

ENVIRONMENTALLY RESPONSIBLE PACKAGING CHOICES

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Abstract. *Environmental and ecological concerns are receiving increasing attention across various human activities. Companies are integrating sustainability criteria into their management, striving to reduce the negative impact of their activities. This includes incorporating concepts such as sustainable development, circular economy, and social responsibility into their industrial and commercial environment, including packaging. Consequently, the term "sustainable packaging" is gaining traction and presenting new opportunities for minimizing the impact on the environment and society.*

Keywords: *biodegradable, compostable, eco-friendly, recyclable, renewable, zero-waste*

Introduction

Sustainability is a crucial aspect of the packaging industry, and it is a topic that is widely discussed among product manufacturers. Packaging is often the most visible representation of a company's commitment to sustainability, and incorporating sustainable principles into their practices is becoming increasingly important.

Sustainable packaging involves considering economic, social, and environmental factors and their interdependence in the decision-making and activities of businesses and organizations. It also requires implementing strategies that address social and environmental concerns throughout the entire life cycle of product/packaging systems at each stage of the supply chain [13].

The Sustainable Packaging Coalition (SPC) has identified eight criteria to describe their vision of sustainable packaging and its relevance to sustainable development. These include ensuring that packaging is safe and healthy throughout its life cycle, meets market criteria for cost and performance, maximizes the use of renewable or recycled materials, uses clean production technologies, and is effectively recovered and utilized in biological and/or industrial cycles [15].

The European Organization for Packaging and the Environment (EUROPEN) promotes the design of packaging that contributes to sustainable development, emphasizing responsible sourcing, efficient and safe life cycle design, meeting consumer needs, and efficient recycling or recovery after use [12].

The problem with plastic packaging

Plastic is an essential material in the modern economy, thanks to its ability to be used in multiple industries and consumer applications. It is a cheap, lightweight, durable, and versatile material used in the packaging sector, agriculture, construction, the automotive industry, and electronics. In the last few decades, global plastic production has increased exponentially, from 1.5 million tonnes in 1950 to 322 million tonnes in 2015 [14].

Packaging is the most significant use of plastic in the EU. They correspond to approximately 40% of plastic production, and they are responsible for 61% of total plastic waste generated [4].

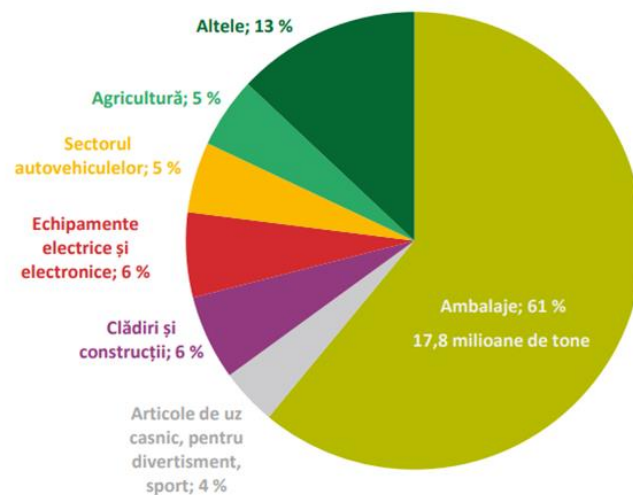


Figure 1. Plastic waste generated by sector in 2018

Source: collected by the author [4]

Petroleum-based polymers, including polypropylene (PP), polystyrene (PS), polyvinyl chloride (PVC) and polyethylene terephthalate (PET), have been extensively used for packaging due to their lightweight, good mechanical performance, good barrier properties, and many other properties. They are responsible for a large amount of environmental pollution, as they are not biodegradable [14].

Sustainable packaging alternatives

A variety of recyclable and long-lasting materials are now available to create innovative and sustainable packaging solutions.

As stated by the European Federation of Glass Packaging, glass is made from natural raw materials like sand, limestone, and soda ash, along with recycled glass. Glass is one of the rare packaging materials that can be endlessly recycled in a closed loop system. For many years, glass has been successfully collected for recycling through extended producer responsibility (EPR) programs, where it is gathered at the curbside or at designated collection centers throughout the European Union. Currently, nearly 8 out of 10 glass bottles in the EU are collected for recycling, and initiatives such as Close the Glass Loop aim to raise this rate to 90% [2].



Figure 2. Glass packaging [11]

Bamboo, a fast-growing and versatile plant, can contribute to reducing plastic pollution by providing both single-use and durable products that are easy to produce, biodegradable, and have a low environmental impact. In recent years, bamboo processing technologies and techniques have evolved, expanding the range of bamboo products and ensuring that they are safe, high-quality, and competitive with plastic products on the market. While plastic products require fossil fuels for production, bamboo products can be 100% biomass-based, meaning they can be recycled and have a much smaller carbon footprint and overall environmental impact [1].



Figure 3. Bamboo packaging [6]

Mushroom-based packaging represents a new generation of eco-friendly packaging, based on the use of biodegradable and compostable materials. This characteristic meets the requirement of environmentally friendly materials, while also providing the necessary strength and reliability for most products. Mushroom packaging can be grown and molded to meet the specifications of any product, making production efficient and reducing waste. This feature is advantageous for small businesses that require precise product specifications and any company that wants more control over the raw materials used in their products [5].



Figure 4. Mushroom packaging[16]

Biodegradable plastic, according to the European Environment Agency, is an ecological and compostable plastic material that "can be produced from either biological raw materials or fossil-origin ones" [8]. It is a type of plastic that can decompose through natural biological processes, such as the action of microorganisms and enzymes, into harmless natural substances such as carbon dioxide, water, and compost. It is considered to be a more environmentally friendly alternative to traditional plastic, which can persist in the environment for hundreds or even thousands of years and can pollute the soil, water, and air. Some of the most common materials used include starch, cellulose, and biodegradable polyesters [10].



Figure 5. Biodegradable plastic packaging [7]

Regulations and Policies on Sustainable Packaging

In recent years, the concern for protecting the environment has led to the implementation of a set of regulations and policies on sustainable packaging. Among the most important regulations is the EU Directive on Packaging and Packaging Waste, which sets specific objectives for recycling and reducing the amount of packaging waste generated, as well as requirements for the use of recyclable and biodegradable materials [3].

In addition, the national waste management program aims to implement an integrated waste management system, which includes packaging management. The program involves developing policies and measures that encourage the reduction of the amount of packaging used and increasing the recycling rate. Another important policy is the taxation of plastic packaging, which has been introduced in certain countries to encourage companies to use sustainable alternatives and reduce the amount of packaging produced.

These systems encourage consumers to return empty packaging for recycling or reuse, thus reducing the amount of packaging waste generated [8].

Challenges and opportunities for companies

Sustainability has become a crucial topic for companies and consumers alike, driven by concerns about the environment and the need to protect natural resources. The promotion of sustainable practices in business can bring significant benefits, as evidenced by the example of Eva NYC, which saw a 100% increase in orders within two weeks of launching fully recyclable aluminum bottles. McDonald's is another company committed to promoting sustainability, with plans to make its packaging 100% renewable and recycled by 2025 [9].

Experts recognize that adopting eco-friendly packaging can enhance a company's image and meet consumer demand while also promoting environmental education and awareness among consumers [17].

Conclusions

In conclusion, sustainability represents a crucial issue for society and the environment, and managing the pollution caused by plastic packaging is a vital aspect of this issue. As plastic packaging has a significant negative impact on the environment and human health, it is important to find sustainable alternatives. In this regard, biodegradable and recyclable materials represent viable solutions to meet economic, social, and environmental needs. Additionally, the efforts made by companies and individuals to promote the use of eco-friendly packaging are important for promoting a greener and cleaner environment.

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