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The Role of Packaging Designers in the Context of the Environmental Crisis

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ABSTRACT

In the face of a worsening climate crisis and growing consumer awareness of the negative effects of over-consumption, the packaging industry faces the challenge of transforming itself towards more sustainable solutions. Labelling and well-planned production processes that can effectively promote environmental values that benefit both the producer and the environment play a crucial role in this process. Working with experts from other industries involved in creating goods, designers can shape informed and mature visual messages emphasizing the importance of responsible design decisions. The following paper emphasizes that sustainable design requires interdisciplinary knowledge and consideration of long-term effects, such as using and recycling materials, which can help reduce waste generation and promote responsible practices in the packaging industry.

Introduction

The phenomenon of packaging has accompanied man since the beginning of his history, with the first primitive examples dating back to the wanderings of nomadic peoples. Strictly utilitarian products date back several or even several thousand years B.C. (Nougier, 1989, pp. 30-39, Drahotová, 1984, p.12). Packaging, in a sense, is closer to the present day, i.e., considering the mass nature of the consumer, which appeared at the time of the Industrial Revolution and the increasing demand for goods. Economic and technological development, together with forming competition, forced the need for commercial ways to attract customers, and this was achieved by using advertising and incorporating it permanently into the concept of commercial packaging (Kolesár, Mrowczyk, 2018, pp.90-91). On the other hand, the emergence of plastics in the mass market in the 1950s contributed significantly to their domination of the market and the increased production of so-called fast-moving goods, the remnants of which are a problem for present and future generations.

Packaging plays a particularly important role in the economy and everyday life, in addition to being important due to its manipulative nature (Stewart, 2009). The current market offers consumers a multitude of product categories, and these, in turn, consist of thousands of products that differ not only in quality but also in form or label. The customer, therefore, makes purchasing decisions not only on the basis of the availability of the good itself but may be guided by values suggested by the packaging designer. Their wide participation in human activities and the complexity of the processes involved may be evidenced by the fact that there are at least several definitions of them, depending on the industry or function performed. Among these are logistics and production technology, marketing and industrial design. The last of these, consisting of printing processes, i.e. printing methods combined with material manufacturing techniques, appear to have a significant potential for reducing packaging waste, whether due to inappropriate segregation or not being recyclable for other reasons.

Design variables, such as colour, form or the choice of material itself, give specific communicative meanings, linking the sales dimension to the identity and image of the organization in question. As a carrier of value, creating thoughts in the mind of the audience, in this case, who are primarily potential consumers, its high position in the manipulative field of design itself is indicated (Wszołek, Moszczyński, Mackiewicz, 2017). This additional layer of meaning potential, in addition to providing visual qualities, allows another function to be taken into account, which is particularly important from the point of view of communicating pro-ecological values. The sociological aspect of packaging, i.e. concerning how it is dealt with at the end of its life and how the unavoidable environmental burdens created during this time are reduced, boils down to a change in the entire design thinking, in line with the adopted model of the Closed Circuit Economy (European Commission, 2019). It changes the pattern of linear consumption (buy-use-throw-away) to one where impacts on the whole system are already identified at the product and packaging stage and assume that one must design for reusability, thus reducing the exploitation of raw materials. Thus, the benefit of using this model is the minimization of waste.

Context, the rationale for the choice of topic

Global debates in the field of Sustainable Development, including the Agendas developed (Cz. Wodzikowski, 2009, pp. 67-69) and concrete steps at national levels (M. K. Terlecka, 2014, p. 8) taken to mitigate negative environmental impacts point to the need for change in almost every area of human activity. EU citizens indicate that the protection of the climate and the planet is an important value (94% of those surveyed), and the problem of waste, including packaging, appears among the most frequently mentioned (European Commission, 2020). In 2019, the global average production of traditional plastics was 460 million tonnes, doubling in value in 20 years and showing an upward trend, demonstrating their relevance in logistics chains and widespread presence in the economy (OECD, 2022, pp. 34-35). In Poland, 542,000 tonnes of plastic waste will be recycled in 2022, representing 21.2% (GRID, 2024). Global plastic consumption is estimated to triple by 2060, reaching 1 221 million tonnes (OECD, 2022, p. 35).

By using reusable packaging, material recycling, or focusing on the gradual reduction of plastics, it may be possible to reduce the amount of waste and minimize the need for new raw materials. Considerations for change, however, should start with changes in society's habits and lifestyles. The reason plastic has been so widely present and dominant in the industry has been the recognition of its cost-effectiveness and efficiency in FMCG, or fast-moving consumer goods. Relatively cheap and popular everyday goods such as cosmetics and foodstuffs, and with them, caps and disposable containers have taken over the market, with the consequences for today's society. Adequate awareness-building among consumers may prove to be an important step in bringing about change on a global scale, but it is the manufacturers (and indirectly the designers) who should already be responsible at the packaging conceptualization stage and then at the technical implementation stage, for the correct management of available raw materials and for ensuring appropriate conditions according to the regulations being introduced and updated.

In an era of a worsening climate crisis caused by environmental degradation and excessive greenhouse gas emissions, as well as a growing public awareness of the negative effects of consumerist lifestyles, the packaging industry needs to adapt to changes in favour of more sustainable choices. From the point of view of design, communication using appropriate visual elements, labelling, and the production process play a key role here. With their help, the manufacturer has the opportunity to effectively promote brand values that are both good for him and the planet. The graphic designer, on the other hand, in collaboration with professionals from other industries, can prompt these choices, creating a mature and informed message based on the impact of the design decisions made.

Contemporary packaging design should take on the broadest possible context, i.e. taking into account future generations and the environment. Questions of material reduction and recycling and real opportunities for reducing greenhouse gas emissions are becoming relevant. In this context, transparency in terms of environmental responsibility appears to be an important point of communication between the manufacturer and the consumer of the product, communicating the pursuit of common goals. The designer can suggest more sustainable choices at the idea stage. However, this requires at least a basic knowledge of the risks and opportunities, including, among other things, the impact of raw materials and extraction methods on the ecosystem's various elements, as well as the awareness and validity of the chosen decisions. Thinking about the long-term effects of a project, such as end-of-life disposal methods or available recycling methods, can make a difference in reducing future waste generation and avoiding unintended mistakes or unforeseen consequences.

Literature analysis

Given the widespread presence of packaging in the economy and human life and its multifaceted importance, literature from a wide range of fields should be taken into account, including both production and design, as well as legislation and sustainability. On the technical side, material science issues, including knowledge of the raw materials themselves and how they are combined, seem to be important, providing an overview of long-term environmental effects and how to minimize them. It is impossible to separate these issues from the printing possibilities and the information provided on the labels themselves, which is a specialized area of interest for the packaging designer.

The environmental impact literature mainly focuses on the ecosystem effects of individual materials, including their advantages and disadvantages, as well as their system costs and recyclability. Thus, it is pointed out, for example, that the low biodegradability of plastics and the microplastic particles created when they break down pose a threat to organisms, especially those living in the oceans, where some 22 million tonnes of plastics

are already virtually impossible to dispose of ended up in 2022 (European Parliament, 2024). Thanks to the good availability of the raw material - crude oil - as well as the economically viable lightness of the final product and the wide possibilities of heat treatment to form them into any shape, their mass use finds application in almost every sector. However, as reports indicate, the recycling problem is complicated to the extent that it requires an improvement in the entire sorting system, as more plastics end up in mixed waste than in separate collections, accounting for 43.1% (GRID, 2024). On the other hand, their reusability is indicated for glass and metals, with virtually no loss of quality (A. Emblem, H. Emblem, 2023), but the production and reprocessing itself is energy intensive. Similarly, despite exhibiting rapid decomposition properties, cardboard and paper require significant amounts of water and tree felling, and recovery processes generate additional environmental costs by using toxic bleach and biocides (W. Jedlicka, 2009, pp. 229-232).

Given these consequences, the need to search for and develop more friendly, often biodegradable materials is indicated, and the trend in demand for biopolymers since 2006 seems to be increasing (D. K. Platt, 2006, pp. 8-9). Alternative materials, understood as being made entirely from bio-based raw materials or classic materials with additives to facilitate biodegradation, are a new phenomenon on the market that requires further research. On the legal side, there is still a lack of comprehensive regulations regarding safety and the possibility of using them, especially in areas directly affecting the human body, such as cosmetics or food (European Parliament, 2009; European Commission, 2022). As the European Commission's report on biodegradable and compostable plastic packaging points out, mere certification of the material is insufficient, as the properties may change once the product is incorporated, and currently, the assurance of safe use is dumped not on the packaging manufacturer, but on the owner of the contents (European Commission, 2020, pp. 25-27).

Definition of the design problem

Environmental pollution, caused at least in part by packaging waste, is currently one of the key challenges. This wicked problem, as described by H. Rittel (2004, pp. 155-169), is particularly challenging to address due to multiple overlapping factors, including economic costs and causal complexity. It underscores the intricate nature of the issue and emphasizes the necessity of selecting the least harmful approach to mitigate the crisis. The production of biomaterials from natural resources requires the use of land for plant growth, water for plant growth and fertilizers to maintain the productivity of the plants, thus affecting soil and water quality. Giving up alternatives and continuing to use traditional plastics will, in turn, increase pollution and microplastic levels in the environment, which could lead to new health risks.

As early as the 1970s, the importance of industrial design and its effects on the environment was pointed out by design theorists (V. Papanek, 1972, pp. 14-19). Selected authors even suggest that the designer's contribution to climate change is 80% (J. Thackara, 2005, pp. 1-8), and this follows from the definition of the field itself. Every product or service is created to solve specific problems and is guided by the needs and expectations of the recipient, who expects mainly functionality (J. Krupinski, 1998). Design should, therefore, go beyond the traditional goals of functionality or aesthetics, adopting sustainability as the basic organizing principle of the entire creative process. In the case of packaging, this means striving to create products that fulfil functional and communicative functions, with the simultaneous potential to minimize negative environmental impact. Introducing such an approach requires moving away from treating sustainable design solely as a set of legal constraints to fully integrating this philosophy into design practice.

The design problem may not be so much about developing a biodegradable material and replacing traditional plastic, which decomposes in three months, but changing the very approach of thinking about packaging. Tonnes of rubbish in the water and on land is a modern-day problem, and while curbing the amount of non-recyclable waste, it seems important to find a solution for the existing ones. The proposal to fully replace classic plastics with alternative substitutes carries a systemic cost that calls into question the validity of such a solution. Approximately 2.5 kilograms of maize starch are needed to produce a kilogram of PLA bioplastic, and inadequate maize growing conditions can cause excessive greenhouse gas emissions (C. Kingsland, 2010). A key challenge, therefore, is to change the current way of thinking about the production itself, as currently, the concept remains unchanged and only chooses different raw materials. The production of packaging waste has increased dramatically over the last 50 years, which shows that the manufacturing system is flawed. Instead of searching for new raw materials, the focus should be on the efficient use of

existing materials and education on how to process them. Understanding the material and printing technologies available can help to create designs that support the environment instead of burdening it. In order to reduce the negative impact of design on the environment, a systemic approach is needed to change the entire process, from materials to production to use and disposal.

Case Study: implementing ecological solutions in packaging design

Carrefour already implemented a solution pioneered nationally in 2008 - compostable checkout bags made from starch-based biopolymers. This cutting-edge approach aimed to reduce the use of traditional polyethylene advertising bags, which are difficult to recycle and seriously burden the environment. The solution guaranteed complete decomposition within a maximum of one year (Carrefour Poland, 2009), and the project's innovation was recognized in the sixth edition of the PakStar competition 2012 in the unitized packaging category. In 2015, Tetra Pak Ltd and Coca-Cola Brasil received a Sustainability Award for the introduction of an innovative carton made from 78% sugarcane-derived materials (WorldStar, 2015). By using this raw material, it was not only possible to reduce greenhouse gas emissions but also to partially absorb them by the plants during growth. The Coca-Cola brand implemented an innovative approach to bottle design in 2023, dispensing with traditional labels. An embossed logo distinguishes the new packaging and serves both a utility and communication function. The abandonment of labels reduces production waste and facilitates recycling, as there is no need to separate the packaging components. This action is in line with global trends related to reducing unnecessary materials.

Figure 1:
Compostable biopolymer advertising bags introduced by Carrefour in 2008. Adapted from COBRO Archive (https://archive.cobro.org.pl), accessed November 20, 2024

Figure 2:
Tetra Pak and Coca Cola Brasil packaging made from sugarcane (left) and Coca Cola packaging without a label (right). Adapted from Worldstar (https://www.worldstar.org), accessed November 20, 2024.

These examples show that introducing green solutions in packaging design has a positive impact on the environment and responds to growing consumer demands for sustainability. The initiatives also illustrate the diversity of approaches - from biomaterials to recycled raw materials to changes in packaging design to reduce environmental impact.

Findings

Sustainable design should not only be a priority for the future of both the industry and the planet. Modern packaging should combine functionality and aesthetics with environmental concerns, which poses a significant challenge for manufacturers and designers, further compounded by social pressure and emerging regulatory requirements. Today's consumers are increasingly looking for sustainable solutions, and brands able to respond to these expectations are gaining an advantage in the market. Packaging is proof that sustainable design not only meets the market's needs but also provides the impetus for the industry to evolve towards greater environmental responsibility, building on opportunities that already exist but are not always fully exploited.

Conclusion

Social responsibility is becoming an important element shaping the packaging industry's future. Consumers increasingly expect brands to engage in environmentally friendly activities, which is an opportunity for companies to build trust and increase customer loyalty. Green packaging can also play an educational role by providing information about the recycling process or materials used. Changing attitudes to design also affects the perception of product value - consumers are willing to pay more for goods with environmentally friendly packaging, encouraging companies to invest in innovation. The future of packaging design lies in integrating innovative technologies, cross-industry collaboration and social responsibility. These activities respond to current market needs and set standards that can contribute to protecting the environment for future generations. Today's challenges are an opportunity to transform the industry towards a more sustainable and responsible approach.

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