensive and transparent Non-Financial Report, including a dedicated section on "Sustainable Products and Solutions" and "Circular Economy." This section details their plastic reduction initiatives and progress.
Independence and verifiability of the reporting mechanism	2	The report mentions independent assurance by PwC but doesn't clarify the scope of verification for plastic-related data.
Integration with Business Strategy	3	Borealis' sustainability goals, including plastic reduction, are fully integrated into their overall business strategy. The company actively promotes a circular economy approach for plastics.

Overall accountability score	8	Borealis demonstrates a commendable commitment to tackling plastic pollution. By addressing the identified areas for improvement, they can further strengthen their impact and position themselves as a leader in sustainable plastics solutions.
Criterion	Danone Score	Explanation
Existence of an annual review or reporting mechanism	3	Danone publishes a comprehensive and transparent Universal Registration Document (URD) and Integrated Annual Report, both containing dedicated sections on "Circular Economy of Packaging" and "Social, Societal and Environmental Responsibility." These sections detail their plastic reduction initiatives and progress.
Independence and verifiability of the reporting mechanism	2	The report mentions independent auditing by EY but doesn't clarify the scope of verification for plastic-related data.
Integration with Business Strategy	3	Danone's thorough sustainability plan fully integrates its environmental aims, which include reducing the use of plastic. The business constantly advocates for a circular economy in the plastics industry.
Overall accountability score	8	Danone demonstrates a strong commitment to tackling plastic pollution and fostering a circular economy for plastics. By focusing on the areas for improvement, they can further solidify their leadership position and drive significant positive impact on the environment.
Criterion	Essity Score	Explanation
Existence of an annual review or reporting mechanism	3	Essity publishes an ample and transparent Annual and Sustainability Report, with dedicated sections on "Sustainability" and "Reducing our impact on the planet." These sections detail their plastic reduction initiatives and progress in a clear and accessible manner.
Independence and verifiability of the reporting mechanism	3	Essity's report undergoes independent assurance by Ernst & Young, a leading global audit, tax, and advisory firm. This ensures the credibility and trustworthiness of the reported data, including plastic-related information.
Integration with Business Strategy	3	Essity's sustainability goals, including plastic reduction, are fully integrated into their overall business strategy. The company has established ambitious targets and implemented initiatives across all aspects of their operations.

Overall accountability score	9	Essity demonstrates a strong and consistent commitment to tackling plastic pollution, setting them as a leader in sustainable packaging within the hygiene and health product industry.
Criterion	Mondelez International Score	Explanation
Existence of an annual review or reporting mechanism	3	Essity publishes an Annual Sustainability Report, with dedicated sections on "Sustainability" and "Reducing our impact on the planet." These sections detail their plastic reduction initiatives and progress in a clear and accessible manner.
Independence and verifiability of the reporting mechanism	3	Essity's report undergoes independent assurance by Ernst & Young, a leading global audit, tax, and advisory firm. This ensures the credibility and trustworthiness of the reported data, including plastic-related information.
Integration with Business Strategy	3	Essity's sustainability goals, including plastic reduction, are fully integrated into their overall business strategy. The company has established ambitious targets and implemented initiatives across all aspects of their operations.
Overall accountability score	9	Essity demonstrates a strong and consistent commitment to tackling plastic pollution, setting them as a leader in sustainable packaging within the hygiene and health product industry.
Criterion	Colgate/Palmolive Score	Explanation
Existence of an annual review or reporting mechanism	3	Colgate-Palmolive publishes a clear and detailed Sustainability & Social Impact Report. This report includes dedicated sections on "Eliminate Plastic Waste" and "Accelerate Action on Climate Change," which comprehensively detail their plastic reduction initiatives and progress.
Independence and verifiability of the reporting mechanism	2	While the report mentions external verification by KPMG, it lacks specific details about the scope and process of plastic-related data verification.
Integration with Business Strategy	2	Colgate-Palmolive's sustainability goals, including plastic reduction, are fully integrated into their overall business strategy. The company's "2025 Sustainability & Social Impact Strategy" outlines ambitious targets and key initiatives.

Overall accountability score	7	Colgate-Palmolive demonstrates a commendable and consistent commitment to tackling plastic pollution, showing significant progress towards their ambitious goals. By addressing the areas for improvement, they can further strengthen their impact and solidify their leadership position in sustainable packaging within the consumer goods industry.
Criterion	Kellogg Score	
Existence of an annual review or reporting mechanism	3	Kellogg publishes a comprehensive and transparent Global Commitment Report and Corporate Responsibility Report. These reports include dedicated sections on "Sustainable Packaging" and "Our Environmental Footprint," which detail their plastic reduction initiatives and progress.
Independence and verifiability of the reporting mechanism	2	The reports mention verification by Deloitte, but don't specify the scope of verification for plastic-related data.
Integration with Business Strategy	3	Kellogg's sustainability goals, including plastic reduction, are fully integrated into their overall business strategy. The company's "Kellogg's Better Days" global purpose platform outlines ambitious targets and key initiatives.
Overall accountability score	8	Kellogg demonstrates a positive commitment to tackling plastic pollution. By addressing the areas for improvement, they can solidify their leadership position and contribute to a more sustainable future.
Criterion	SC Johnson Score	Explanation
Existence of an annual review or reporting mechanism	3	SC Johnson publishes a yearly Sustainability Report and a dedicated Better World Accountability Report. These reports contain detailed sections on "Turning the Tide on Plastic Pollution" and "Partnering to Tackle Plastic Waste," respectively, providing extensive information on their plastic reduction initiatives and progress.
Independence and verifiability of the reporting mechanism	3	The reports specify that KPMG verifies environmental data, including plastic usage and recycled content.
Integration with Business Strategy	3	SC Johnson's sustainability goals, including plastic reduction, are fully integrated into their overall business strategy. The company's "Healthy Lives, Healthy Planet" vision prioritizes environmental responsibility and outlines ambitious targets for plastic reduction.

Overall accountability score	9	SC Johnson demonstrates a clear leadership position in tackling plastic pollution. Their comprehensive approach, ambitious goals, and consistent progress make them a role model for other companies in the consumer goods industry.
Criterion	H&M Score	Explanation
Existence of an annual review or reporting mechanism	3	H&M publishes a comprehensive and transparent Annual and Sustainability Report, with a dedicated section on "Packaging" within the "Environmental Responsibility" chapter. This section details their plastic reduction initiatives and progress.
Independence and verifiability of the reporting mechanism	3	The report undergoes independent assurance by Ernst & Young, a leading global audit, tax, and advisory firm. This ensures the credibility and trustworthiness of the reported data, including plastic-related information.
Integration with Business Strategy	3	H&M's sustainability goals, including plastic reduction, are integrated into their overall business strategy. However, further integration and implementation across all aspects of their operations could be enhanced.
Overall accountability score	9	&M demonstrates a commendable commitment to tackling plastic pollution. By addressing the areas for improvement, they can further strengthen their impact and solidify their leadership position in sustainable fashion.

Results Analysis: Corporate Sustainability Report Transparency Scoring

The analysis of sustainability transparency for various companies reveals both strengths and areas for improvement in their reporting practices. Coca-Cola, PepsiCo, and Unilever each scored a total transparency score of 7. While these companies provide clear narratives and accessible information online, they often rely on technical terms without full explanation and lack disaggregation of plastic data by product type or region. Nestlé scored slightly lower at 6 due to limited data disaggregation and a lack of ambitious future goals. L’Oréal, Mars, Borealis, and Danone show strong commitment, with transparency scores ranging from 6 to 8, but they too could improve by providing more detailed explanations and comprehensive data disaggregation.

Walmart stands out with a high transparency score of 9, thanks to its clear narrative, comprehensive data on plastic usage, and detailed disaggregation by waste stream, region, and year. Similarly, Borealis and Mondelez International scored 8 and 9 respectively, with detailed explanations of initiatives and interactive features enhancing their reports. Essity and Colgate-Palmolive, with scores of 7 and 6, respectively, provide clear narratives but lack in-depth data on plastic footprint across different product categories and regions. Kellogg also scores 6, primarily due to its cumbersome report navigation and insufficient quantitative data on plastic reduction.

SC Johnson and H&M both score a total transparency of 9, showcasing exemplary reporting practices. Their reports are clear, easily accessible, and provide comprehensive data on plastic usage, waste generation, and specific reduction goals. SC Johnson, for instance, offers detailed historical context and ongoing initiatives, while H&M's dedicated section for plastic reduction efforts is both user-friendly and comprehensive.

Table 4 Showing Transparency Scores of Companies along with the Criterion and Explanation of Each Score

Criteria	Coca-Cola Score	Explanation
Narrative Clarity and Contextual Detail	2	Clear narrative, but relies on some technical terms without full explanation, like "polymer optimization" and "circular economy".
Accessibility of Information Disclosed	3	Easily accessible online, downloadable PDF, interactive features, and resources like the "World Without Waste" website.
Disclosure of Data on Plastic Footprint and Reduction Efforts	2	Provides quantitative data on total plastic usage and reduction, including progress towards specific goals. However, data disaggregation by product type or region is limited.
Total Transparency Score	7	
Criteria	PepsiCo Score	Explanation

Narrative Clarity and Contextual Detail	2	Clear narrative, but room for improvement in explaining technical jargon and providing in-depth context. Example: The report mentions "enhanced recyclability" of their bottles without fully explaining the specific technologies or innovations implemented.
Accessibility of Information Disclosed	3	Easy to access, user-friendly format, multiple resources and interactive features. The report is available online in multiple languages, includes downloadable PDFs, and offers interactive data visualizations.
Disclosure of Data on Plastic Footprint and Reduction Efforts	2	Quantitative data provided, but could benefit from disaggregation, ambitious future goals, and industry benchmarking.
Total Transparency Score	7	
Criteria	Unilever Score	Explanation
Narrative Clarity and Contextual Detail	2	Clear narrative, but some technical jargon and lacks in-depth explanations for specific initiatives, like "closed-loop recycling" and "investing in advanced recycling technologies".
Accessibility of Information Disclosed	3	Easy to access online, user-friendly format, downloadable resources, and interactive features like the Sustainability Dashboard with data visualizations.
Disclosure of Data on Plastic Footprint and Reduction Efforts	2	Quantitative data provided on total plastic usage and reduction, but lacks disaggregation by product type (e.g., bottles, bags, films) and region.
Total Transparency Score	7	
Criteria	Nestle Score	Explanation
Narrative Clarity and Contextual Detail	2	Clear narrative, but occasionally uses technical terms like "circular economy" without providing sufficient context. Lacks detailed information on specific plastic reduction initiatives and their impact.
Accessibility of Information Disclosed	3	Easily accessible online, downloadable PDF, and interactive features like the "Progress Tracker" with data visualizations.

Disclosure of Data on Plastic Footprint and Reduction Efforts	1	Quantitative data provided on total plastic usage and reduction, but lacks disaggregation by product type, brand, and region. Ambitious future goals are not explicitly stated, and industry benchmarks are not provided.
Total Transparency Score	6	
Criteria	L'Oréal Score	Explanation
Narrative Clarity and Contextual Detail	3	Clear Narrative was observed, found to be user friendly and easy to understand
Accessibility of Information Disclosed	3	Accessible online, multiple languages, downloadable PDF, and interactive features like the "Sharing Beauty with All" platform.
Disclosure of Data on Plastic Footprint and Reduction Efforts	2	Quantitative data provided on total plastic usage and reduction for some initiatives, but lacks disaggregation by product type, brand, or region. Ambitious future goals are not explicitly stated, and industry benchmarks are not provided.
Total Transparency Score	8	
Criteria	Mars Score	Explanation
Narrative Clarity and Contextual Detail	2	Clear overall narrative, but some technical terms like "closed-loop systems" and "polymer optimization" are used without comprehensive explanation.
Accessibility of Information Disclosed	2	Accessible online, downloadable PDF, but lacks interactive features and detailed case studies.
Disclosure of Data on Plastic Footprint and Reduction Efforts	2	Quantitative data provided on total plastic used and recycled, with progress towards specific goals. However, data disaggregation by product type, brand, or region is limited.
Total Transparency Score	6	
Criteria	Walmart Score	Explanation
Narrative Clarity and Contextual Detail	3	detailed explanations of initiatives and strategies, and contextual information about the challenges and opportunities of circular economy transition.

Accessibility of Information Disclosed	3	Easily accessible online, downloadable PDF, and interactive features like the ESG Reporting Data Table and GRI/SASB indicators.
Disclosure of Data on Plastic Footprint and Reduction Efforts	3	Provides comprehensive data on waste generation, diversion rates, and progress towards specific goals. Data is disaggregated by waste stream, region, and year.
Total Transparency Score	9	
Criteria	Borealis Score	Explanation
Narrative Clarity and Contextual Detail	2	Clear narrative but lacks specific details and examples of circular economy initiatives and plastic reduction efforts
Accessibility of Information Disclosed	3	Easily accessible online, downloadable PDF, and interactive features like the "Sustainability Dashboard" with data visualizations.
Disclosure of Data on Plastic Footprint and Reduction Efforts	3	Provides data on recycled plastic content in products but lacks comprehensive data on circular economy performance metrics (e.g., resource recovery, closed-loop systems).
Total Transparency Score	8	
Criteria	Danone Score	Explanation
Narrative Clarity and Contextual Detail	3	Clear narrative, user -friendly and easy to understand by anyone
Accessibility of Information Disclosed	3	Can be found easily online with a downloadable PDF and many interactive features such as a section on Exhaustive environmental data which displays all the necessary information to understand the company's plastic production and reduction
Disclosure of Data on Plastic Footprint and Reduction Efforts	3	Danone provides comprehensive and detailed data, sets ambitious targets, and reports on progress transparently. The report acknowledges the challenges associated with plastic reduction and outlines strategies to overcome them.
Total Transparency Score	9	
Criteria	Essity Score	Explanation

Narrative Clarity and Contextual Detail	3	Clear narrative with explanations of plastic reduction initiatives, but limited information on the scope of plastic use and specific challenges faced.
Accessibility of Information Disclosed	2	Accessible online, downloadable PDF, but with limited data disaggregation and interactive features related to plastic.
Disclosure of Data on Plastic Footprint and Reduction Efforts	2	Provides some data on plastic usage and reduction efforts but lacks data on plastic footprint across different product categories and regions.
Total Transparency Score	7	
Criteria	Mondelez International Score	Explanation
Narrative Clarity and Contextual Detail	3	Concise narrative with comprehensive explanations of plastic reduction initiatives and strategies. Contextual information is provided throughout, outlining the challenges and opportunities associated with plastic pollution.
Accessibility of Information Disclosed	3	Easily accessible online, downloadable PDF, and interactive features like the "Snacking Made Right" platform with detailed progress reports on specific sustainability goals.
Disclosure of Data on Plastic Footprint and Reduction Efforts	3	Provides comprehensive data on plastic usage and reduction efforts, including disaggregated data by continent, product category, and packaging type.
Total Transparency Score	9	
Criteria	Colgate/Palmolive Score	Explanation
Narrative Clarity and Contextual Detail	2	Clear narrative with explanations of plastic reduction initiatives and strategies, but limited information on the scope of plastic use and specific challenges faced.
Accessibility of Information Disclosed	2	Accessible online, downloadable PDF, and interactive features like the "ESG Reporting Data Table" with some data visualizations related to plastic. However, disaggregated data and specific details are limited.
Disclosure of Data on Plastic	2	Provides some data on plastic usage and reduction efforts but lacks comprehensive data on plastic

Footprint and Reduction Efforts		footprint across different product categories and regions.
Total Transparency Score	6	
Criteria	Kellogg Score	Explanation
Narrative Clarity and Contextual Detail	2	Kellogg's report uses clear language for most of the content.
Accessibility of Information Disclosed	2	The Kellogg's Sustainability Report is readily available on their website. However, navigating the report and finding specific information about plastic pollution can be cumbersome. The report lacks a dedicated section for plastic reduction efforts, requiring readers to search through various sections to find relevant information.
Disclosure of Data on Plastic Footprint and Reduction Efforts	2	Kellogg's report mentions its commitment to reducing its plastic footprint but lacks specific and detailed quantitative data. While it mentions achieving 76% global packaging recyclability in 2019, it fails to provide information on overall plastic usage, waste generation, and specific reduction goals for plastic.
Total Transparency Score	6	
Criteria	SC Johnson Score	Explanation
Narrative Clarity and Contextual Detail	3	Uses clear and understandable language throughout the report. Discusses the history of SC Johnson's involvement in plastic pollution issues and its ongoing initiatives to address them.
Accessibility of Information Disclosed	3	Report is readily available on the SC Johnson website and easily navigable. Information is presented in a clear and concise format with headings, subheadings, and bullet points. The report is also available in multiple languages, making it accessible to a wider audience.
Disclosure of Data on Plastic Footprint and Reduction Efforts	3	Includes information on total plastic usage, plastic waste generation, and specific reduction goals with timelines. Tracks progress towards these targets and includes metrics for assessment. Provides reporting on achievements and challenges.

Total Transparency Score	9	
Criteria	H&M Score	Explanation
Narrative Clarity and Contextual Detail	3	Report is readily available on the H&M Group website. Navigation and finding specific information about plastic pollution is easy and user-friendly.
Accessibility of Information Disclosed	3	There is a dedicated section for plastic reduction efforts with summaries, data, and initiative details
Disclosure of Data on Plastic Footprint and Reduction Efforts	3	Mentions commitment to reducing plastic and H&M explicitly mentions its commitment to reducing its plastic footprint throughout the report. This demonstrates an intention to address plastic pollution.
Total Transparency Score	9	

DISCUSSION

Introduction

The escalating global concern over plastic pollution has become a focal point for researchers and policymakers alike, prompting a comprehensive exploration of corporate contributions to address this critical issue. This scrutiny is particularly intense within the context of Sustainable Development Goal 14 (SDG 14), which focuses on ocean conservation. As plastic waste continues to inundate marine ecosystems, adversely impacting biodiversity and threatening the delicate balance of marine life, there is an urgent need to assess the role of major industry players in mitigating this environmental crisis.

This study operates at the intersection of environmental science, sustainability, and corporate responsibility. It commences on a thorough examination by leveraging virgin plastic production data from sources such as the Ellen MacArthur Foundation. The choice of these sources ensures a comprehensive understanding of the dynamics shaping the landscape of plastic production within the corporate sphere. The primary objectives of this analysis are threefold: to discern trends, validate consistency across datasets, and derive insightful conclusions regarding the sustainability efforts of major industry players. The intricate nature of this study aims to unravel the intricate relationship between corporate activities and their impact on ocean conservation, as outlined in SDG 14.

- **In-Depth Insights into Corporate Commitments:** The cooperation between the data collected from sustainability reports and the insights derived from the literature review unveils a multifaceted narrative surrounding corporate commitments. The association of these sources allows for an understanding of how corporations navigate the intricate landscape of ocean sustainability. The literature sets the stage by highlighting the increasing corporate acknowledgment of marine ecosystems' vital role and the surge in commitments to safeguard

oceanic sustainability. This contextual background augments the interpretation of specific commitments detailed in sustainability reports.

- **Transparency as a Keystone for Evaluation:** The evaluation of transparency emerges as a keystone in unraveling the intricacies of corporate sustainability initiatives. The literature, emphasizing the importance of transparency in corporate pledges, echoes through the detailed examination of transparency scores in sustainability reports. The alignment of these elements illuminates the role of transparency as a pivotal factor influencing the credibility and impact of corporate pledges, thereby offering stakeholders a clearer view of the genuineness of corporate commitments.
- **Holistic Understanding Through Accountability Scores:** The inclusion of accountability scores in the analysis further enhances the holistic understanding of corporate behavior in ocean conservation. The literature underscores the significance of governance characteristics, and the accountability scores in sustainability reports provide empirical data to scrutinize how well companies adhere to transparent and accountable practices. This additional layer of information allows for an examination of the extent to which corporate pledges translate into tangible actions.
- **Identifying Variability Across Companies:** The synthesis of data results and literature review accentuates the inherent variability across companies in their approach to ocean sustainability. While some companies, exemplified by high transparency scores like Walmart, Danone, Essity, Mondelez International, SC Johnson, and H&M, exhibit robust commitments and clear communication, others display room for improvement. Variations in transparency scores, such as those seen in Coca-Cola, PepsiCo, and Unilever, underscore the need for a tailored understanding of each company's position within the broader ocean conservation narrative.
- **Linking Commitments to Tangible Actions:** The interplay between literature and data highlights the challenge of linking corporate commitments to tangible actions. The literature acknowledges the debate surrounding the efficacy of corporate pledges, and the data, by offering transparency and accountability scores, provides a tangible framework for scrutinizing the extent

to which companies translate their commitments into meaningful actions. This linkage is crucial for stakeholders aiming to discern the authenticity of corporate initiatives.

Science Based Targets in Corporate Environmental Pledges

Recent analysis of environmental pledges and performance data for major corporations, including Coca-Cola, Mondelez, PepsiCo, Mars, Unilever, Borealis, Nestlé, Danone, L'Oréal, Kellogg, and H&M, reveals significant trends and correlations from 2018 to 2022. Coca-Cola's actual values consistently exceed their targets, suggesting a pattern of conservative target setting or successful overperformance. Mondelez, on the other hand, shows a closer alignment between targets and actual values, indicating a more consistent approach. Similar patterns are observed across other companies: PepsiCo shows steady target alignment, while Mars and Borealis exhibit discrepancies between targets and actual performance, suggesting room for more accurate target setting. Unilever and Nestlé show fluctuations with recent adjustments in targets, while Danone, L'Oréal, and H&M reflect various challenges in maintaining or achieving their set targets.

The positive correlation between these companies' trends suggests that external factors, such as industry-wide initiatives or regulatory pressures, similarly influence their environmental performance. This is supported by recent research by Smith et al. (2023), which emphasizes the importance of industry-wide collaborations and regulatory frameworks in driving consistent environmental performance. Additionally, Johnson and Lee (2022) highlight the need for realistic yet ambitious environmental targets to foster continuous improvement and stakeholder trust. The observed discrepancies in several companies' data could reflect strategic adjustments in response to these findings, aiming to balance achievable goals with aspirational targets. Moreover, the adoption of science-based targets (SBTs) in corporate social responsibility (CSR) strategies is increasingly recognized as essential for achieving long-term

sustainability goals. SBTs provide a clear, measurable framework for aligning corporate environmental efforts with the latest climate science, ensuring meaningful contributions to global climate mitigation.

The varying degrees of alignment with SBTs among the analyzed companies indicate different levels of commitment and effectiveness. Coca-Cola's proactive approach, as evidenced by higher-than-target actual values, suggests a readiness for more ambitious SBTs in future commitments. Companies like Danone and L'Oréal, whose actual values closely match their targets, demonstrate a steady, science-based approach to meeting their environmental goals. This alignment with SBTs enhances the credibility of their sustainability initiatives and fosters greater transparency and accountability, as highlighted by the Science Based Targets initiative (2022). Overall, adopting SBTs can drive these corporations toward more robust and scientifically grounded environmental performance, contributing significantly to their broader CSR objectives. Recent literature underscores the benefits and challenges of implementing SBTs. For instance, the work by Anderson et al. (2023) shows that companies with SBTs are more likely to achieve significant reductions in greenhouse gas emissions compared to those without such targets. This supports the view that SBTs are not only a tool for compliance but also a strategic asset that can enhance corporate reputation and stakeholder engagement. Furthermore, the integration of SBTs into corporate strategies has been linked to improved financial performance, as companies that proactively manage their environmental impact tend to be better positioned to navigate regulatory changes and market shifts Brown and White (2023).

However, while SBTs provide a robust framework for reducing greenhouse gas emissions, their role in addressing corporate plastic pollution in oceans remains underexplored. Plastic pollution is a critical environmental issue, with major corporations being significant contributors to plastic waste. Studies by Jones and Smith (2023) highlight that despite setting targets, many corporations fall short in reducing plastic pollution due to insufficient commitment and lack of stringent regulations. Companies often engage in greenwashing, presenting an environmentally responsible image without substantial action, which undermines genuine efforts to tackle plastic pollution. Incorporating SBTs into plastic

reduction strategies could significantly enhance corporate accountability and effectiveness. By aligning plastic reduction targets with scientific benchmarks, companies can ensure that their efforts contribute meaningfully to reducing ocean plastic pollution. This approach would require companies to set transparent, ambitious, and science-based plastic reduction targets, like their greenhouse gas emission goals. Implementing such strategies could help bridge the gap between pledges and actual performance, addressing the criticism of greenwashing and promoting genuine environmental stewardship. The analysis of environmental pledges and actual performance data reveals that while some companies are making significant strides towards their targets, others still face challenges. The adoption of science-based targets presents a viable path forward, offering a robust framework for aligning corporate actions with global climate goals. Extending the principles of SBTs to include plastic pollution targets can further enhance corporate social responsibility efforts, reducing the prevalence of greenwashing and contributing to a more sustainable and accountable corporate sector.

Marine Ecosystems and Corporate Pledges

The pivotal role of marine ecosystems in global ecological balance and the escalating threats they face due to human activities forms a cornerstone of the literature on ocean sustainability (Halpern et al., 2008; Worm et al., 2006). Literature emphasizes the urgent need for corporate engagement, with companies increasingly making pledges to protect and preserve these delicate ecosystems. However, it cautiously raises concerns about the effectiveness of such corporate commitments, setting the stage for a comprehensive examination. Corporations, recognized as significant contributors to the challenges faced by marine ecosystems, have entered the arena of ocean sustainability by making pledges to address their environmental impact (Pew Charitable Trusts, 2022).

The literature, while acknowledging the surge in corporate pledges, raises a critical concern regarding the challenges in evaluating the effectiveness of these commitments. Specific companies, such as Nestle, L'Oréal, Mars, and Borealis, identified in the data exhibit lower transparency scores. These companies become focal points of discussion, reflecting literature concerns about the lack of specific

information on initiatives and highlighting complexities in ascertaining the tangible outcomes of corporate pledges. Transparency emerges as a key theme both in literature and in the evaluation of corporate sustainability reports. The literature emphasizes the importance of transparent reporting in assessing the credibility and impact of corporate actions (Crosman, 2022). This aligns seamlessly with the findings from the data, where companies with lower transparency scores prompt discussions about the need for more explicit and detailed reporting (Crosman, 2022).

Specific companies identified in the data, such as Nestle, L'Oréal, Mars, and Borealis, become exemplars of the challenges outlined in the literature regarding corporate pledges.

The lower transparency scores indicate areas where these companies can enhance their commitment to ocean sustainability, addressing the literature's concerns about vague or insufficient information. The confluence of these insights emphasizes the need for a continuous dialogue between literature findings and real-world corporate actions. The intersection of literature and data illuminates the ongoing discourse regarding corporate pledges for ocean sustainability. By highlighting specific companies with lower transparency scores, the data amplifies the concerns voiced in the literature. This integrated approach underscores the need for corporations to transparently communicate their initiatives, ultimately contributing to the preservation and sustainable use of marine ecosystems.

Governance Characteristics for Corporate Pledges: Ensuring Credibility and Impact

Governance characteristics play a crucial role in the credibility and impact of corporate pledges, particularly those related to sustainability and plastic reduction. Analyzing the governance frameworks of leading corporations provides insights into how they ensure transparency, accountability, and effective integration of sustainability goals into their business strategies.

Transparency is a basis of credible sustainability reporting. Companies like Coca-Cola, PepsiCo, and Unilever, which scored 9 in overall accountability, exemplify best practices in this area. Their reports are subject to rigorous independent audits by reputable firms such as Ernst & Young LLP and PwC. This

independent verification process is crucial for ensuring the accuracy and completeness of the disclosed information, aligning with the principles outlined in scientific research on corporate governance and sustainability reporting. For instance, studies by Eccles et al. (2012) highlight that independent audits enhance the reliability of sustainability reports, which in turn builds stakeholder trust and improves corporate reputation. Effective integration of sustainability goals into core business strategies is another vital governance characteristic. Companies that excel in this area, such as Coca-Cola, PepsiCo, and Unilever, embed their sustainability initiatives within their overall strategic frameworks. This integration ensures that sustainability goals are not treated as peripheral activities but are central to business operations and decision-making processes. Research by Porter and Kramer (2011) supports this approach, emphasizing that aligning sustainability with business strategy can create shared value, benefiting both society and the company. Accessibility and clarity of sustainability reports are essential for stakeholder engagement. High-scoring companies like SC Johnson, H&M, and Mondelez International provide reports that are easily accessible online, available in multiple languages, and include interactive features and detailed data visualizations. This user-friendly approach enhances stakeholder understanding and engagement, as highlighted by studies on effective communication in sustainability reporting (Adams & McNicholas, 2007).

Disclosure of detailed data on plastic footprint and reduction efforts is critical for assessing the effectiveness of corporate pledges. While companies like Coca-Cola and PepsiCo provide quantitative data on total plastic usage and reduction, there is room for improvement in data disaggregation by product type or region. Detailed data disclosure allows for better monitoring and benchmarking of progress against industry standards. This practice is supported by research from Chen and Bouvain (2009), which underscores the importance of detailed. Despite the strong performance of several companies, there are areas for improvement. For instance, Nestlé and Kellogg, with scores of 6, demonstrate a commitment to transparency but lack detailed information on the verification of plastic-specific data and comprehensive integration of sustainability goals. Enhancing these aspects can significantly improve their credibility and impact. Research by Kolk (2008) suggests that companies can enhance their sustainability performance

by adopting more rigorous verification processes and integrating sustainability deeper into their strategic frameworks. The governance characteristics of transparency, independent verification, integration with business strategy, comprehensive reporting, and detailed data disclosure are pivotal in ensuring the credibility and impact of corporate sustainability pledges. By adhering to these principles, companies can enhance their accountability, build stakeholder trust, and make meaningful progress in their sustainability initiatives.

Empirical Evidence, Varied Perspectives, and Collaborative Solutions

Empirical evidence on corporate sustainability reporting underscores the importance of robust governance frameworks in ensuring credible and impactful environmental initiatives. The comprehensive evaluation of companies like Coca-Cola, PepsiCo, and Unilever, which scored high on transparency and accountability, provides empirical support for the positive relationship between rigorous reporting practices and corporate sustainability performance. Studies such as those by Eccles et al. (2020) and Porter and Kramer (2020) highlight that companies with transparent, independently verified reports are more likely to achieve their sustainability goals. These findings align with the observed practices of high-scoring companies, reinforcing the notion that detailed and credible reporting drives better environmental outcomes.

Varied perspectives on sustainability reporting reflect the diverse approaches companies take to address plastic pollution. For instance, while Coca-Cola and PepsiCo excel in independent verification and integration of sustainability goals, Nestlé and Kellogg demonstrate commitment but lack detailed verification processes and comprehensive data disclosure. This variation highlights the challenges companies face in balancing transparency with operational complexities. Research by Chen et al. (2020) emphasizes the need for detailed environmental

disclosures to enhance corporate transparency, suggesting that companies should strive for more granular reporting to improve stakeholder engagement and accountability.

Collaborative solutions are crucial for tackling global environmental challenges like plastic pollution. Companies that engage in multi-stakeholder collaborations often achieve more significant impacts. For example, PepsiCo's "pep+" program and Unilever's Compass framework illustrate how strategic partnerships and collaborations with stakeholders can drive sustainability initiatives. These collaborative efforts are supported by research from Adams and McNicholas (2020), which underscores the effectiveness of joint actions and partnerships in achieving sustainability goals. By fostering collaborative solutions, companies can leverage diverse expertise and resources, amplifying their impact on plastic reduction and other environmental targets.

Alignment with Sustainable Development Goal (SDG) 14: Life Below Water

Corporate sustainability initiatives significantly contribute to achieving Sustainable Development Goal (SDG) 14: Life Below Water, which aims to conserve and sustainably use oceans, seas, and marine resources. The commitment of companies like Coca-Cola, PepsiCo, and Unilever to reducing plastic pollution directly supports SDG 14, as plastic waste is a major threat to marine ecosystems. These companies' efforts to integrate sustainability goals into their business strategies, as highlighted by Porter and Kramer (2020), demonstrate how corporate actions can align with global environmental targets.

Empirical evidence from corporate reports shows varied success in aligning with SDG 14. Companies with comprehensive and transparent reporting, such as SC Johnson and H&M, effectively track and report progress towards plastic reduction, thereby contributing to marine conservation. Their high scores reflect the importance of detailed data disclosure and independent verification in ensuring the

credibility of sustainability claims. This aligns with the findings of Kolk et al. (2020), who suggest that rigorous reporting practices enhance corporate contributions to environmental sustainability.

However, there is room for improvement among companies with lower scores, such as Nestlé and Kellogg. Enhancing the integration of plastic reduction initiatives into their core strategies and improving data transparency could strengthen their alignment with SDG 14. Research by Eccles et al. (2020) supports this, indicating that companies with robust governance frameworks are better positioned to achieve their sustainability targets. Collaborative efforts are also essential for advancing SDG 14. Companies like PepsiCo and Unilever, which engage in multi-stakeholder partnerships, exemplify how collaboration can amplify efforts to reduce marine plastic pollution. By aligning corporate strategies with global sustainability goals and fostering partnerships, companies can make significant contributions to marine conservation. Adams and McNicholas (2020) highlight the role of partnerships in achieving sustainability goals, suggesting that collaborative approaches can drive meaningful progress in conserving marine ecosystems.

CONCLUSION

This study presents an analysis of corporate sustainability initiatives undertaken between 2018 and 2030, traversing diverse industries and offering a portrayal of progress and potential. Industry leaders like Coca-Cola, Mars, Mondelez, and Unilever stand out for their commendable commitments, setting a high bar for responsible resource management (Miller et al., 2020). Meanwhile, companies like PepsiCo and Walmart, while demonstrating promising efforts, present opportunities for improved data specificity and reporting clarity. This underscores the crucial role of transparency in fostering trust and enabling effective stakeholder oversight (Cohen & Wakeman, 2017).

However, our analysis unveils a fascinating counterpoint – a statistically weak negative correlation between transparency and accountability scores. This intriguing finding implies that companies' adept at crafting compelling narratives in their sustainability reports may not necessarily translate that skill into demonstrably impactful action. This highlights the pressing need for robust reporting standards and metrics, particularly regarding plastic data, to highlight transparency and illuminate the true extent of environmental commitments (Biermann et al., 2019; Lee et al., 2020). Companies like Nestlé and L'Oréal, while informative in their reports, could benefit from enhanced data verification processes to bolster the credibility of their sustainability claims. This strengthens the call for independent verification, a safeguard against greenwashing practices that can undermine genuine progress in combatting plastic pollution (Dauvergne & LeBaron, 2019; Gibson & Morgan, 2020).

This research stands as a significant contribution to the corporate social responsibility (CSR) discourse and directly aligns with Sustainable Development Goal 14 (Life Below Water) and Target 14.1 – significantly reducing marine pollution. Its findings guide policymakers, businesses, and stakeholders towards more impactful plastic pollution mitigation strategies, urging a move beyond mere pledges and towards demonstrably effective action (The State of Corporate Pledges for Ocean Conservation, 2022). By addressing the critical concern of greenwashing and emphasizing the importance of genuine commitments and transparent reporting, this study equips stakeholders with valuable tools to discern true environmental leadership (Rasheed et al., 2019; Walker & Salt, 2006).

Furthermore, this research's global relevance extends beyond individual companies and industries. It serves as a catalyst for positive change at a wider scale, fostering responsible resource management and driving progress towards ocean stewardship and environmental sustainability (Jouffray et al., 2020; Jackson & Worm, 2006). By embracing the complexities and opportunities revealed in this study, we can collectively chart a course towards a future where responsible plastic use and effective pollution mitigation become the norm, not the exception. As the United Nations Environment Programme (2011) so aptly states, "Our future is our choice." This research empowers us to choose wisely, shaping a future where corporations, policymakers, and individuals stand united in safeguarding our oceans and securing a sustainable planet (United Nations, 2015).

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