

Reflections on Packaging Design in Sustainability

Yuxuan Sha^{1*}

¹ Nantong Institute of Technology, Nantong, Jiangsu, China

Email Address

865960581@qq.com (Yuxuan Sha)

*Correspondence: 865960581@qq.com

Received: 3 September 2022; **Accepted:** 20 October 2022; **Published:** 11 November 2022

Abstract:

The essay is based on the sustainable development strategy that is gradually popularized, and mainly focuses on the inevitable trend of sustainable packaging design and the importance of the characteristics and application of sustainable packaging materials. Through a large number of literature review, analysis of specific cases, material characteristics and comparisons, it is particularly suggested that the optimization and innovation of packaging materials is more important than reducing use.

Keywords:

Packaging Design, Sustainable Packaging Strategy, Environmental Issues, Packaging Materials

1. Introduction

Packaging is everywhere in modern life. Traditionally, first of all, the basic purpose of packaging is to protect the internal safety of the product. Secondly, it is not easy to be damaged and convenient to transport in the logistics process. More importantly, packaging design is a key strategy for marketing. The impact of packaging on purchasing decisions is highly associated. According to the research in 2007 by Wells et al., over 73% of interviewed consumers in the survey indicated that they rely on packaging to help them make purchase decisions [1]. Therefore, one of the means by which designers inspire customers to purchase is ingenious packaging design.

However, with the change of consumers' perception and the challenges of environment issues, packaging design and technology have to meet an innovation. The mass production of traditional packaging leads to excessive waste of packaging materials and serious environmental pollution. Most packaging materials used in traditional packaging are difficult to recycle and cannot be naturally degraded, which causes environmental issues such as the waste of raw materials, depletion of resources and global warming. Therefore, the government has to invest considerable money to handle with the packaging waste. In other words, traditional packaging has a detrimental impact on the environment and social economy. To be more specific, in their review of the literature [2], it was pointed out that the world's cities produce about 1.3-1.9 billion tons of solid waste annually, and this figure will increase to 2.2

billion tons by 2025. In this context, there is an urgent demand to develop and implement sustainable packaging design systems.

In response to this situation, one of the common goals of sustainable development proposed by the leader of EU is that the recycling rate of packaging waste should reach 75% by 2030[2]. This figure demonstrates the importance of focusing on and studying the development of sustainable packaging design. Packaging design is a major consideration in a company's sustainable development strategy. In a way, packaging materials determine the extent to which they can be cyclic and recycled. The part of the incorporation and industries have already started experimenting with and adopting sustainable packaging. The development of sustainable packaging design enables people from all walks of life to achieve multi-win consensus. Sustainable design strategies can not only make a social contribution to environmental issues related to packaging, but can also improve a company's reputation and the advantages of marketing competition[3]. In the early stages of production design, packaging functions and characteristics need to be explicitly considered around the principles of sustainable packaging design strategies, namely effective, efficient, cyclic and safe[4]. Furthermore, the proper selection of packaging materials can promote sustainable development effectively. This viewpoint was proved by Ahmed and Alam[5], who pointed out that sustainable design of packaging starts with sensible material selection. Nevertheless, sustainable packaging system is a complex concept. The success of sustainable packaging design depends on coordination among designers, manufacturers, governments and consumers. Nowadays, the criteria of sustainability implemented in the packaging design process is still entirely unclear. Therefore, sustainable packaging design is an area worthy of research, and this essay will focus on packaging materials in sustainable packaging design strategies.

1.1. Mind map of sustainable packaging

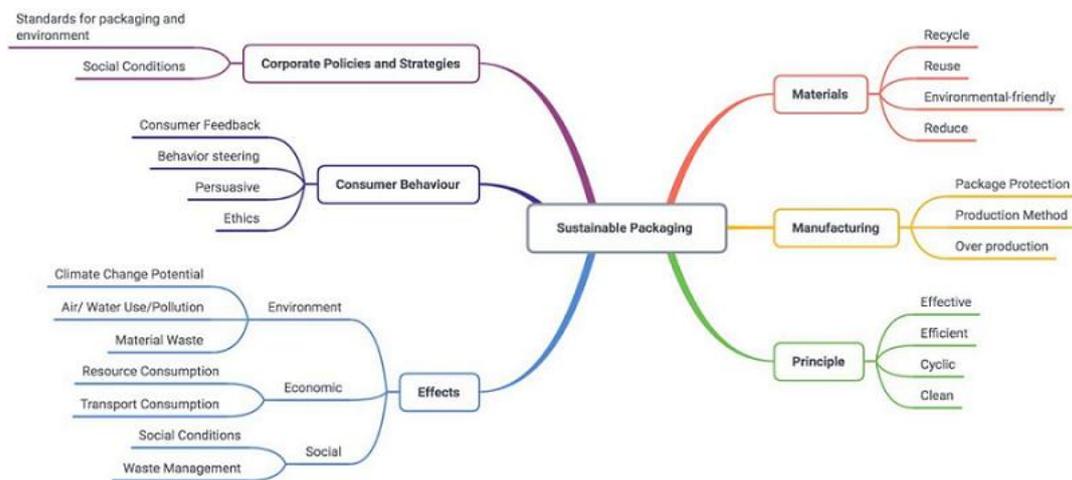


Figure 1. The mind map of sustainable packaging.

1.2. The process of thinking

The mind map was divided into six parts, namely packaging materials , manufacturing, principles, corporate polices and strategies, consumer behaviour and multiple effect.

Generally, the first four principles of sustainable packaging introduced by Sustainable Packaging Alliance are ‘effective’, ‘efficient’, ‘cyclic’ and ‘clean’ [6].

The 'effective' mainly refers to the function of sustainable packaging to ensure the circulation of products effectively in the supply chain. In addition, designers, manufacturers and consumers have a responsibility to minimize negative impact on environment through product selection and proper disposal. The other three principles are related to the properties of the packaging materials. The recycling of clean packaging materials, which significantly reduces material degradation and energy consumption. In another word, the four principles of sustainable packaging guide the choice of packaging materials. When manufacturers and designers choose packaging materials, the materials need to have the characteristics of recycle, reuse, environment-friendly and reduce.

The corporations and manufacturers are two direct decision makers who have an impact on packaging that cannot be ignored. The coordination between them can promote efficient manufacturing. As far as manufacturing is concerned, the protective nature of the packaging and production methods need to be considered. It is worth mentioning that overproduction of packaging is one of the main causes of serious environmental consequences [7].

In terms of corporations, packaging policy needs to be based on social standards and conditions. Moreover, to a large extent, the success of sustainable strategic development depends on the corporation marketing strategy. The corporations have a social responsibility to develop practical marketing strategies to steer consumer behavior. For example, Innocent, a prominent beverage company, promises a sustainable source of its products and gives 10% of the profits from each bottle sold to charity [8]. This commitment and measures made Innocent exist in consumer awareness with a strong ethical and environmentally friendly brand image, which had a positive influence on the reputation of company and market competition. Furthermore, this has implicitly affected consumer purchase behavior. According to the proof of Steenis et al. [9], the purchase behavior of consumers of sustainable packaging material products would improve consumers' self-moral satisfaction.

Throughout the product life cycle, sustainable packaging design has a profound influence on the environment, economy and society. The governments, enterprises and individuals are increasingly aware of the environmental changes, and designers are beginning to actively consider the broad impact of packaging design on society [10]. If resources are exhausted, an outbound supply chain situation will emerge. The excessive consumption of resource and transportation, the profit of the industrial stakeholders will be negative while the normal operation of the enterprise cannot be maintained. Nevertheless, packaging design in the context of sustainable development can alleviate environmental pollution, economic consumption and waste of social resources effectively. As experts point out that the application of sustainable packaging design strategies can greatly reduce the negative impact of packaging on the three dimensions of environment, economy and society.

2. Literature Review

2.1. Direction

Throughout the literature review, based on the four principles proposed by Sustainable Packaging Alliance (SPA) for sustainable packaging in 2004, these four principles focus on the function and purpose of packaging. In addition, in the same year, according to the Sustainable Packaging Coalition(SPC), sustainable packaging

has three characteristics of environmental benefits, namely safety, health and has the performance of renewable energy throughout its life cycle. In the early stage of packaging design, the selection of materials can effectively affect the sustainable development. Designers should optimize packaging materials to achieve the optimal packaging. Therefore, this portfolio focuses on the application of packaging materials in sustainable packaging design strategies.

According to Dziak's review article state that the International Organization for Standardization introduced two methods for assessing the sustainability of packaging materials are life cycle assessment and life cycle inventory assessment. The former focuses on the environmental impact of products. The latter is specific to each stage of the product's extraction from material to its final use [11].

The common packaging materials are mainly glass, paper, metal and plastic. Some packaging materials with recycling potential are worth exploring. According to research data conducted by Ahmed and Alam in 2013, the current recovery rate of metal cans is about 54%, the recovery rate of paper packaging waste is about 49%, and the recovery rate of glass is about 22%. However, compared with the other three types of materials, plastics have a recovery rate of only 5-10% due to the immature technology of recycling it.

Compared with traditional packaging design, sustainable packaging design is based on this optimization and innovation. First of all, it is well known that degradable materials have traditional packaging functions. After use, they will be naturally degraded by ultraviolet rays, soil and water, and finally re-enter the ecological environment in a non-toxic form. The difficulty with degradable plastic is the chemical structure of the material. In a sense, the implementation of sustainable packaging design not only avoided environmental pollution caused by a large number of waste plastic packaging, but also contributed to the development of science and technology.

Secondly, plant fiber packaging that has appeared in recent years is a new type of material, and cellulose is a relatively abundant renewable polymer. If extra grains or plants are used to produce packaging materials, this will not only benefit the environment, but also promote agricultural economic development. For example, films made from starch have become edible packaging for disposable fast food. In addition, a new type of green paper packaging represented by pulp molding. This material uses waste paper and plant fibers as raw materials. It is used to replace foamed plastic products and is widely used in egg trays.

In general, the application of sustainable packaging materials significantly reduces production costs. Packaging is lighter and transportation costs are relatively reduced. In addition, environmental responsibility through sustainable products can increase customer loyalty. However, when assessing the sustainability of packaging, it cannot focus solely on improving the recyclability of materials, as the safety of materials is of paramount importance.

2.2. Overview of the sustainable packaging materials

The topic of this research is to analyze the positive impact of sustainable packaging materials on economy, society and environment. Whether from the production costs of rising fossil oil, or from an environmental perspective, the use of sustainable materials is an inevitable trend. The proper selection of packaging materials is the first step in the success of sustainable packaging design. This viewpoint is proved by

Lindh, et al., 2016, they state that the starting point of sustainable packaging development is packaging materials [12]. Maximizing the use of renewable or recycled raw materials is the first choice of designer in the design process.

In terms of packaging products, packaging materials account for about 65% of global household waste production [13]. It is clear from this data that further research and analysis of packaging materials is necessary in order to find innovative materials with lower costs and relatively minimal impact on the environment.

This essay explores the importance of material selection by exploring the characteristics and functions of sustainable packaging materials. As mentioned above, the creation of new sustainable packaging materials has stimulated technological progress. Using agricultural crops and fibers to make packaging is low cost and effectively solves the problem of excess agricultural products.

All walks of life have realized the need for sustainable development strategies. For example, the packaging of cosmetics is mostly plastic bottles and cans that are relatively difficult to recycle, which should be altered under the tendency of sustainability. Almost all the cosmetic companies in the market have made promises to improve the packaging. They launched a series of test tubes and bottles that can be recycled. The research of Boots company on new product development includes research on the environmental problems caused by product packaging. Unilever has promised to reduce packaging weight by one-third by 2020. Aveda's lipstick box was changed to recycled aluminum, and some gift boxes were made from recycled paper [14]. In addition, Sainsbury's bread packaging has transformed the original carton and plastic lining into polypropylene film, which protects the product while reducing packaging weight by 70% and improving transport efficiency by 20% [15]. The optimization and change of packaging materials has created a profitable situation, whether it is production costs, commercial competition or the ecological environment. However, some researchers find that reducing packaging ignores objective factors. For example, fruit needs cushioning packaging to avoid damage during express delivery. In addition, cucumbers sold in supermarkets are often wrapped in plastic cling film, which prevents moisture evaporation, extending their shelf life from three days to 14 days, further increasing consumers purchase intention [16]. Therefore, sustainable packaging does not represent a reduction in use, but a rational use of optimized and innovative sustainable materials.

3. Reflective Commentary

This essay is based on the sustainable development strategy that is gradually popularized, and mainly focuses on the inevitable trend of sustainable packaging design and the importance of the characteristics and application of sustainable packaging materials. Through a large number of literature review, analysis of specific cases, material characteristics and comparisons, it is particularly suggested that the optimization and innovation of packaging materials is more important than reducing use.

In the literature review, the four basic principles proposed by SPA have become the basic guidelines for the effective implementation of sustainable packaging design. However, Lewis et al. in 2007, the definitions given by SPA and SPC masked the complexity of achieving the goal of minimizing the negative impact of products on the environment. More specifically, trade-offs may need to be made between recycling and energy consumption. Increasing the recycling rate of packaging is one

of the sustainable packaging design strategies, but in the meantime, it is necessary to consider whether this will produce greenhouse gas emissions. Therefore, there is no clear dividing line between how to reduce the use, recycling and energy consumption, which is also one of the research gaps in this essay. In addition, although there is no doubt that sustainable packaging design has positive influence on environment, economy and society. However, it is well known that sustainable packaging systems are complex and still lack other general guidelines for implementing standards in the product and packaging design process. In short, it is necessary to transform its complexity into a universal tool. It is necessary that the generic terms for packaging functions and attributes are standardized to facilitate better communication between stakeholders in each field. Moreover, despite increasing consumer acceptance of sustainable packaging design, it remains a great challenge for designers and stakeholders. Designers and companies need to have a context of ecologically conscious cultural. In most cases, they lack awareness of the numerous issues related to sustainable development, as sustainable design involves more than cyclical or recyclable materials. In fact, there are still some products that rely on scarce resources to package to create high value without considering the sustainability of packaging and environmentally friendly packaging materials.

4. Conclusions

In general, under the guidance of the current concept of sustainable development, new packaging materials with sustainable characteristics will also continue to rise. Materials are the core of product packaging. The rational selection and use of sustainable packaging materials is one of the main objectives of sustainable packaging design. Consumers' demand for packaging is no longer limited to satisfying the single protection functions, but more attention is paid to the visual, tactile, safety and environmental protection brought by the materials themselves. A more comprehensive sustainable packaging design strategy is based on continuous coordination and communication among designers, manufacturers, governments and consumers. There is no doubt that any unilateral action will be insufficient to fully promote the development of sustainable packaging.

Conflicts of Interest

The author declares that there is no conflict of interest regarding the publication of this article.

Funding

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

References

- [1] Rundh, B. Packaging design: creating competitive advantage with product packaging. *British food journal*, 2009, 111(9), 988-1002.
- [2] Rada, E.C.; Cioca, L.I.; Ionescu, G. Energy recovery from Municipal Solid Waste in. EU: Proposals to assess the management performance under a circular economy perspective[C]/MATEC Web of Conferences. EDP Sciences, 2017, 121: 05006.

- [3] Young, A.; Kielkiewicz, Y.A. Sustainable supply network management. *Corporate environmental strategy*, 2001, 8(3), 260-268.
- [4] James, K.; Lewis, H.; Jordan, R, et al. Industrial packaging supply chains creating links and achieving change. Report to EcoRecycle Victoria, Sustainable Packaging Alliance, Melbourne, 2005.
- [5] Ahmed, J.; Alam. T. Concept of sustainable packaging system and its development. *Sustainable Food Processing*, 2013, 337-362.
- [6] Lewis, H.; Fitzpatrick, L.; Verghese, K, et al. Sustainable packaging redefined. Melbourne, Australia: Sustainable Packaging Alliance, 2007.
- [7] Rezaei, J.; Papakonstantinou, A.; Tavasszy, L, et al. Sustainable product-package design in a food supply chain: A multi-criteria life cycle approach. *Packaging Technology and Science*, 2019, 32(2), 85-101.
- [8] Frings, L. The Marketing Strategy of Innocent Drinks. GRIN Verlag, 2017.
- [9] Steenis, N.D.; Van Der Lans, I.A.; Van, H.E, et al. Effects of sustainable design strategies on consumer preferences for redesigned packaging. *Journal of Cleaner Production*, 2018, 205, 854-865.
- [10] Bhamra, T.; Lofthouse, V. Design for sustainability: a practical approach[M]. Routledge, 2016.
- [11] Nah, E.H.; Cho, S.; Kim, S, et al. International organization for standardization. (ISO) 15189. *Annals of laboratory medicine*, 2017, 37(5), 365-370.
- [12] Lindh H, Williams H, Olsson A, et al. Elucidating the indirect contributions of packaging to sustainable development: A terminology of packaging functions and features. *Packaging Technology and Science*, 2016, 29(4-5), 225-246.
- [13] Battini D, Calzavara M, Persona A, et al. Sustainable packaging development for fresh food supply chains. *Packaging Technology and Science*, 2016, 29(1), 25-43.
- [14] Sahota, A. (Ed.). Sustainability: how the cosmetics industry is greening up. John Wiley & Sons, 2014.
- [15] Holdway, R.; Walker, D.; Hilton, M. Eco-design and successful packaging. *Design Management Journal (Former Series)*, 2002, 13(4), 45-53.
- [16] Lindh, H.; Williams, H.; Olsson, A, et al. Elucidating the indirect contributions of packaging to sustainable development: A terminology of packaging functions and features. *Packaging Technology and Science*, 2016, 29(4-5), 225-246.



© 2022 by the author(s); licensee International Technology and Science Publications (ITS), this work for open access publication is under the Creative Commons Attribution International License (CC BY 4.0). (<http://creativecommons.org/licenses/by/4.0/>)