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A STUDY ON THE REGENERATIVE DESIGN OF BOOKS BASED ON ECOLOGICAL PRINCIPLES

Abstract. *The article examines aspects of book design from the perspective of applying the eco-design method as a reduction and lightening of materials, redistribution of the book's structure and size. The regenerative design of book materials based on the form and reading characteristics of the book itself is analysed.*

Keywords: *book design, reduction, extension, regeneration, ecological design.*

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РЕГЕНЕРАТИВНІ ТА ЕКОЛОГІЧНІ ПРИНЦИПИ ДИЗАЙНУ КНИГ

Анотація. *Досліджуються аспекти книжкового дизайну з позиції застосування методу еко-дизайну як зменшення та полегшення матеріалів, перерозподілу структури та розміру книги. Аналізується регенеративний дизайн книжкових матеріалів, що базується на формі та читацьких характеристиках самої книги.*

Ключові слова: *дизайн книги, розширення, регенерація, концепція, екологічний дизайн.*

Introduction. Book design, as a kind of system design, not only involves the form, type, structure, layout and printing of the book itself, but also integrates the author, editor, publisher, printer, logistics, bookstore and readership. The eco-design of books implies that the environmental and ecological impacts of books should be taken into account throughout their life cycle in the whole system of production and dissemination. Based on the concept of eco-design and its intrinsic connection with book design, we explore the issue of book regeneration design in the light of the current development of book design at home and abroad. Based on the principle of eco-design, the study explores the significance of book regeneration design, and at the same time applies a variety of methods to optimise book design, including enriching the structure of the book, increasing the flexibility and diversity of the layout, and adopting a variety of materials, etc., to study the method of regeneration design based on the principle of eco-design. It is hoped that this study will provide useful reference for book design, improve readers' aesthetic quality, form correct ideological and moral qualities, and thus promote the better development of circular economy.

Setting tasks. To explore the modern development of book design based on the principle of ecological design, to reveal the issues of book regeneration design and its significance.

Research results. Since entering the new century, the protection of ecological environment and the realization of sustainable development have become the primary problems facing mankind. At this stage, the design field has also begun to focus on ecological design. The same situation also occurs in the book binding design, which leads to a variety of environmental problems, social problems, are people urgently need to solve. In the binding design process is too much focus on the use of new technologies, new materials, and ignore the value of cultural connotations, did not take into account the harmonious development of man and nature, resulting in a large amount of resource consumption, publishing costs, publishing efficiency, readers to increase the economic burden.

American design theorist Victor, Babanak published his book "Designing for the Real World" at the end of the 1960s, which caused strong repercussions at that time. He argued that the design process must take into account the problem of limited resources and that design

should serve environmental protection. At the time, few people supported this view. However, in the 1970s, when mankind was facing a global resource crisis, Babanak's "finite resource theory" was widely recognized. Since then, many people have begun to pay more attention to the concept of green design.

In recent years, China has been paying more and more attention to the issue of environmental resources, and the General Administration of Press and Publication issued a document entitled "Notice on the Prohibition of Publishing and Distributing Books with Luxurious Packaging and Expensive Prices, such as "Gold Books"". At the same time, China's famous book designer Lv Jingren pointed out that at this stage, China's book binding there are many problems. In recent years, some books with vulgar binding and too much pursuit of form began to enter the book market, therefore, how to solve the problem is the main topic we are currently facing [3].

As an important cultural consumption, book design provides us with a good reading environment, so we should establish the concept of moderate consumption, promote frugal life, avoid waste. Human production activities, consumption activities can not exceed the scope of resources and the environment, adhere to the road of sustainable development, ecological civilization construction, and establish the correct value concept.

Highlight the fundamental connotation of book design. At present, China's book design pays too much attention to the form and ignores the fundamental connotation of book design. Based on the eco-design principle of book regeneration design research, can help us further understand the fundamental connotation of book design. The essence of design is to serve mankind, which is also the core of the book design concept, not only to provide readers with a comfortable reading environment and sensory experience, but also to prevent environmental pollution, to achieve a harmonious relationship between man and nature [1].

Combined with domestic and foreign research results, based on the principle of ecological design to achieve book regeneration design, reduce book waste, as far as possible recycling and reuse, ecological and environmental protection concepts into the design process, so that the book design embodies the ecological thinking, and constantly enrich the connotation of the book design, change the original single-consumption resource utilization model, recycling and reuse, and promote the publishing industry to take the road of sustainable development.

In short, the designer has a new understanding of the book structure, material, layout and so on during the design process, based on which the book is regenerated. In fact, it is to integrate the concept of ecological and environmental protection into the design, which is very important for the development of the circular economy, book recycling design provides designers with new ideas, and further broaden the creative channels.

Eco-design principles for books:

1. Focus on ecological aesthetics. Ecological aesthetics adds ecological elements to traditional aesthetic art. Reading environment creation pays more attention to ecological and natural beauty, without deliberate depiction, highlighting simplicity and simplicity. At the same time, it requires to follow the natural laws of ecology, based on aesthetic rules, through technical means to transform the processing of publications, to achieve the organic combination of nature, humanities and art, and to present ecological beauty in an artificial way. It advocates that artificial green media should be integrated into the cultural connotation of books, so that people feel not a moment of visual stimulation, but a long time to stay in people's hearts to enjoy the joy of bringing people sustained spiritual pleasure.

2. Advocating conservation. The concept of resource recycling into the ecological book design, which is the way to achieve sustainable development of modern design, but also reflects the nature of ecological book design. Based on the ecological concept of book design,

constantly enrich the book binding design connotation, improve the design grade taste, change the original single-consumption resource utilization mode, to achieve recycling, and promote the publishing industry to take the road of sustainable development.

3. Moderate consumption. Human production activities, consumption activities can not exceed the scope of resources and the environment, adhere to the road of sustainable development, ecological civilization, and set up the correct value concept.

4. Focus on functional design. Today's society has entered the information age, the design should be more intelligent, book binding design should be based on the principle of sustainable development, pay attention to intelligent design. Eco-design requires attention to functional changes to meet the actual needs of readers. Modern bookbinding design emphasizes the embodiment of functional superiority and humanistic care.

The conditions of regenerative design of books based on circular economy.

Regenerative design is mainly through the design method, to redefine the book (usually when the book is not used or at the end of its service life), so as to develop more new functions, but not overly dependent on technological means; The book should be in line with the principle of eco-design after regenerative design; The regenerative design of a new books should be practical.

Regenerative book design methods based on eco-design principles, such as weight-reducing design, expandable design, regenerative design.

The first is the reduction and lightweighting of book materials. As the carrier of slow reading, books are fundamental for their legibility and readability, and any interfering or redundant design should be discarded. Layout is the main framework of the visual presentation of a book. Most of the design content of a book lies in how to "place" the text and pictures, and sort out all the visual information, so that it becomes a unique value of the life of an individual. And this kind of life individual is not at the expense of empty or flashy design. Designers can make effective use of the layout through layout design, avoiding empty and meaningless white space as much as possible. For example, in the design of some collections and albums, the rate of graphic plates should be increased in order to highlight the works, and the layout should be presented as a "watch" type, which saves paper and provides readers with a relatively active visual experience at the same time.

Secondly, the structure and function of traditional books are not static. For example, in "Functional Innovation and Design of Book Covers" (Fig. 1), the covers of the four famous books are combined with the main contents of the books, so that readers do not need to flip through the inner pages of the books, but can read a summary of the contents of the books from the covers alone, including five levels of information: the important events, the locations of the events, the number of chapters in which the events take place, the chapters where the events take place, and the map of the distribution of the stories. In this project, the back cover space is also fully utilised, changing the traditional functionality of the back cover, arranging the catalogue in a vertical layout, and making use of the principle of grid composition to enable smooth information transfer. This innovative functional design not only gets rid of the constraints of traditional book design ideas, but also realizes the lightweight design of books. The lightweight design of books is mainly for the unreasonable use of some hardcover books. It is worth noting that hardcover books, compared with simple books, will increase the consumption of energy in the cost of raw materials, production, storage and transportation, and sales [5].

Thirdly, there is a reasonable limit to the size of the booklet. Generally speaking, the specifications of the open book based on the international common paper specifications, so the regular open book is the lowest rate of paper waste open book. But in order to pursue the personality of the book modeling, there are a lot of shaped. Some actual size of the book changes

in the alien size will be used in the printing process of vertical and horizontal mixed cutting method, that is to say, the paper will be the longitudinal and horizontal not along the straight line for cutting, open down the paper pages of the longitudinal and transverse, so easy to remain a large number of paper edges, resulting in a waste of paper. In addition, some round, triangular, polygonal and other shaped open book, the cost of more demanding. Special shaped caused by the innate lack of plate heart rate, the requirements of the die-cutting plate is also very high, and more importantly, in the process of opening and cutting the edges of the paper than the regular square of the open book more, doubling the waste.



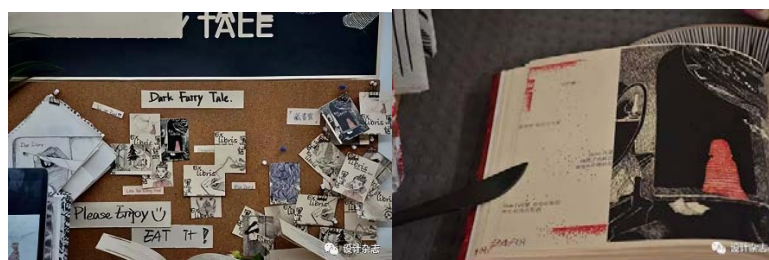
Source: [4].

Fig. 1. Functional innovation and design of book cover

Extensible design of book materials is a purposeful derivation and transformation of book design. On the one hand, extensible design involves all stages of the life cycle of books. On the other hand, extensible design can make use of modern media to go beyond paper itself and broaden the scope of book design.

The full use of paper trimmings is an important way for the extensible design of book materials. The ecology of book materials is to make full use of the raw materials, and to make the best use of them at all stages. Therefore, the leftover paper edges in the cutting process can be designed into book-related derivatives, such as bookmarks, bookmarks, waistcovers and so on. In the design work "Black Fairy Tales" series of books (Fig. 2), due to the square opening book, there are many leftover edges, so bookmarks, bookmarks and other auxiliary designs of the series of stories are designed for this set of books, which not only find a proper home for the discarded materials, but also add readers' aesthetic feeling to the books themselves. The design of extensibility during the transport of the books is also key to the realisation of eco-design. The book shown here (Figure 3) was designed for the Buenos Aires-based publishing group Eloisa Cartonera. The design concept of the book is "much more than a book!" This cardboard box is ready to be turned into a book. By opening the carton it is easy to read and arrange the book for display. In this design, a part of the book packaging used for the transport

process, i.e. the carton material that could have been discarded, becomes the structure of the book [3].



Source: [3].

Fig. 2. Extended design of "Black Fairy Tales" book



Source: [3].

Fig. 3. Hardboard book

In addition, books can also use network resources for virtualisation design to achieve the function of derivation, on the one hand, saving paper materials, on the other hand, also in line with the new situation of paperless reading. Mature virtualization technology is having an impact on people's lives, and the human visual imagination and spatial exploration range has been greatly expanded, making the visual image has broken through the category of entity and matter towards virtualized and digitalized visual images, giving human beings an unprecedented new experience. This experience breaks the single-sense, single-channel, single-level expression of traditional visual images, and transforms into a multi-sense, multi-level, multi-angle expression of three-dimensional images" [5].

The regenerative design of book materials mainly includes two dimensions. One dimension is to redesign the book based on its own form and reading characteristics. For example, superimposing forms and functions on books for secondary recycling. The other dimension is to recycle the book as a unit to realize the recycling of materials.

Based on the original form of the book itself, the regenerative design is still the creative design of the book as a reading medium. The project "Browse Copy" (Fig. 4) is a good example of the recycling of the original form of the book. The project attempts to change the fate of the so-called stock books on the shelves that are not sold. The project invites designers from all over the world to re-create these books and give them a second life. Part of the project is to document the process of regeneration of books: "Befores and Afters". In this project, 20 to 25 designers are invited for each collection. Each different collection is exhibited online. The accompanying catalogues are printed in limited editions and exhibited and circulated in quality bookstores, shops and design studios. The catalogues are not for sale; they are retrieved after a period of time and disseminated to other shops. The status of the catalogues and the venues where they are displayed are updated on the project website [1].



Source: [1].

Fig. 4. Book regeneration design

The recycling of materials or structures of books as units is an effective method of book eco-design. Some old books can be used as a decorative element in the bookstore display to create an overall bookish environment in the bookstore. These books have been removed from the reading nature of books, both in terms of their placement and function, and are more of a visual and symbolic significance of books.

In book design, with the significant development of ecological and environmental protection technology and modern printing technology, it is also more and more important to realise the ecology on the origin of book materials.

There are many different types of paper used for book printing, the main types include movable paper, offset paper, newsprint, writing paper and so on. Especially writing paper, which is smooth, waterproof and lightweight, is the first choice for high-volume printing. In addition, due to fierce market competition, many designers pin their hopes on the use of specialty paper. Because different materials of paper can enhance the reading interest, convey the connotation of books, to meet the different functional utility of books. Specialty papers are the result of processing a variety of materials, such as synthetic fibers and wood pulp compounds. It can be decorated or treated with other types of materials to give the paper various properties and make it suitable for various purposes. Traditional paper is based on wood pulp, grass pulp as the basic raw material, has caused a large amount of wastewater waste on the ecological environment erosion, and these special paper to be added on the basis of traditional paper chemical raw materials, synthetic fibres, etc., further aggravate the environmental pollution of the paper industry. In fact, good design, not to stick to the paper of the strange new, a lot of handmade paper, recycled paper material books with its ecological awareness of the first and superb design skills to become a trend in the book ecology [7]. This book, Tofu Recipes (Figure 5), is unique in eco-book design in its use of handmade paper, wooden book box, and minimalist layout. The book uses a wooden eco-book box to symbolize a tofu mould, while the book is wrapped in cotton cloth, just like fresh tofu. The interior of the book reflects different aspects of tofu through several textured pages: hand-torn paper represents the ripples created by stirring boiling soymilk and its transformation into a smooth substance; a piece of transparent paper crushed and colored with food coloring evokes tofu skin; and the tofu paper is handmade from recycled paper and tofu, thus "expressing the intangible qualities of tofu through the use of tangible materials". The paper is handmade from recycled paper and tofu, thus "expressing the intangible qualities of tofu through tangible materials". Some designers use edible materials to replace the materials of books, turning the state of the book after use into something intangible, which is an innovative approach to eco-design. At the Design Criminals exhibition at the MAK in Vienna, a graphic design and typography studio called Practice + Theory created a catalogue from edible materials (Figure 6). The wrappers were made from whole sheets of icing (containing sugar, gelatine and yarrow gum) and the pages inside were waffles printed with food coloring. A total of 80 such books were produced for visitors to enjoy. Once the book has fulfilled its information-carrying function, it goes on to another life, resulting in zero-waste books [8].



Source: [2].

Fig. 5. Book design of "Tofu-Recipes"



Source: [2].

Fig. 6. Frosting book

Conclusion. It should be noted, that the concept of modern book design should be the design of book regeneration, which should reflect the idea of environmental protection as one of the main activities of nowadays society. A modern book should not only provide readers with a comfortable reading experience, but should also be environmentally friendly, promote harmonious relations between humans and nature, focus on environmental protection, rational use of resources, and building a resource-saving, environmentally friendly community. That is why the study of ecological book design is extremely necessary and of great practical importance. The introduction of ecology into the field of book design provides a new starting point for the printing industry and book design practitioners, opening up a new creative space. Promoting green ecological book design, creating a sustainable ecological and humane cultural atmosphere should be the main focus of book design.

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