

MULTIFUNCTIONAL PACKAGING FOR CULTURAL PRODUCTS

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ABSTRACT

Is famous tourist city in China and flower cake is its representative cultural product cherished by tourists. The tourism industry sews as the backbone of Dali's economy, and enhancing the product packaging can offer more possibilities for acceptance among tourists, leading to increased sales while also promoting Dali's culture. After conducting research, it was observed that the current packaging of flower cakes in the market is quite ordinary, failing to highlight the unique aspects of the product, and mostly utilizing environmentally unfriendly plastic material for packaging. To address these issues, this study utilizes methods like market-research, random interviews with Taurus, and references to outstanding cultural product packaging, to explore the potential for multi directional development and cultural product packaging through various attempts, the final design revolves around Daily cultural products and emphasizes the use of environmentally friendly packaging materials that are also multifunctional. This new packaging goes beyond new decoration it can be repurposed after the product is consumed or disposed of in a manner that is not severely harmful to the environment. In cooperation of diverse opening and closing methods adds an element of surprise the product that introduces innovative ideas for the packaging design. By doing so it seeks to make Dali's cultural products more appealing to tourists while promoting sustainability and responsible environmental practices.

Keywords: Cultural Products, Packaging, Multifunctional, Environmental Protection

1. Introduction

Dali, a renowned tourist city in China, boasts a captivating blend of breathtaking landscapes and a rich historical heritage. Situated in the Yunnan Province within the plateau region, Dali offers a picturesque setting of majestic mountains and serene freshwater lakes. The city's unique allure is further enriched by its vibrant cultural diversity, with various ethnic groups harmoniously interacting with one another.

Amidst this mesmerizing natural backdrop, Dali showcases a plethora of cultural landmarks, including an ancient city, traditional villages, three iconic towers, and the enchanting Butterfly Spring. Throughout the year, the climate remains pleasant, with temperatures ranging from zero to 30 degrees Celsius, making it an ideal destination for tourists seeking a delightful and comfortable travel experience.



With its captivating blend of natural beauty and cultural wonders, Dali stands as a popular and alluring destination, inviting travelers from far and wide to explore its treasures.



Figure 1 Picture of Dali (image from the author, 2021)

Tourism is the pillar industry of Dali. I have created the following chart based on China's 2022 statistics. As you can see from the chart below, revenue has been growing steadily from 2015 to 2019. After 2020, tourism revenue fell sharply due to the epidemic, and after the reopening in 2023, the tourism industry also recovered rapidly. As a resident of Dali, every holiday, the city will be full of tourists.







According to the statistics of China Data Network, nearly half of the people will throw away the product packaging directly, so the packaging will become garbage, improper treatment will bring serious harm to the environment.



Figure 3 The way the user handles product packing (Jiangsu News, 2019)

I interviewed random group members and solo travelers at scenic spots in Dali. The interviewed tourists were 10 freelancers and 3 tour groups, a total of 103 people, 92 of whom bought souvenirs. 90% of people will buy tourist souvenirs. They will choose products with high recognition, long shelf life, easy to carry, local cultural characteristics, cost-effective and genuine products.

Dali lies on the southwest border of China and serves as a gathering place of various ethnic minorities. With its long history and cultural integration, Dali has given rise to a diverse range of cultural products, one of which is the popular flower cake. During a visit to the ancient city of Dali, which spans an area of 3 square kilometers and encompasses numerous scenic spots, I noticed a total of 24 flower cake shops. Unfortunately, the majority of these stores use plastic as a wrapping material for the flower cakes, despite the well-known harmful effects of plastic on the environment.

2. Objectives of the study

The purpose of this paper is to provide convenient and good-looking cultural product packaging for tourists traveling to Dali, so that the packaging can exist independently and become items that can continue to be used. When the package is discarded, it does not harm the environment.

3. Materials and methods

3.1 Dali Cultural Products

Dali boasts a rich array of cultural products, and among them, the flower cake stands out as a top-seller and a favorite among tourists, with a significant presence in many shops (Wang Junxin & Li Weina, 2022).

True to its name, the flower cake is made using fresh flowers. In the process, freshly picked edible roses are carefully cleaned, dried, and then combined with white sugar and honey to create a delectable filling. The resulting baked flower cake possesses a delightful sweetness without being greasy, and it carries the unique and captivating aroma of roses.



The favorable climate in Dali, which maintains temperatures between 0 degrees and 30 degrees throughout the year, provides an ideal environment for flower cultivation. Consequently, the quality of flowers in Dali is excellent, and the area boasts numerous flower markets where roses are abundantly available. Many local farmers cultivate edible roses, which helps keep the production cost low, ultimately leading to the affordable pricing of flower cakes. This affordability significantly contributes to the popularity of flower cakes among tourists visiting Dali.



Figure 4 Size and picture of flower cake (image from the author, 2022)



3. 2 Environmental protection material

Figure 5 Environmental protection material (image from the author, 2022)

According to the new packaging trend article published by the Plastic Network on May 17, 2022, the following content is summarized: In recent years, research on environmental protection packaging materials has yielded significant results, leading to their widespread adoption and application in China. Green and environment-friendly packaging materials refer to the materials that conform to Life Cycle Assessment (LCA) in the process of



production, use and recycling, are convenient for people to use, do not cause too much harm to the environment, and can be self-degraded or recycled after the end of use. At present, the green packaging materials widely used in our country are mainly divided into: paper products, natural biological materials, degradable materials, edible materials(Kong Zhen,2021).

Paper materials come from natural wood resources, fast degradation, easy recycling, and a wide range of applications, so it has become the most common, most widely used and earliest green packaging materials in China. Its typical representatives are honeycomb cardboard, pulp molding and so on. However, due to the lack of forest resources in our country, excessive use will consume a lot of wood. Therefore, with the development of technology, non-wood pulp and paper making should be actively used in the future, such as reed, straw and bagasse, to replace the use of wood and cause irreversible damage to the environment. After the use of paper packaging, it will not cause pollution and damage to the ecology, but can be degraded into nutrients. Therefore, in today's fierce competition for packaging materials, especially by the impact of plastic and foam products, paper packaging still has a place, with its unique advantages. The "paper" packaging is designed by Australian student Emilienrica. The packaging material is 100% biodegradable pulp, which has good adaptability and high recyclability. It is easy to handle, easy to degrade, and has reached the safety of microwave oven and food safety tested by FDA. The design of the box is ergonomic, and the design of heat proof can be comfortably held. The cover label keeps the noodles sealed and increases flavor time. The Pizza Tray designed by Zume Pizza was shortlisted for the DuPont Packaging Innovation Award. The packaging is made of 100% sustainably grown sugarcane fibre, non-tree, compostable and biodegradable. The tray can keep the pizza crispy and warm for a longer time. It absorbs maximum grease and moisture, keeping the pizza warm and crispy long after it leaves the oven.

Natural biological packaging materials mainly include plant fiber materials and starch materials, of which more than 80% natural plant fiber, has the advantages of non-pollution, renewable, simple processing, beautiful shape, practical and simple, after being abandoned, can be well converted into nutrients, realize from nature to nature, into the ecological cycle. Some plants are natural packaging materials, as long as a little processing can become a natural flavor of packaging, such as leaves, reed, gourd, bamboo tube and so on. These packages are beautiful and have cultural flavor, which can make people feel back to nature and have the feeling of original ecology. Such as bamboo tube tea, wine packaging, original ecological coconut packaging.Rimping Supermarket in Thailand uses banana leaves instead of plastic to wrap vegetables, leaving shelves in shades of green instead of plastic bags.

Biodegradable materials are mainly based on plastics, adding raw materials such as photosensitizers, modified starch and biodegraders. Through these raw materials, the stability of traditional plastics can be reduced, and the degradation rate in the natural environment can be accelerated to reduce the pollution to the natural environment. According to different degradation methods, they can be divided into biodegradable materials, photodegradable materials, thermal degradable materials and mechanical degradable materials. At present, traditional degradable materials, such as starch based, polylactic acid and PVA films, are mainly used. Other novel biodegradable



materials, such as cellulose, chitosan, protein and other biodegradable materials also have great development potential. Degradable in fast food. This material not only has the functions and characteristics of traditional plastics, but also can split, degrade and reduce in the natural environment through the microbial action of soil and water, or through the action of ultraviolet light in the sun after the completion of its mission, and finally re-enter the ecological environment in a non-toxic form and return to nature. Biodegradable materials, using a variety of renewable materials as raw materials, through biological, chemical and physical preparation of new materials, with biodegradable natural rubber can be used as educational toys of organic beverage packaging, can be connected into a variety of shapes, to achieve secondary use. Finnish brand Valio has launched a 100% plant-based dairy box. Cellulose-based packaging is at the forefront of plant-based packaging innovation, such as PulPac's 3D dry molding technology, which provides a renewable and economical alternative to plastic for coffee LIDS, coffee bags, dinner plates and more.

Edible materials are mainly materials that can be eaten directly or ingested by the human body, such as lipids, fibers, starches, proteins and other renewable energy sources. With the progress of science and technology, these materials are increasingly mature and gradually rising in recent years. However, because they are food-grade raw materials and strict sanitary conditions are required in the production process, their production costs are high and they are not convenient for commercial use. Learn more: Are these ingredients edible? Classification and introduction of edible membranes. Bob's fast-food restaurant in the US has launched an edible burger wrapper that can be eaten straight away or used as a napkin. KFC has developed the Scoff-ee cup, which allows you to drink your coffee and eat it in one gulp! The cups are actually sugar-coated cookies with a layer of edible candy wrappers and heat-resistant white chocolate inside.

3. 3 Analysis of Existing packaging



Plastic and paper

1 pieces



paper

20 pieces

Box

Plastic and cardboard

10 pieces

Big box

Plastic and cardboard

20 pieces

Figure 6 Analysis of packaging specifications and materials of existing flower cake (image from the author, 2022)

At present, all the packaging basically has the above four kinds, using cardboard and plastic packaging, it is very easy to break, and these packaging can not be reused, the use of plastic and glue parts will cause harm to the environment after discarding.



As shown in the figure above, the packaging of flower cake is not very different from that of other cakes. Most of the packaging uses rose elements to represent flower cake in the packaging illustration, which I think is not enough. In contrast to this problem, innovation in the packaging structure may be a better choice(Yan Chen,2017).

3. 4 Excellent cultural product packaging case



Figure 7 Excellent example of wine packaging in Dali (wine & tea)

As shown in picture 7, the three photos on the left were taken by me in the Liangshan Wine Lake. Their packaging has the advantage of combining Dali fruit wine with the hero characters in the famous Chinese novel Water Margin. For example: Wusong green plum wine. After Wu Song was drunk, he was very brave and went to the mountains to kill the big tiger that was endangering the villagers, and he was loved by the locals. And provide a variety of sizes of wine for customers to choose from.

As shown in Picture 7, the three photos on the left were taken by me at Liangshan Wine Lake. Their packaging exhibits the advantage of combining Dali fruit wine with the hero characters from the famous Chinese novel, Water Margin. For instance, the "Wusong Green Plum Wine" represents Wu Song, who, after consuming the wine, displayed remarkable bravery by venturing into the mountains to slay a fierce tiger that had been endangering the villagers. Consequently, he earned the admiration and love of the local community. Additionally, the wine is offered in various sizes to cater to the preferences of customers.

On the other hand, the four photos on the right showcase the use of tie-dye for tea packaging. This innovative approach employs cloth as the raw material and natural plant-based dyes to create appealing and distinct tea packaging through the art of tie-dyeing.





Figure 8 The packaging of Japanese sake (White deer brand)

This is the packaging design of White Deer brand Japanese sake (Figure 8). Sake is a characteristic product of Japan, and the bottle body features an illustration of a farmer dressed in traditional Japanese clothing. The package creatively incorporates elements of Japanese national dress, showcasing distinct national characteristics. Upon observation, it becomes evident that this packaging stands out as a unique and distinctive representation of the product.



Figure 9 The packaging of Chinese black tea (Yu Jian brand, 2023)

YU is a shorthand representation of Henan Province in China, known for its renowned Henan Opera. JIAN carries the meaning of "meet" in Chinese. YUJIAN, when pronounced in Chinese, signifies "to meet you" in Henan, creating a homophonic connection. The packaging ingeniously incorporates the imagery of Yu Opera, resulting in a highly innovative and culturally meaningful combination.

Moreover, this packaging material is environmentally friendly, causing no harm to the environment. When unfolded, it reveals a three-dimensional image of Peking Opera, further enhancing its artistic appeal. Upon seeing the packaging, one can easily associate it with China and its rich cultural heritage (Zhang Xuemin, 2017).



4. A preliminary attempt at the project

4.1 Attempt 1

Through the above research, I divided the design ideas into three parts, as shown in picture 9, and tried new packaging ideas through different combinations.

For the first time, I chose cloth as the material and adopted plant dyeing, so that my design is not only the packaging of flower cake but also a tablecloth, which can also be used as a bag for daily use.



Figure 10 Attempt 1 of design ideas (image from the author, 2022)

The raw material of tie-dyeing in Bai nationality area of Dali is pure white cloth or cotton-hemp blended white cloth, and the dye is indigo solution of natural plants such as liau blue, isatis root and mugwort growing on Cangshan Mountain. The process is divided into design, drawing, sewing, immersion dyeing, unstitching, rinsing, whole inspection and other procedures. During production, according to people's favorite pattern pattern, the white cloth is tied with thread to make small patterns with certain folds, and then dipped into the dye VAT to dye. So repeated, each time the color of a deeper layer, that is, soaked to a certain extent, take out the dry, remove the valerian knot, there will be a blue background white flower pattern. These patterns are often made up of dots, irregular shapes and other simple geometric shapes.(Song Yanlin. 2023).



Figure 11 Tie-dye (image from the author, 2021)

The engraved pattern is applied to the printed cloth, and the anti-dyeing paste is scratched on it (Song Yanlin,2023) .After the scratched paste is dry and solid, it becomes the anti-dyeing layer. Then the dyed cloth is soaked with dye, the paste is removed after dyeing, and the obvious pattern at the bottom of the picture is called.



Another first dyeing and then scratching the paste to draw the color into the pattern, called dyeing. Because the scraping paste is an anti-dyeing agent, it was often called scraping paste dyeing in the past. (Zhang Wen-Liang, Kong Ling-Xiang & Tian Xin-Yu,2023). Because it was often dyed with indigo in the past, and presented a clear blue and white pattern after dyeing, it was also called blue calico-cloth. The main steps of the pattern dyeing process: pattern design, engraving plate, making anti-dyeing paste, dyeing cloth positioning, scraping anti-dyeing agent, dyeing, removing paste .



Figure 12 Type dye (image from the author, 2021)

Persimmon dye is not only impressive color, even the texture of the cloth will also change significantly. When dyed with persimmon, a soft cotton cloth can be transformed into a tough, leathery fabric . "Persimmon dyeing" process is a kind of vegetation dyeing process, its dyeing solution is made by crushing the immature green persimmon, pressing the juice, and then fermenting it for more than one year. Unlike most vegetation dyeing processes, which involve soaking the cloth in a solution, persimmon dyeing begins to develop a tawny color and gradually deepens after the cloth is exposed to the sun. Therefore, persimmon dye is also called "sun dye". It's a craft that depends entirely on the sun. In summer, the color of the cloth will be dark, and in winter, it will be slightly softer. According to the wind intensity, humidity and different places, the work will be different (Wang, Xian-ying & Zhang, Yi,2022).



Figure 13 Persimmon dye (image from the author, 2021)

Blue dyeing is an ancient printing and dyeing process, which first appeared in the Qin and Han dynasties (Di Hangyu,2022). It also includes the printing and dyeing of wax valerian, winch valerian and valerian pinch. The raw material of indigo dyeing is the leaves of radix isatidis collected from deep mountains. The bluegrass is fermented in a vat to produce indigo, which is then used for the printing and dyeing of cloth. "Green, from blue, but better than blue" said this process. As the raw material of the dye solution, the stems and leaves of pliant blue are harvested in March and April every year, and they are soaked in water and injected into a large dye vat. It takes at least 5 months from picking them to making a full dye vat. During this period, indigo is needed to be extracted and fermented, and the foam needs to be observed to change from green to blue. (Song Yufeng & Liu Qun,2019)





Figure 14 blue dye (image from the author, 2021)

4.2 Development and results of Attempt 1

- 1. Use environmentally friendly materials as packaging materials for cultural products
- 2. The package can stand alone and continue to be used
- 3. Apply some Dali characteristic culture and skills.
- 4. Seeing the package will make people think of Dali and even recall a good travel memory

As shown in Figure 15, when opened it is a tablecloth and when closed it is a bag



Figure 15 Preliminary design sketch (image from the author, 2022)

In the first model I tried, I used a hexagonal box with a bayonet design in the middle of the box to connect

the boxes together, and seven hexagonal boxes could form a flower shape.





Figure 16 Attempt 1 model (image from the author, 2022)

The attempt 1 was a failure, because the bag made of cloth is very easy to deform, when carried, will cause the internal box deformation, even damage the flower cake inside. And boxes made of hexagons look more like beehives than flowers.

4.3 Attempt 2





In recent years, due to the wide application of pop-up book technology, more enterprises and public institutions like to use in a variety of picture albums, folders, and paper creative documents. Pop-up book is a unique type of book design, its design core is the use of paper tension and motion dislocation, display pop-up book opened when the instant shock! It breaks the limitation in space and creates a multi-dimensional depth of field. With unique techniques and presentation methods, it brings readers the superposition of color vision, page-turning hearing, material touch, and the unique experience of interweaving multiple sensory stimuli. Because of its extreme fun and interactive deeply loved by the public.



Pop-up books are moving picture books. Some people say that pop-up books are visual interactive books in which the illustrations of the content become three-dimensional or models. Pop-up books are generally divided into the following categories (Li Ruixin2017):

1.Tunnel mode; The paper folding method of tunnel book is to make continuous mountain and valley folding of the paper according to a certain width, and then fold it into the wavy shape of this fan. When it is opened, it is like playing an accordion to produce the depth of field effect like a tunnel.

2. Cross space; Cross space is the most common stereoscopic effect. When opened directly or assembled, it is transformed into a three-dimensional crossover model, presenting a series of small rooms with all kinds of furniture. In addition to the flat floor design, it can also be designed into two/three floors of foreign houses.

3. 90-degree scene layer; The principle is to cut the illustrations in outline on a single sheet of paper but not completely cut them off. Then, according to the different depth of field, the mountain and valley folds are folded to create a hierarchical stereoscopic perspective.

4, 180 degree stereo; The main form of modern pop-up book, when opened, the main character like origami model immediately "bounce out", the specific structure of the way in many ways.

5. Theater style; As the name suggests, the book first opened to both sides, around the background of a small stage, page one by one, the story is told, but also supporting props, small dolls, random place, play, build a small theater.

Modern pop-up books, often a comprehensive use of more than a variety of techniques, such as 180 degrees + rod, such as rope, plastic rod, reflective pieces, interactive devices and so on, can better achieve the effect of popup books .The above is for the main production of stereo books and the form of the designer to do a comprehensive classification of experience.

4.4 Development and results of Attempt 2





Figure 19 attempt 1 design drawing (image from the author, 2022)

A flower is formed by combining a hexagon and six trapezoids. The middle hexagon is the center of the flower, and the outer six trapezoids surround it. The box can hold two flower cakes, and there are petals in the box. Through testing, Attempt 2 has the possibility that can be developed and needs to be further explored.



5. Project development

5.1 First edition model

In the first version of the model, the hexagon in the middle serves as the flower center, which is used to decorate and fix other boxes. A trapezoidal box can hold two flower cakes, so a total of 12 flower cakes can be held in the first version of the box.



Figure 20 First edition model (image from the author, 2022)

5.2 Second edition model

In the first version of the model, six boxes were arranged to form a flower shape, with each box holding two flower cakes. However, the boxes were quite heavy, and the resulting flower was too small. Additionally, the center of the flower lacked any functional purpose. Furthermore, the boxes did not have locks, making them prone to slipping or opening unintentionally.

In response to these shortcomings, the second edition was modified to address the issues.

In the second model, the central flower was changed from a single flower to a bunch of flowers, and the trapezoid box was thinner than the first version. A trapezoid box could only hold one flower cake. The box in the center was enlarged to fit a flower cake and a lock was added to prevent the box from slipping off .



Figure 21 Second edition model (image from the author, 2022)

5.3 Third edition model

Third addition model



The second version of the model a total of sunflowers were arranged to form the box this updated design has successfully passed the preliminary evaluation. The next step in the process is to add color and content to enhance the overall aperients and appeal of the packaging

In the model of the third edition, leaves are added to the bouquet, colors are added to the box, and packaging information is added. A rose is the prototype, the color of the flower is red, and packaging information is on the side of the box. The number of packages is the same as that of the second edition, and a set of boxes can hold 7 flower cakes in total.



Figure 22 Third edition model (image from the author, 2022)

5.4 Fourth edition model

In the third edition model, the flowers were attached to the box using glue, which is not an ideal method. The excessive use of glue can pose a burden on the environment, as it may lead to environmental pollution and waste. Therefore, it is essential to reconsider the adhesive method and explore more eco-friendly alternatives to ensure sustainability and reduce the environmental impact of the packaging.

In the fourth edition, the need for glue has been eliminated, and the boxes are now combined by splicing. Each small box can be easily assembled through splicing, and the flowers have been changed from a bunch to individual ones. The color matching has been adjusted to enhance the overall aesthetic appeal.

However, one drawback of the fourth edition is that it is not very convenient for customers to open the packaging. Additionally, the configuration of six boxes to hold the flower cakes inside might not be the most practical and efficient design. Further improvements are needed to address these issues and create a packaging solution that is both visually appealing and user-friendly for customers.





Figure 23 Fourth edition model (image from the author, 2022)

6. Final project

6.1 Interior box drawing

The trapezoid box outside is formed by folding, do not need to use glue, because the flower cake is round and easy to break, so need to add a circular bracket in the trapezoid box, this trapezoid drawing can be rotated to form a stable bracket, rectangular paper to make the flower cake more easy to take out.



Figure 24 Trapezoidal box drawing (image from the author, 2022)

The small hexagonal box that serves as the center of the flower is assembled by means of clasps, without glue. It is located in the center of the assembly, which not only holds a flower cake, but also holds the surrounding trapezoid.





Figure 25 Hexagonal box drawing (image from the author, 2022)

6.2 Exterior box drawing



Figure 26 Exterior Box Drawing 1 (image from the author, 2022)

The first external box does not need to be made of glue. The outside of the box has the brand and name of the flower cake, as well as a sticker. The six sides of the hexagonal box are the lids, which cover the inner box and hide it, making way for opening the box and seeing the flowers inside.

Such boxes cost very little and can be folded in transit, making them very easy to transport, taking up no shipping space, and not easily damaged in transit.





Figure 27 Exterior Box Drawing 2 (image from the author, 2022)

Compared with the first external box, the second box can hold 14 flower cakes, and it is more luxurious at the same time. When it is closed, it is an ordinary gift box. When opened, you will first see the roses blooming using pop-up book technology.

This gift box is made with a little eco-friendly glue and can be used after the flower cake is eaten.

6.3 Project model



Figure 28 Exterior Box 1 (image from the author, 2022)

When the box is not opened, the box looks very ordinary. When the box is opened layer by layer, it increases the sense of expectation. When the box is fully opened, you can see the flowers formed by the inner box of the flower cake, which gives people a sense of surprise. The whole set of boxes is glue-free, low-cost to manufacture, easy to transport and harmless to the environment when discarded.





Figure 29 Exterior Box 2 (image from the author, 2022)

The second box is a gift box. When you open this box, you will first see the rose in the middle blooming, which gives you a sense of surprise. In the background of the rose is a postcard or letter paper, where customers can write their wishes and send them to others as gifts. There is a box (7 pieces) of flower cakes on each side, a total of 14 flower cakes.



Figure 30 Project model (image from the author, 2022)



All the packaging design in this project uses environmentally friendly materials, which will not cause harm to the environment after being discarded, fully displaying the characteristics of flower cake. The overall shape of the box is dominated by flowers, which makes the box innovative in shape and increases the good memory brought by packaging to customers. Let the flower cake on the packaging can also arouse the customer's purchase idea.

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