

Green Aesthetic Approach for Upcycling Packaging Products

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Abstract. There is a need for unique packaging designs using a green packaging approach which would help encourage multiple usages. In order to reuse an up-cycled packaging product, the up-cycled packaging design must meet the users' aesthetic preferences. This paper attempts to document the key green aesthetics fundamentals for upgrading recycled packaging products. The purpose is in merging the green packaging concept with a suitable user's aesthetic, thus, formulating the unique packaging transformation. This paper presents the initial study that is based on a selection of literature reviews in order to capture the influencing factors that designers could consider in guiding unique packaging approaches; it describes the results of the literature survey on unique packaging, user aesthetics, appropriate aesthetics, and the current concepts of green packaging. This research proposes that applying innovative design concepts for green packaging and combining green aesthetic requirements for customers could encourage acceptance among the customers in the upgrading and transformation of unique packaging. The results of this study are recommended for the future development of a green aesthetics approach for a green product packaging process. The proposed approach is expected to guide designers to embrace up-cycling techniques, thereby contributing in reducing waste in the post fabrication life cycle.

Keywords: Unique Packaging, Green Packaging, Green Aesthetic Preferences, Upcycling, Package Design

1 Introduction

Nowadays, many people randomly discard the packaging after receiving the product instead of recycling and reusing it [1]. Consequently, packaging waste is increasing, which accounts for most of the total waste, hence, there is a need for green packaging, circular economy, and sustainable development [2]. Accordingly, there is a need to make the package unique for reuse in order to minimize unnecessary waste disposal to the landfills [3]. This article aims to introduce the green aesthetic approach for up-cycling packaging products. The keywords are unique packaging, green packaging, green aesthetic preferences, up-cycling, and package design, which are used in the literature search to evaluate appropriate painting language features that could make unique packaging for packaging design. One of the most significant advantages of this strategy is the emphasis on function, which implies that the value of a product- such as its capacity, to execute a certain purpose [4]. Up-cycling is a term that is used to describe the process of converting waste materials into something of better worth or quality in their second life. This is becoming more commonly known as a viable way to cut down on material and energy use [5]. Packaging may be described as "all the operations of designing and creating the

container for a product," according to Kotler [6]. The relevance of sustainable packaging stems from the fact that it should take into account the three primary pillars of the sustainability idea, namely the economic, social, and environmental [7], which is the packaging systems of 'triple bottom line' [8].

Sustainable packaging should have four unique characteristics: 1) effectiveness (fit for purpose); 2) efficiency (minimum use of energy and materials); 3) cyclically (minimum waste); 4) safety (there should be no toxic materials and no pollution from it). Sustainable Packaging has issued some KPIs for measuring the sustainability of packaging based on these four characteristics [9]. According to Fitzpatrick et al. [10], Eco-efficiency is defined as "a management concept that pushes businesses to seek environmental changes that have a positive impact on the bottom line." It encourages activities that add greater value while having a lower environmental impact. Consumer requirements and desires, lifestyle choices, and an awareness of the product life cycle drive package innovation [11]. The '3R' principle, namely reducing, reusing, and recycling is the core idea of green design for industrial design. This not only requires the reduction of energy and material consumption, but the reduction of hazardous substance emissions as well, and also the need for products and parts that are easy to separate and collect for reuse or recycling. The current green design provides a new '4R' concept to specify re-cycle as two parts, i.e., recycling and regeneration, based on the '3R' principle and the low-carbon notion that is popular among all the public (Figure 1).

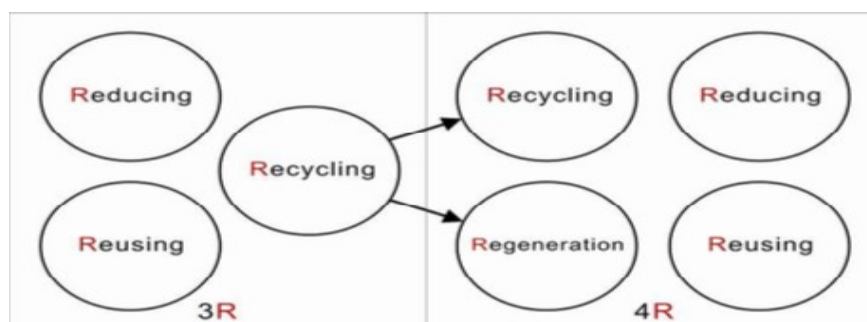


Figure 1. From '3R' to '4R' Source: [XU, 2015]

2 Research Methodology

This study conducted a literature survey on selected topics under the green aesthetic approach for up-cycling packaging products. These keywords were identified using Ibrahim's [12] research questions construct categorization technique for identifying three different RQ Constructs— 'WHO', 'WHAT', and 'HOW'—in formulating the main research question. Ibrahim defines the 'WHO' construct as the element that is used or impacted by research, the 'WHAT' construct as the information that is required to solve a research problem, and the 'HOW' construct as the action or impact on the element or information of the research. A search-by-search engines on Elsevier database returned information about the unique packaging, articles of which sub-themes were preselected based on their abstracts. A detailed analysis of their abstracts was guided by the E.A.G.L.E. Navigator system. For each topic, this study will

present the major works by prior scholars, how their works could support future studies, and what aspects need to be enhanced for each selected topic. The outcomes of this exercise would produce a synthesized summary for each topic. Then, the study will discuss the cross-analysis, integrated possibilities, and prioritize the synthesized information gearing towards high probable solutions that can make the packaging unique, which is conducive to the up-cycling of consumers. This article concludes with a discussion on the potential integrated solutions for the further development on the up-cycling theoretical approach in future studies. It follows the prescribed E.A.G.L.E. technique where the authors would analyse the advantages and disadvantages of the combined viewpoints and put forward the dominant selection for the next analyses.

3 Unique Packaging

3.1 Green packaging

In the book “*product durable design*”, Ruize Du (2002) summarized the concepts of regeneration as the following four characteristics: (1) utilize surface treatment to only recycle materials; (2) utilize structural design to make up for lack of recycling materials; (3) design with secondary materials in mind; (4) avoid using any other natural materials as much as possible [14]. The need for food packing, e-commerce transportation, and health-care goods would increase noticeably. While Zhang et al. (2019) emphasized the need for green packaging and the challenges of promoting green packaging, Liu, Pang and Ruiqiu (2017) had highlighted the analysis of packaging emotions and green packaging materials. Additionally, Gadhav et al. (2018) had noted that the research of sustainable packaging materials was based on starch. Accordingly, based on the significance and gaps of green packaging, a questionnaire survey was conducted and measured the promoting green packaging [15]. The principles of packaging material selection were analyzed where packaging emotions in packaging materials and the studied concept of green packaging design were discussed in the role of green packaging in packaging design [16].

However, [15] several suggestions were made regarding green packaging design and promotion. In order to solve these problems, the support from many sources is needed. Liu et al. (2017) discussed packaging emotion in packaging culture but did not mention packaging design and consumer acceptance of packaging emotion and packaging culture. Despite mentioning the benefits of manufactured products that are derived from renewable resources, there are still many gaps in their specific promotion and product, and they still need to be revised intensely (Gadhav et al., 2018). Another study by Shirhirun et al. (2017) has focused on the research and design of a small number of new structures and new graphics that have been designed using termite-coated corrugated cardboard due to a lack of comprehensiveness. Their study did not consider the environmental impact of the materials that were used. Kolek and Z. (2001) highlighted the problems that were related to environmental protection of recycled polymers in food packaging but did not propose relevant solutions to solve this problem.

Singh et al. (2016) have studied the material conversion of plastic waste without mentioning its feasibility. The research focuses on a comprehensive understanding of the status quo of green packaging and expands the scope of green packaging, thereby contributing to the

promotion of low-carbon environmental protection [17]. The research focus is not only to achieve novel and unique packaging designs but also to save resources and to protect the environment [16]. Many studies focus on applying renewable resources to sustainable packaging applications [17] and also focus on the innovative design of packaging; many studies cover their appearances besides the effectiveness in the use of functions and attractiveness to consumers [18]. Although many studies have outlined on the sustainable use of packaging materials, this study is encouraged by prior scholars towards recycling of packaging [19].

In general, this study agrees with the views of Zhang et al. (2019) on the recommendations for understanding the current status of green packaging, expanding the scope of green packaging and promoting low-carbon environmental protection. In addition, this study agrees with Gadhave et al. (2018) and Singh et al. (2016) about the rethinking of environmental recycling, reducing pollution and other issues, while being committed to the sustainable application of renewable resources in packaging. In addition, this study supports Liu et al. (2017) in committing to achieving novel and unique packaging design and the perfect environmental protection; the study supports using green and sustainable innovative products that are conducive to green packaging design. Packaging classification is recommended especially at the beginning of packaging design, and future studies can look into environmentally friendly recycling of materials, reducing waste of resources and pollution of polygonal, and focusing on the reuse of resources. Finally, the research suggests that the use of low-carbon, environmentally friendly green packaging design concepts could create unique packaging that is sustainable and innovative, and that the use of low-carbon, environmentally friendly green packaging design concepts could create unique packaging that is sustainable and innovative.

3.2 Green aesthetic preferences

Client satisfaction is one of the most important factors in determining future business success since it impacts customer's loyalty [20]. In order to maintain a high quality in their products, companies must aim to reduce costs. The efficiency of the packing solution can have an impact on the overall cost of the operation across the supply chain. The ultimate cost of the packing solution is determined by factors such as weight, shape, construction, and volume. Another crucial component of this strategy is the supplier. Consumer trends and needs can have an impact on cost-effective tactics [23]. Cost-cutting tactics are dependent on the amount of collaboration between package design and the buying specialists, as well as their ties with the suppliers. Also, the packaging material selection plays an important role in this marketing purpose. Companies are always pushed to identify and use materials that have the properties that the customers desire. Some of the most typical needs are textures, colors, visuals, ergonomics, forms, and functionality. The packaging must appeal to the customer as well as meets the company's special criteria, such as product compatibility and environmental performance while keeping costs and manufacturing strain to a minimum [22]. The 'target market' has a significant impact on the materials that are used as part of the project. The container design process reveals the consumers' lifestyles, interests, needs, and habits [24]. Material selection for this type of packaging must be carefully managed because it may need a combination of materials that may not be recyclable or compostable when combined [22].

Sensational beauty is the neuroscience of aesthetic [25]. The relationship between the environmental attractiveness of bio-based plastic packaging to consumers and their disposal behavior can provide demonstration design and digital advertising training for products. [25]

pointed out the creative thinking of modern product design in a distributed resource environment. [26] pointed out that product packaging is important for consumer shopping the economic impact of behavior, where green packaging materials and packaging emotions [16] as well as the impact of packaging on product market competitiveness are valued [27]. Understanding the neural basis of aesthetic experience can reshape our aesthetic and artistic concepts according to [25], to explore whether the consumers' perception of the environmental benefits of recyclable and portable bio-plastic packaging matches the way the consumers handle these packaging [29]. The unique product design is the added value of digital advertising in marketing [26], where the embodiment of three different innovative design models and innovative thinking processes [30] could provide strong designed packaging plays and play a vital role in product consumption [26]. Furthermore, the use of sampling techniques is available to measure social characteristics to determine the consumers' green aesthetic preferences [28].

However, Petts and Jeffrey (2015) only pay attention to the basics of aesthetic experience, but the importance of influence on the consumers' aesthetic preferences needs more research. Taufik and Danny (2020) have highlighted the consumers disposing of the packaging in a relatively infrequent and incorrect way which is inconsistent with the content that is conveyed on the packaging label. Establishing public service plans about the importance of digital advertising is also not well supported by packaging design whereby digital advertising has already garnered an expanded marketing [28]. This study has found that packaging designers, as key participants in the company's marketing activities do not consider the influence of materials, environment, consumers and other factors [26]. Moreover, concerns are lacking for green packaging design, and the relationship between its culture and packaging emotions and the impact on the consumers' aesthetic emotions are very important for considerations [16]. Packaging is one of the important influencing factors of the production process. Other factors such as the choice of sustainable materials and green aesthetic emotions should also be deeply understood [26].

In general, this research agrees with the views of Umami et al. (2020) and Ma (2019), that innovative thinking is recommended at different stages of design in order to meet the needs of the product life cycle. This study proposed a focusing on developing concepts and product packaging innovation. In addition, the method of Hamdar et al. (2018) was used to investigate the function and market attractiveness of newly designed packaging where packaging designers could summarize the green aesthetic preferences of different groups of people. In addition, Liu et al. (2017) have found ways to study unique packaging design that is based on different themes and different factors that are affecting marketing activities.

Therefore, this study follows Petts (2015)- to have future research that focuses on the aesthetic experience in packaging. Such a focus is recommended to involve increasing consumers' familiarity with the product [27] and the development of creativity and product packaging innovation [28]. Hence, this study recommends combining colorful graphics, unique shapes or any other eye-catching methods and studying various factors that would affect marketing activities. Understanding such activities could provide better options for entering a market. Finally, this research suggests combining innovative thinking at different stages of product packaging to develop innovative product packaging that meets the green aesthetic preferences of different consumers.

3.3 Upcycling

The term 'upcycling' was coined in 1994 by Thornton Kay, who interviewed Reiner Pilz for a news report. In that story, Reiner Pilz referred to existing recycling as 'downcycling' while also applauding 'upcycling', which may increase the value of waste materials [31]. In 1999, two Germans, Gunter Pauli and Johannes F. Hartkemeyer published a book titled 'upcycling'. The former was a well-known entrepreneur and the founder of the Blue Economy', while the latter was the director of Osnabruck Community College. Then in 2002, Michael Braungart and William McDonough, in a book called *Cradle to Cradle: Remaking the Way We Make Things*, have defined the notion of 'upcycling', which has gotten much attention from the academic world. The purpose of upcycling is to avoid wasting potentially usable resources by repurposing them, in order to cut down on the usage of new materials and energy, pollution of the air and water, and even greenhouse gas emissions [32].

Reuter et al. (2015) pointed out the opportunities and limitations of recycling based on dynamic models. The determinants of adopting a zero-waste consumer lifestyle [33]. The design of packaging sustainability, the influence of appearance and the influence of better Ecol-labeling on consumer evaluation and choice [34]. There are impacts caused by the expansion of the collection product portfolio on key performance indicators. A comparison of the Dutch recycling systems for post-consumer plastic packaging waste [35]. Reuter et al. (2015) have mentioned the construction of a dynamic simulation optimization model that can accurately describe the process of recovering materials and energy from product residues and wastewater sludge. It is also important to test from the perspective of the customers in terms of packaging appearance and with more environmentally friendly labels that affect consumer's response [34]. Researchers have mainly studied the choice of recycling methods, the impact of recycling on product prices, and various recycling channels [33]. However, this study proposes to consider and understand green packaging and the integration into the design concept, to analyze the principles of packaging, material selection, studying the packaging emotions and to discuss the important position and role of green packaging materials in packaging design [16]. The use of discrete choice experiments could be used to evaluate the consumers' willingness to support packaging materials and the recycling ability of beverage products that were highlighted by Klaiman et al. (2016).

Underlining all types of costs and benefits, especially the impact on renewable materials, is another factor that should be considered [37]. The environment mainly comes from the protection of raw materials and the removal of waste landfill transfer to solving the problems of some conditions that are existing in traditional packaging design solutions [37], the evaluation of plastic packaging reuse and the recycling strategies that are suggested by Ross et al. (2003).

The life cycle assessment methods are used by practitioners and decision-makers to help them understand the impact of packaging on sustainability [38]. The current product recycling intentions had provided the latest published works survey [37]. It focused on the relationship between the growth of consumer income and the purchase of disposable goods, and studied this trend reason [40]. Combining the technical design supply chain system with environmental factors and variables to develop green packaging is the best choice to achieve the coordinated development of packaging the sustainable packaging model [41]. It was also the post-consumer plastic packaging waste recycling network that had been explored in the Netherlands using material flow analysis and data reconciliation technology [35]. However, Reuter et al. (2015)

focused on large products and did not consider the small objects that were closely related to the people's life. The customer's point of view should be analyzed to include multiple perspectives by producers and designers [36] who would be selecting the recycling methods [33].

Therefore, based on Reuter et al. (2015), future research can clarify the product design and recycling technologies that would affect the recycling rates and provide possibilities for sustainability. The study recommends influencing the evaluation and selection of sustainable packaging, and the considering the importance of recycling material and methods [33]. It also identifies novel and unique packaging designs that are effectively protecting the environment [16]. Based on Klaiman et al. (2016), the study places concentrations on the consumers' willingness to pay and the recycling capacity of packaging materials to meet their social and environmental impacts due to selective collection and classification of packaging waste [36].

In general, this research agrees with Reuter (2015) and others who believe that product design and recycling technologies affect the possibility of the recycling rates and sustainability. In addition, the research also agrees with Taufik and Danny (2020), and Lewis et al. (2010), to consider the many factors that affect the sustainability of packaging. In addition, Brouwer et al. (2019) incorporate reuses and recycling into the product design process. Hence, the study will focus on environmentally friendly resource recycling, reduction of resource waste and material reuse, and the application of appropriate environmental knowledge in the product packaging design stage [39]. It also analyzed the incorporating reuse and recycling into the product design process [41]. Finally, this study suggests combining sustainable packaging factors and recycling technologies into a product design for creating a novel product packaging, promoting product upgrades and recycling, and to effectively protect the environment.

4 Discussions

This paper attempts to document the key green aesthetics fundamentals for upgrading recycled packaging products. This research has analyzed and discussed the following aspects- green packaging, green aesthetic preference and up-cycling.

4.1 Green packaging concept

Based on the literature review of green packaging, the study concludes that the concept of green packaging using low-carbon and environmentally friendly design concepts create sustainable and innovative unique packaging. Green aesthetic preference can be combined with innovative thinking at different stages of product packaging to develop innovative product packaging that meets the green aesthetic preferences of different consumers. One approach is through combining the concept of green packaging with the characteristics of the different consumers' aesthetic preferences. Such an approach could lead to an understanding of the characteristics of unique packaging. Hence, this study proposes to combine sustainable green packaging concepts to meet the consumers' different aesthetic preferences, which could promote the formation of unique packaging for product packaging design.

4.2 Innovative aesthetic thinking

Innovative thinking at different stages of product packaging is recommended for developing innovative product packaging that meets the green aesthetic preferences of different consumers. The study of the literature review of up-cycling has surmised that if designers could combine sustainable packaging factors and recycling technologies into the product design, such an approach could be conducive to the formation of a novel product packaging. This would eventually enable the promotion of product upgrades and recycling, yet the process could effectively protect the environment. This research is a combination of two points: 1) combining innovation, green aesthetics and product upgrades, and 2) upgrading utilization of product packaging. This study recommends that designers focus on the recycling capacity and sustainability of materials in order to promote the upward cycle of products.

4.3 Factors that promote up-cycling

Green packaging that uses low-carbon green packaging design concepts could create unique packaging that is sustainable and innovative. This study further recommends that green aesthetic preferences to be part of sustainable packaging factors. Additionally, the use of emerging recycling technologies in the product design process could further create a more conducive facilitation in the formation of novel product packaging for product upgrades and recycling. The combination could help this research in nurturing continuous innovation in the concept and technology of product packaging. The proposed application of these innovations would involve the product packaging design process throughout the various stages of its life cycle; it is conducive to the formation of unique packaging and promotes the upgrading of product packaging. Therefore, adopting a green packaging concept of low carbon material, securing environmental protection and renewable resources, and giving attention to the sustainability of recyclable materials would encourage more up-cycling of product packaging.

In general, applying innovative design concepts for green packaging refers to combining green aesthetic requirements for the customers. This study will encourage acceptance among the customers in the upgrading and transformation of unique packaging that could help conserve the environment.

5 Conclusion

From the above recommendations, combining sustainable green packaging concepts and green aesthetic preferences can develop unique product packaging, and promote packaging up-cycling. Moreover, combining innovative thinking mode of the different stages of product packaging, adopting the concept of green packaging, and by paying attention to the sustainability of materials the upgrading of product packaging could be promoted. Hence, this research posits that the application of innovative design concepts for green packaging and the combination of green aesthetic requirements for customers could encourage acceptance among the customers, in the upgrading and transformation of unique packaging that could help to conserve the environment. The results of this study are recommended for future development of a green aesthetics approach for a green product packaging process. The proposed approach is expected to guide designers to embrace up-cycling techniques thereby contributing in reducing waste in the post fabrication life cycle.

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