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# Plastic packaging is for efficiency and sustainability in the face of ESG, circular economy, and shared responsibility

*Envases de plástico para la eficiencia y la sostenibilidad frente a los criterios ESG, la economía circular y la responsabilidad compartida*

*fEmbalagens plásticas para eficiência e sustentabilidade em face ao ESG, economia circular e a responsabilidade compartilhada*

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**Abstract**:

Packaging contains and protects the product during handling operations. This article is justified by the importance of packaging for efficiency and sustainability in the consumer chain in light of the circular economy, shared responsibility and ESG practices. According to ABRE, plastic materials will represent 33.2% of the total value of packaging manufacturing in 2023. Most of them are not biodegradable, taking more than a century to decompose by nature completely. Their production often emits polluting gases and depends on oil, a non-renewable natural resource. Plastic packaging has also created environmental problems, reinforcing the throwaway culture, harming the environment and making consumption less environmentally friendly. Considering the problems identified, we have the following research question: By applying Circular Economy and ESG practices, will we have means and methods to combat and reduce all improper returns of plastic packaging? This research aims to alert the packaging industry, organizations and entrepreneurs to the culture of discarding plastic packaging, proving the existence of environmental policies, their social responsibilities and governance. Exploratory and bibliographic research was used to analyze the results. The implementation of ESG is being strengthened daily because, according to the interviewees, sustainability is a strategic driver.

***Keywords***: *Plastic packaging; Sustainability; Sustainable logistics.*

**Resumo**:

As embalagens têm a funcionalidade de conter e proteger o produto durante as operações de movimentação. Este artigo justifica-se pela importância que se tem sobre o tema embalagens para a eficiência e sustentabilidade na cadeia de consumo

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em face a economia circular, a responsabilidade compartilhada e as práticas do ESG. Segundo a ABRE, os materiais plásticos compuseram 33,2% do valor total da fabricação de embalagens em 2023. A maioria não é biodegradável, levando mais de um século para ser totalmente decomposta pela natureza. Sua produção costuma emitir gases poluentes e depende do petróleo, um recurso natural não renovável. Com as embalagens plásticas, surgiram também problemas ambientais, fortalecendo a cultura dos descartáveis, prejuízos ao meio ambiente e consumos menos ecológicos. Considerando os problemas identificados, temos a seguinte questão de pesquisa: Aplicando a Economia Circular e práticas do ESG teremos meios e métodos para combater e diminuir todo o despejo inadequado de embalagens plásticas? Esta pesquisa tem como objetivo alertar as indústrias de embalagens, as organizações, os empreendedores, sobre a cultura do descarte das embalagens plásticas comprovando a existência de políticas do meio ambiente, suas reponsabilidades sociais e governança. Foi utilizado a pesquisa exploratória e bibliográfica para análise dos resultados. A implementação do ESG estão sendo reforçados a cada dia pois segundo as respondentes a sustentabilidade é um direcionador estratégico, acredita-se que a sustentabilidade é uma jornada continua de aprimoramento e que cada um de nós desempenha um papel fundamental nesse processo e as empresas precisam entender e aplicar a responsabilidade compartilhada.

**Palavras-chave**: Embalagens Plásticas; Sustentabilidade; Logística sustentável.

***Resumen***:

Los paquetes tienen la funcionalidad de contener y proteger el producto durante las operaciones de manipulación. Este artículo se justifica por la importancia de los envases para la eficiencia y sostenibilidad en la cadena de consumo frente a la economía circular, la responsabilidad compartida y las prácticas ESG. Según ABRE, los materiales plásticos representaron el 33,2% del valor total de la fabricación de envases en 2023. La mayoría no son biodegradables, tardando más de un siglo en ser completamente descompuestos por la naturaleza. Su producción suele emitir gases contaminantes y depende del petróleo, un recurso natural no renovable. Con los envases de plástico también han surgido problemas medioambientales, fortaleciendo la cultura de los desechables, el daño al medio ambiente y un menor consumo ecológico. Teniendo en cuenta los problemas identificados, tenemos la siguiente pregunta de investigación: Al aplicar la Economía Circular y las prácticas ESG, ¿tendremos los medios y métodos para combatir y reducir todos los vertidos inapropiados de envases de plástico? Esta investigación tiene como objetivo alertar a las industrias de empaques, organizaciones, emprendedores, sobre la cultura de la eliminación de envases plásticos, demostrando la existencia de políticas ambientales, sus responsabilidades sociales y gobernanza. Para el análisis de los resultados se utilizó investigación exploratoria y bibliográfica. La implementación de ESG se está reforzando cada día porque según los encuestados, la sostenibilidad es un motor estratégico, se cree que la sostenibilidad es un viaje continuo de mejora y que cada uno de nosotros juega un papel fundamental en este proceso y las empresas necesitan entender y aplicar la responsabilidad compartida.

***Palabras clave***: *Envases plásticos; Sostenibilidad; Logística sostenible.*

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## 1. INTRODUCTION

Packaging has the functionality of containing and protecting the product during delivery, storage and transportation operations, and is designed to facilitate the logistics process.

Its development began with humanity's origin when the first inhabitants needed to transport and store essential items for survival (Moura; Banzato, 1997).

However, from the 1930s onwards, packaging became valuable as a marketing tool. For Della Lucia et al. (2007) apud Barão (2011), packaging, as it is the consumer's first contact with the product, is considered a sales vehicle for promoting the brand and its identity, becoming one of the main characteristics of the time of purchase.

In today's economy, it is commonly known as the linear economy process based on using natural resources. Products manufactured using this method are used until the end of their useful life and discarded. Unlike this process, the Circular Economy has the principle of being regenerative and restorative. Its objective is to maintain products, components and materials at a higher level for an extended period (Astrolábio, 2021).

This article is justified by the importance of packaging for efficiency and sustainability in the consumption chain in the face of a circular economy and shared responsibility, mainly involving ESG (Environmental, Social and Governance) practices. Companies currently place a high value on their social and environmental performance as well as positive financial results.

According to the Brazilian Packaging Association (ABRE- *Associação Brasileira de Embalagens*), plastic materials accounted for 33.2% of the total value of packaging manufactured in 2023. Most are not biodegradable, taking more than a century to decompose by nature fully. Their production usually emits polluting gases and is dependent on petroleum, a non-renewable natural resource on the planet.

With packaging, its resourcefulness and the need to present and protect food and goods, environmental problems related to plastic packaging have also emerged, strengthening the "culture of extras," damage to the environment and less ecological consumption.

Therefore, we formulated the following research question: By applying the Circular Economy and ESG practices, do we have the means and methods to prevent and reduce all inappropriate plastic packaging waste?

This research aims to alert the packaging industry, organizations, entrepreneurs, commercial workers, and end consumers to the culture of discarding plastic packaging, highlighting the existence of environmental policies, their social responsibilities and governance.

The specific objectives highlight the general objectives in the sense of: Evidencing the shared responsibility required by the National Solid Waste Policy; Understanding the Circular Economy as a strategic tool for optimizing the process

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of reinserting these packages into the production chain; Demonstrating the impact of effective solid waste management and the commitment of the entire production chain; Confirming whether there is a journey of transformation of sustainable businesses through ESG practices.

The work's methodology is based on bibliographic and exploratory research, mandatory in scientific works. For Marconi and Lakatos (2017, our translation), "[...] exploratory research complements descriptive research, providing the researcher with greater familiarity with their research problem and constructing their objectives." Regarding bibliographic research, Marconi and Lakatos (1991, p. 183) emphasize that this makes it possible to define and solve already known problems and explore new areas whose problems have not been sufficiently realized.

## 2. Theoretical Basis

### 2.1 Packaging

Although packaging brings many benefits, by way of illustration: conservation, practicality, storage and transportation, its disorderly use generates a large volume of solid waste, which is associated with environmental impact. Since the 1980s, people have been looking for ways to reduce the waste generated and the destination of packaging after use. (Landim et al., 2016).

This waste generally comprises biodegradable organic matter, non-biodegradable organic material (plastics) and non-degradable inorganic matter (glass, metal and others).

Landim et al. (2016, p. 85, our translation) state that "solid waste is commonly found in solid and semi-solid states, resulting from industrial, domestic, hospital, commercial and agricultural activities."

Law No. 12,305/10 establishes the National Solid Waste Policy (PNRS – *Política Nacional de Resíduos Sólidos*) and promotes the prevention and reduction of waste production by adopting more ecological consumption behaviors.

Furthermore, it encouraged recycling, reuse of solid waste and the correct disposal of waste through composting. The law establishes the joint responsibility of waste producers and compliance with the creation of solid waste management plans by private individuals. (Landim et al., 2016)

Current population growth trends and the resulting pressure on natural resources highlight the need for modern societies to move towards a more sustainable paradigm. This "green" economy ensures economic development, better living conditions, livelihoods and employment. In this scenario, biodegradable and compostable packaging has emerged.

In Brazil, ABNT establishes, through standards NBR 15448-1 (2006) and NBR 15448-2 (2008), that biodegradable and compostable packaging is that which degrades biologically, that is, it can be decomposed naturally and serve as food for microorganisms namely fungi and bacteria in soil, water and air.

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These packages decompose more efficiently, generating mainly water (H2O), carbon dioxide (CO2) and biomass, which can be integrated into the soil and used as fertilizer for growing new crops.

Consequentely, using these packages can contribute ecologically and offer significant advantages for the environment and the community.

## 2.2 Circular Economy

The need to offset new packaging production strategies is an important measure for companies to obtain a possible competitive advantage over competitors, involving the use of materials and energy more efficiently, where circular economy (CE) practices tend to minimize the use of raw materials, bringing benefits in cost reduction, waste elimination and improvement of the company's image in the consumer market (Gonçalves; Barroso, 2019 apud Paixão et al. 2023).

“The Circular Economy is, hence, seen as a profit from competitiveness and innovation” (Monteiro, 2018, our translation).

Figure 1 – Representation of the Circular Economy


Source: Astrolábio (2021)

According to Monteiro (2018), the circular economy is a strategic concept defined as reducing, reusing, recovering, and recycling materials and energy. The process is integrated and executed as a key element in promoting the dissociation between economic growth and the increase in resource consumption.

To reduce plastic pollution by 80% globally by 2040, the report “Turning off the tap: How the world can end plastic pollution and create a circular economy” first proposes eliminating problematic and unnecessary plastics to minimize the magnitude of the problem. The document then calls for three market changes – reusing, recycling and repurposing, and diversifying products:

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Reuse: Promoting alternatives to reuse, including refillable bottles, bulk dispensers, deposit schemes, packaging take-back schemes, and others, could reduce plastic pollution by 30% by 2040. Governments must help create more robust, reusable business models to realize their potential.

Recycling: If recycling becomes more stable and profitable, reducing plastic pollution by an additional 20% by 2040 could be achievable. Eliminating fossil fuel subsidies, implementing design guidelines to improve recycling, and other measures could increase the share of economically recyclable plastics from 21% to 50%.

Repurpose and diversify: Replacing care products for instance plastic packaging, sachets, and takeaway containers with products made from alternative materials (to give an example: paper or compostable materials) can reduce plastic contamination by an additional 17%.

### 2.3 ESG - Environmental, Social and Governance

Social and governance practices have changed in organizations. ESG is an acronym in English that stands for environmental, social and governance and corresponds to an organization's environmental, social and governance practices. The term was coined in 2004 in a publication by the Global Compact in partnership with the World Bank called Who Cares Victories.

The ESG approach, which combines environmental, social responsibility and governance policies, aims to estimate the extent to which an organization works towards socio-environmental objectives, clarity and inclusion that range from commitment to the market only to involving consumers, suppliers, employees, and investors.

For Grandisoli (2023), one of the paths that dialogue with the ESG tripod is the Circular Economy since it proposes a globalizing and integrated view of resource extraction, production, consumption and disposal processes. In other words, incorporating practices linked to circularity is a fundamental path in the face of socio-environmental emergencies since it seeks solutions with the participation of all actors in this chain, and not simply in an isolated and punctual way.

According to PRI/UNEP FI (2012) apud Carlos and Moraes (2017), ESG issues or factors can be defined as:

a) Environment (E) - Examples of environmental issues include biodiversity loss, greenhouse gases (GHG), the impact of climate change, renewable energy, energy efficiency, resource depletion, chemical pollution, waste management, freshwater, ocean acidification, strategic pollution, and phosphorus.
b) Social (S) - Examples of social issues include activities in conflict areas, distribution of fair-trade products, health and access to medicines, occupational safety and quality of health care, labor standards in the supply chain, child labor, slavery, relations with the local community, human capital management, employee relations, diversity, controversial

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weapons issues, and freedom of association.

c) Corporate Governance (G) - Governance issues include harm to employees and investors from executives, bribery and corruption, shareholder rights, business ethics, board diversity, management structure, independent directors, risk management, early warning systems for stakeholder dialogue, lobbying, and outreach. This category may also include corporate strategy issues, e.g. the implications for environmental and social issues and how innovative the strategy is.

## 3. Method

Bibliographic research supports work by incorporating a theoretical basis, while exploratory research improves the work by seeking paths so that solutions to problems are sufficiently concrete.

This article presents, through exploratory research, questions and answers from people involved in the management area. Hence, it results in a comparative table between Managers (1, 2 and 3) and organizations highlighting ESG and Circular Economy practices, enabling actions on environmental, social and business strategy issues.

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Table 1 – Field research with environmental professionals (part 1)

| PERGUNTAS | Beatriz Cristina De Freitas Silva - Indústria de peças automotivas compostas de metal-borracha e plástico | Nadine Hoffmann Da Silva - Votorantim Cimentos S/A | Lavinia Bruna Couto - Indústria de peças automotivas compostas de aço e metal |
|---|---|---|---|
| **Qual o segmento e a proposta da organização?** | Segmento automobilístico, peças para controle de vibração e componentes leves para a indústria automotiva. | As empresas do portifólio da Votorantim S/A operam em diversos setores: materiais de construção, financeiro, alumínio, energia limpa e renovável, metais e mineração, suco de laranja, aços longos, imobiliário e infraestrutura. | Segmento automotivo, produção de peças a partir de aço e metal para clientes da indústria de veículos |
| **Sua empresa sabe o que é economia circular, é importante para vocês? Já aplicaram/aplicam este conceito?** | A empresa está começando a ter a noção do que se trata a economia circular. Ainda não aplicam de forma concreta. | Sim, a empresa implementa o conceito, nosso relatório integrado de sustentabilidade fica disponível no site da companhia, com os compromissos e práticas sociais, ambientais e de governança. | Sim, a economia circular é aplicada dentro do retorno de embalagens de produtos químicos, refino de óleo. |
| **Quais os tipos de embalagens utilizados em seu processo?** | Embalagens plásticas e de madeira. | Para o processo do cimento a embalagem é de papel. Na operação são utilizadas de plástico, madeira e papel. | No processo produtivo são utilizadas embalagens plásticas pra transferências de peças entre fornecedor e montadora que tem sua devolução, tendo praticamente 100% das embalagens retornáveis. |
| **Qual o diferencial da sua empresa, o que a torna diferente de outras do mesmo segmento no mercado?** | Acredito que o nosso diferencial seja a tecnologia inovadora implantada em nosso processo para atender a satisfação dos clientes. | A Votorantim Cimentos está comprometida com a sustentabilidade, buscando reduzir o uso de materiais, valorizar subprodutos industriais e aumentar o uso de recursos renováveis. A empresa se esforça para diminuir o fluxo de materiais e o consumo de recursos naturais, o que contribui para sua competitividade. Temos um forte sistema de coprocessamento de materiais para consumo térmico e enfatizam o uso responsável de combustíveis, matérias-primas e recursos naturais, além do reuso e reciclagem. | A empresa é certificada no resíduo zero, onde mais que 90% dos resíduos tem sua destinação para reciclagem, ou valorização energética. Cerca de 99,8% dos resíduos que tem essa forma de destinação. Apenas resíduos de banheiro e guardanapos de papel, são destinados a aterro, |
| **Vocês conhecem os objetivos de desenvolvimento sustentável da ONU? A organização está caminhando para cumprir quais dos objetivos?** | Conhecemos sim, a empresa está com uma carta de objetivos e metas para até 2026 reduzir em 7% a utilização dos recursos e redução dos impactos gerados. | Sim, possuímos compromissos de sustentabilidade para 2030 alinhados aos Objetivos de Desenvolvimento Sustentável (ODS), da Organização das Nações Unidas (ONU), com metas definidas em sete pilares. Realizamos o acompanhamento contínuo da evolução dos nossos compromissos e a empresa está caminhando para cumprir todos. | Sim, temos uma plataforma interna de gerenciamento de objetivos ambientais desenvolvida com base nos objetivos de desenvolvimento da ONU |
| **Há aplicação do conceito ESG dentro da corporação?** | Sim, o conceito ESG está sendo reforçado a cada dia na nossa empresa. Trazendo a visão desde da alta liderança e áreas produtivas. | Sim, para nós, sustentabilidade é um direcionador estratégico. Temos Pilares que norteiam nosso plano sustentável, aplicando a Transformação social, Ecoeficiência e energia, Segurança e saúde, e muito mais. | Falando de ESG temos a parte de doação de óleo para instituições de caridade, onde esse óleo de cozinha é destinado para fazer sabão e o valor arrecadado ajuda instituições de apoio infantil. Temos também o programa de reciclagem de copos descartáveis, que tem a logística reversa, tornando se embalagens de cosméticos (projeto i'm green) |

Source: Prepared by the authors.

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Table 1 – Field research with environmental professionals (part 2)

| | | | |
|---|---|---|---|
| **Qual o planejamento futuro da empresa para um mundo sustentável? Qual o papel da mesma para que isso ocorra?** | Nós temos uma carta realizada pela sede que é renovada a cada três anos, e nela consta nossas metas anuais e trimestrais sobre redução de recursos, eventos poluidores, impactos, proteção dos colaboradores, entre outros pontos importantes de ESG. | Acreditamos que a sustentabilidade é uma jornada contínua de aprimoramento e que cada um de nós desempenha um papel fundamental nesse processo. Com essa convicção, em outubro de 2023, lançamos globalmente a campanha "Evoluindo Rumo a um Mundo Sustentável", com o propósito de mostrar como a sustentabilidade está presente em tudo o que fazemos. A campanha foi divulgada globalmente por meio de nossas mídias sociais internas e externas. Além disso, com intuito de aumentar a visibilidade, ações específicas foram realizadas em cada uma de nossas regiões de atuação. | Buscamos o aterro zero ainda pro ano de 2024, e via corporativo estamos desenvolvendo um plano de eficiência energética, para redução de emissões de $co^2$ |
| **Vocês acreditam que a logística pode ser sustentável? De que forma podemos realizar esta tarefa?** | Acreditamos sim! Sempre que nos unimos para o bem do meio ambiente e pessoas conseguimos soluções sustentáveis. A reutilização de embalagens e também utilizar de forma consciente as frotas auxiliam na redução de emissão de gases efeito estufa. | Sim, acreditamos! A sustentabilidade está em nossas fábricas, nas nossas centrais de concreto, centros de distribuição, enfim, está em todas as nossas unidades. Olhamos para os nossos materiais e minerais e buscamos novas possibilidades. Uma delas é conhecer soluções viáveis na reciclagem de resíduos da construção civil. | Acreditamos, a logística deve pensar na melhor maneira de alocação e distribuição de espaço e processos, onde desperdícios podem ser evitados, pensar em maneiras de embalagens retornáveis, ou priorizar embalagens que sejam provenientes de fibras naturais, ou de processo de reciclagem. |
| **De que forma trabalham a questão das embalagens plásticas? Que meios são utilizados pela empresa?** | Embalagens plásticas não reutilizáveis são um problema. Temos que ter a responsabilidade de não aceitar embalagens descartáveis quando não necessária. Hoje utilizamos embalagens plásticas reutilizáveis no processo e as embalagens de madeira são destinadas para empresa de reciclagem. Temos o compromisso com a sustentabilidade do planeta, faz e fará as medidas necessárias para cuidar dos seus colaboradores e meio ambiente. | Sim, minimizando o uso e utilizando empresas que tenham implementado a economia circular. | As embalagens em si não são um problema, seu uso, descarte e destinação podem ser. Já pensou em uma peça de roupa descartável? O quão útil ela é? Usa apenas uma vez, e depois descarta. Prático, mas um dinheiro que foi pro lixo com apenas um uso. Embalagens tem esse mesmo significado, aqui as caixas são reutilizadas, e embalagens não inerentes ao processo são recicladas da melhor forma que encontramos. |

Source: Prepared by the authors.

## 4. Results and Discussion

Law No. 12,305/10, which establishes the National Solid Waste Policy (PNRS), promotes the prevention and reduction of waste production by adopting more ecological consumption behaviors. It also establishes the joint responsibility of waste producers and requires the creation of solid waste management plans by private individuals. The interview with the three companies' managers shows that they are mobilizing to implement it. Clearly, the ideas are not strange, and many have even been applied. Ideas and projects should be foreseen to expand the conscious use of plastic packaging.

Regarding the managers' responses to the companies surveyed, manager number 1 responded that they are just beginning to implement these practices although do not concretely apply them. Manager number 2 responded that she

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fully implements sustainability in her report. Manager number 3 says that she applies the return of chemical product packaging. All the companies interviewed are committed to sustainability, increasing the use of renewable resources, for instancethere, in the case of manager number 3, whose company is certified with zero exclusion, where 90% of the waste is destined for recycling, and the company donates oil to NGOs.

Regarding the question about the SDGs (Sustainable Development Goals), Manager 1 responded that her company's goal is to reduce resource use by 7% by 2026. Manager 2 has aligned the SDGs with goals defined in seven pillars. Manager 3 had an internal SDG management platform visually outlined for her employees.

The implementation of ESG is reinforced daily because, according to respondents, sustainability is a targeted strategy. In short, the managers of the respective companies believe that sustainability is a continuous journey of improvement, that everyone plays a fundamental role in this process, and that companies need to understand and apply shared responsibility.

The results obtained are essential to understand the implications of our study and how it contributes to the field of Sustainable Logistics. In this way, the UN SDG awareness objective is achieved, and organizations are aware of their responsibility towards the environment, proper disposal, recycling and reuse of plastic packaging. Nevertheless, it is important to note that our research had a limited sample of companies; more research makes it easy to achieve more outstanding results.

The analysis of the responses confirmed both the objective and the problematic issue, given that companies are interested in a sustainable future, are concerned about the plastic they use, follow action plans and carry out activities related to ESG, SDG or Circular Economy in favor of sustainability.

## 5. Conclusion

The initial objective of the research was to identify whether organizations have knowledge and applied methods to reduce the impact of plastic packaging on our environment. Logistics, together with UN planning, ESG methodology and the circular economy, were used as the main strengtheners of the cause, emphasizing their shared and social responsibility.

Through the analysis, even in organizations with different segments, plastic packaging is important, whether for drinking water, transporting a product or packaging for the end customer. For this reason, there is an extreme need for awareness of methods for controlling and handling the return of plastic packaging, with the main objective being environmental preservation.

Companies are applying environmental tools, and there is a history of planning in favor of the SDGs, meetings and applications involving ESG, packaging reuse using the circular economy and other methods for environmental combat.

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Accordingly, by moving forward with awareness and proposals for improvements as highlighted, we will achieve the reduction of plastic packaging through tools including the implementation of ESG in companies, investment in the circular economy, the operation of sustainable logistics and the application of the SDGs according to the United Nations.

## REFERENCES

ABRE - Brazilian Packaging Association. Macroeconomic study of packaging. 2023. Available at: <https://www.abre.org.br/dados-do-setor/2023-2/>. Accessed on: May 01. 2024.

ANVISA - National Health Surveillance Agency. RESOLUTION OF THE COLLEGIATE BOARD OF DIRECTORS – RDC NO. 259, OF SEPTEMBER 20, 2002. Available at: <556a749c-50ea-45e1-9416-eff2676c4b22 (anvisa.gov.br)> Accessed on: March 01, 2024.

ASTROLÁBIO – Orientação e Estratégia, S.A. 5th Guide to Good Practices – Circular Economy and Sustainability. 2021. Available at: < Guia-de-Boas-Práticas-5º-Economia-Circular-e-Sustentabilidade.pdf (master export.pt)>. Accessed on: May 01. 2024.

BARÃO, Mariana Zanon. Packaging for food products. 2011. Available at: <http://www.respostatecnica.org.br/dossie-tecnico/downloadsDT/NTY0MQ==> Accessed on: 05 mar. 2024.

CARLOS, Maria da Graça de Oliveira; MORAIS, Dafne Oliveira Carlos de. Corporate Social Responsibility in the Banking Sector: Analysis based on ESG Factors. 2017. Available at: <https://engemausp.submissao.com.br/19/anais/arquivos/518.pdf> Accessed on: March 14, 2024.

GRANDISOLI, Edson. ESG and Circular Economy: paths to innovation and co-responsibility. 2023. Available at: <https://noticias.ambientalmercantil.com/2023/05/esg-e-economia-circular-caminhos-para-a-inovacao-e-corresponsabilizacao/>. Accessed on: 14 May. 2024.

LANDIM, Ana Paula Miguel; BERNARDO, Cristiany Oliveira; MARTINS, Inayara Beatriz Araujo; FRANCISCO, Michele Rodrigues; SANTOS, Monique Barreto; MELO, Nathália Ramos de. Sustainability regarding food packaging in Brazil. 2016. Available at: <scielo.br/j/po/a/Mnh695j5cVys99xsSSx54WM/?lang=pt&format=pdf>. Accessed on: April 02, 2024.

MARCONI, Marina de Andrade; LAKATOS, Eva Maria. Fundamentals of Scientific Methodology. 2nd Edition. 1991.

MARCONI, Marina de Andrade; LAKATOS, Eva Maria. Fundamentals of Scientific Methodology. 8th Edition. 2017.

MONTEIRO, Mônica. Circular Economy. 2018. Available at: <startgo20.pdf (startandgo.pt)>. Accessed on: April 05, 2024.

DOI: https://doi.org/10.29327/2384439.3.2-2

MOURA, Reinaldo A.; BANZATO, José Maurício. Packaging, Unitization & Containerization. 2nd ed. São Paulo: IMAM, 1997.

PAIXÃO, Fernando Pimentel; ARGUELHO, Maria de Lara Palmeira de Macedo; VASCONCELOS, Cleiton Rodrigues de. Circular economy in the packaging segment. 2023. Available at: <Circular economy in the packaging segment (ufs.br)> Accessed on: May 02. 2024.

UNO. 2023. - <UN report points to solutions to reduce plastic pollution | The United Nations in Brazil > Accessed on: May 02. 2024