

## APPLYING CHINESE CULTURE HERITAGE ELEMENTS TO GLASS PRODUCT DESIGN

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### ABSTRACT

Developing products with added cultural value has become one of the main means of promoting economic growth in China, which can enhance local cultural influence and improve the quality of people's spiritual lives. What's more, with the development of China's economy, people are more inclined to a high quality of life and a culture that caters to their spiritual needs. On the other hand, glass has become a standard industrial material and is increasingly widely used. Daily glass products occupy a significant share of life. However, the connection with traditional Chinese culture has been lost in the design of glass products, and there is a separation between China's economic transformation and the revitalization of cultural industries. This study aims to find ways to successfully integrate Chinese cultural heritage elements into glass product design. In the case study session, this study analyses the main visual components level of cultural heritage based on many different views, mainly divided into three components: color, shape, and decoration. At the same time, it also puts forward the meaning level of cultural heritage and its transformation process. There are also amounts of glass products with cultural heritage elements as examples, which provide valuable references for researchers to analyze how to integrate cultural elements from the visual level and meaning level. The key factors that influence the success of glass product design are also described in this paper, which provides a basis for further research.

**Keywords:** cultural elements, glass products, visual component, Chinese heritage

## INTRODUCTION

In 2022, China's "14th Five-Year Plan for Cultural Development" was issued, marking the cultural creative industry as a national economic development focus. Meanwhile, glass products are increasingly used in the creative industry with their unique properties. Besides, people are no longer limited to material pursuit, cultural pursuit has increasingly become an essential part of the high-quality development of human society (Sun et al., 2022). Thus, glass products with cultural elements have become the key to creating value in transforming glass products from technology-driven to experience-driven innovation. Huang Mingdong, working at the China Academy of Art, argued that product design with national traditional culture can often stand on the world's design forest as national culture is the precipitation of history, with a lasting sense of history and glory. Therefore, with consumers' aesthetics of modern civilization and the influence of foreign cultures, the research on cultural heritage elements applied to glass products can provide more valuable ways for innovation.

China having a long history of 5,000 years is one of the countries that have a lot of cultural heritage. There are many impressive cultural heritages in China, some of which can be preserved to the present, while others are only preserved in written records. For example, Chinese shadow play, the Peking Opera, Chinese traditional mulberry silk weaving skills, and Chinese movable type printing which can be categorized as intangible cultural heritage, and The Great Wall, Mount Huangshan, Old Town of Lijiang, and the Cultural Landscape of Honghe Hani Rice Terraces which can be categorized as tangible cultural heritage according to UNESCO's definition. The cultural heritage in China has won a unique good reputation in the world. Cultural heritage is an important embodiment of a country's culture, showing the cultural characteristics of a country, and inheriting the essence of a country's culture.

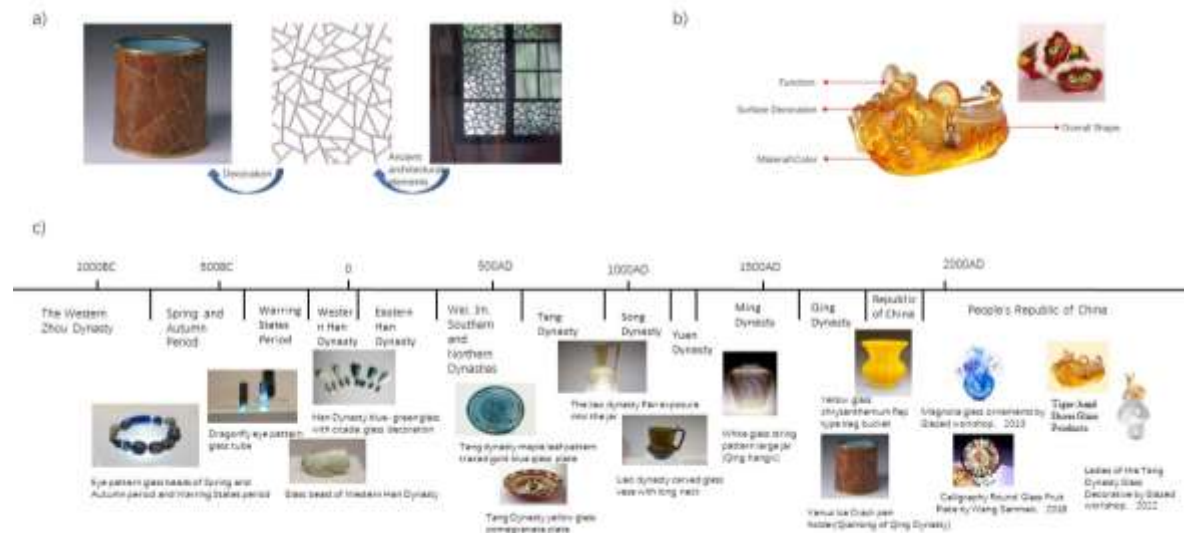
However, modern design often blindly follows fashion, personality, and Westernism. New ideas and concepts from abroad have also brought an unprecedented impact on Chinese traditional culture and Contemporary product design. How to make glass products with cultural elements considering the users' needs and preferences is a question that has not yet been answered. According to Norman's theory, there are two important dimensions in the process of glass product design: the conceptual model of the designer and the psychological model of the user. Ideally, the two models will be consistent to successfully design the product (Norman, 2013). However, for glass products with cultural heritage elements, it is difficult to achieve unity between the designer's interpretation of cultural heritage elements and the actual feelings of consumers. Many glass products are original and innovative by incorporating cultural heritage elements in design practice, but in the market, it has been met with apathy. Hence, Understanding the factors that affect the users' perception of glass products with cultural heritage elements has always been a difficult problem in the glass product design process, which academics and design practitioners have tried to overcome. In other words, to understand the perception and understanding gap in glass product design with cultural heritage elements, the following questions need to be studied first: How to correctly interpret cultural heritage elements, and how these elements are applied to product design?

## GLASS PRODUCT AND CULTURAL HERITAGE IN CHINA

### Development of Glass Product Design in China

Many of China's early glass materials and glass products were imported from abroad. Glass is often referred to as “Bo Li” and “Liu Li” in Chinese literature. The development of glass in China is related to ancient Chinese metallurgy, alchemy, and primitive glaze technology, which appeared in the Spring and Autumn Period. Until the Qing Dynasty, China's glass products began to flourish. Xue Lu pointed out in his "Glass Art of Qing Dynasty in China" that the local glass art and technology in China had not been the mainstream arts and crafts until the peak period of glass craftsmanship in the Qing Dynasty. The glass art of the Qing Dynasty in China was produced under the dual influence of Western practices and indigenous recipes. For example, the bronze pen holder inlaid with gold stars and glass ice cracks in the Kang Qian period of the Qing Dynasty in the Palace Museum in Beijing shows the concept of foreign technology serving traditional aesthetics and decoration, as shown in Figure 1(a).


















Traditional aesthetics and decoration as cultural elements can be traced in cultural heritage which can be inherited, material or immaterial, with historical, cultural, symbolic, social, or aesthetic value. In contemporary glass product design, more and more designers are also taking advantage of these characteristics of cultural elements to innovate products. As a result, today more innovations and changes have been brought to glass products, decorative glass products, office supplies, and souvenirs in China. Chinese artists and designers use glass art worldwide and integrate traditional Chinese cultural elements to create glass products. An example of contemporary glass design with cultural elements is the Tiger-head Shoes Glass products designed by “Liu Li Gong Fang”, which is one of the most famous glass workshops in China. It shows how to incorporate Chinese cultural elements from traditional shoes for children, as shown in Figure 1(b). Tiger-head shoes have practical and ornamental value, and their manufacturing skills have been included in China's intangible cultural heritage. Meanwhile, it is a mascot, and people give it the function of exorcising ghosts and evil spirits. This deep meaning is also given to glass product design through the use of visual elements. If you simply stand on the traditional cultural heritage of tiger shoes, it has been difficult to inherit and retain. This is because any product has an essential function: the fundamental value and the reason for its existence. Its primary performance is that products meet the basic needs of consumers and constitute the material basis of the interaction between products and people. Thus, this traditional product has been unable to adapt to people's needs and gradually withdrew from the market, and was used as a cultural element by artists and designers to be incorporated with other products. In the history of the development of Chinese glass products, although the manufacturing technology has been affected by foreign production processes, the product design has always retained the traditional Chinese cultural characteristics. The brief timeline of glass product development in China can be seen in the following Figure 1(c).



**Figure 1.** Venus Ice Crack Pen Holder of Qing Dynasty(a) Contemporary Tiger-head Shoes Glass Products(b) Brief timeline of glass products development in China(c)

## Conservation and Reuse of Cultural Heritage

With the deepening of the understanding of world cultural heritage and the continuous development of the protection field, the scope of cultural heritage is gradually expanding. Understanding the meaning and classification of cultural heritage is crucial to the study of how to apply cultural elements to glass products in the later study session. The definition of cultural heritage is very broad, including material cultural heritage and immaterial cultural heritage. In recent decades of the 20th century, cultural heritage has been mentioned and studied. Scholar Higgins went on to put forward the characteristics of two kinds of cultural heritage. Tangible heritage is the characterization material, including both artificial and natural environments. In contrast, intangible heritage is practice, performance, expression, knowledge, and skills. In addition to that, the associated utensils, objects, cultural relics, and cultural spaces are also included in this (Higgins, 2022). According to the definition of UNESCO and these scholars' research, it is not difficult to see that cultural heritage can be divided into two categories. Their common characteristics are that they can be inherited, reused, and have aesthetic value and emotional meaning. This provides a reference for how to apply cultural heritage elements, that is, to extract the visual aesthetic features of cultural heritage elements and consider the meaning behind them.

Chinese cultural heritage					
Tangible cultural heritage			Intangible cultural heritage		
Name	Example	Icon	Name	Example	Icon
Geoheritage sites	 01	 06	Legends	 11	 16
Geoheritage in urban spaces	 02	 07	Performances	 12	 17
Cultural landscapes	 03	 08	Traditional festivals	 13	 18
Mausoleum Heritage	 04	 09	Historical relics	 14	 19
Ancient town	 05	 10	Traditional skills	 15	 20

**Figure 2.** The proposed classification of Chinese cultural heritage

Previously, a literature review about cultural creative products indicates that cultural heritage has provided help in the context of China's economic transformation. According to previous literature, in terms of tangible heritage, this study will classify it into five aspects, namely geoheritage sites, geoheritage in urban spaces, cultural landscapes, mausoleum Heritage, and ancient towns. In terms of intangible cultural heritage, it is categorized as Legends, performances, traditional festivals, traditional skills, and historical relics. The proposed classification of Chinese cultural heritage can be seen in Figure 2. In this classification, historical relics are also listed as intangible cultural heritage, because according to Higgins, these traditional objects are carriers of ancient skills and knowledge, and it is more conducive to analyzing the extraction process of different cultural heritage elements and their application in glass products under this classification.

As mentioned earlier, this definition and classification are not final. They should be adjusted as the research progresses. For cultural heritage to be successfully protected and utilized, it must be consumed. The scholar Hewison said that culture can be turned into a commodity. In many countries today, cultural heritage is often used as a driving force for local economic development. The value of cultural heritage can only be protected better if it is properly reused. This is because cultural heritage is not only representative of a country's culture and the main identity of a nation but it is also regarded as a potential resource that provides the basis for sustainable economic development (Hani et al., 2012). The growth of glass products with cultural heritage elements is one of the many means to utilize and protect cultural heritage, and it is a type of creative industry. Glass products with visual elements of cultural heritage and implied cultural meanings are becoming an important direction in product innovation design, which is not only because of the Chinese people's love for transparent and pure texture but also the love and

pursuit of their own traditional culture. In other words, the combination of cultural heritage elements and glass products is an important way to utilize and spread Chinese traditional culture, through which the sustainability of cultural heritage protection can be realized and the cultural emotional needs of users can be met. It is not difficult to see from the definition and categories of cultural heritage that the subsequent protection and reuse of cultural heritage should be closely related to the characteristics of cultural heritage. There are many characteristics of cultural heritage, but for this study, we only need to focus on the relevant characteristics. It can be seen from the previous literature that, from the perspective of product art design, two major characteristics of cultural heritage can be inherited and utilized, namely, aesthetic characteristics of visual elements and the cultural emotional meaning behind them. To be specific:

Aesthetic features are the extraction and abstraction of visual elements involved in cultural heritage, such as color, shape, decoration, etc., which represent the aesthetic elements of cultural heritage.

Meaning features are characterized by exploring the extensive social meaning and spiritual bond behind it, which helps to enhance the positive meaning of users such as pride, upward, and cohesion. For example, the spiritual needs for an affluent life or academic progress are reflected in some of the Chinese cultural heritage.

## **THEORETICAL BASIS**

### **Understanding Products Innovation**

The application of cultural heritage elements to glass product design is one of many innovative glass product design methods. Therefore, research on the definition of innovation and its user acceptance will also be very important. Innovation originally comes from the Latin "Innovatus", which mainly means to create a new object or idea. Casey & Ging (2007) further proposed that there are three types of innovation: first, it is the act of creating new products; Second, it can also be an act of providing a new service, and third, adding new value to an existing product is also an innovation. That is to say, based on the innovation of the appearance of glass products, giving it new emotional meaning and value is also an important means of innovation, which is also an indispensable level of cultural and creative products. Academic researchers have used a large number of definitions over a while. Malik provides a taxonomy of the definition of "innovation" in his doctoral thesis, which can help researchers fully grasp the definition of innovation. Different from other scholars, in addition to the two features of innovative products and innovative services, he also specifically mentions innovation from the perspective of users: users can experience novel added value. From the research of these scholars, we can see that innovation is an extremely complex and multifaceted issue, and these scholars give explanations based on their research directions. However, from different angles, the concept of adding value is mentioned. In the application of cultural and creative glass product design, the increase of added value can be understood as the inheritance and reuse of aesthetic characteristics and meaning characteristics of the cultural heritage mentioned above.

Innovation needs to be defined and adapted to the specific situation in this research. It needs to focus on current categories and take traditional elements of cultural heritage as a form of design innovation. In addition to the debate on innovation from different perspectives of designers and consumers, if looking at the historical

trend of innovation drive, there is a change from driving by technology to creativity. Initially, it was widely believed that innovation was invention, and technology-based innovation played an important role in this period. Subsequently, the emergence of product design and industrial design led to creative innovation becoming a popular innovation method today. In addition, in many theoretical studies on innovation, the acceptance of innovation can follow Rogers' theory. In this study, Rogers' theory is also helpful in successfully integrating cultural heritage elements into glass product design. Besides, using this theory can help find the factors that glass product innovation can be effectively accepted by users (Rogers, 2003). The reason for this is that, as mentioned above, the research on the factors affecting users' perception of glass product innovation is indispensable in the research. In other words, people's acceptance of innovation in Rogers' theory determines whether the innovation in this research can be successful. Rogers' model is defined at a fairly general level, which for this reason makes it widely applicable and can be applied to the study of how glass products can be innovatively combined with elements of cultural heritage. On the other hand, it also limits its ability to provide detailed information in specific innovation cases to some extent. Therefore, in this study, it is necessary to combine the results of the case study with the literature review to provide more specific measurement indicators.

### **Innovation Through Meaning**

In the field of product design innovation, Heskett (2002) proposed that the practical level of products concerns function and performance, and the equally important meaning level of products concerns symbol, and emotion. This shows that product-meaning innovation is as important as product-function innovation. There is no coincidence, that in the field of local culture-oriented design, Moalosi's research argues that symbolism is consciously used in the design and production of products, and symbolic associations are used to construct differentiated lifestyle patterns using products. In other words, in the innovation of product design, the symbolic meaning behind the visual elements is crucial.

Every product can be said to have meaning and value to some extent, but designers try to give products as much value and attributes as possible. Moreover, the research on the market economy also shows that the symbolic meaning of products plays a very important role in the success of design innovation (Tian, 2021). For example, under the premise of the basic loss of functionality of all glass products, the significance of meaning is bound to be more apparent. In the case of the National Museum of China derivative design, based on retaining only the most basic product functions, all derivatives try to add elements of cultural relics in the collection of the National Museum of China, through these symbols, let consumers feel more emotion, identity, and meaning. One of the spin-off products of the National Museum of China, the Rotating Star Night lamp (Figure 3), derives its elements from ancient Chinese astronomical instruments and astronomical observations. Let users fantasize about lighting up the fantastic stars, rendering a romantic atmosphere. The innovation of this glass product is more of a meaning-driven innovation, combining the shape of "Tu Gui" and the decoration of "Gan Shi Xing Jing", and making people imagine the state of ancient Chinese observing stars, and playing a role in promoting Chinese traditional culture. Why is it necessary to use this element of cultural heritage instead of modern star maps and observation tools to innovate glass products? It is the use of the hidden meaning behind a cultural heritage that adds more meaning and value to the innovation of

glass products. This is because “Gan Shi Xing Jing” is the earliest record of ancient Chinese observing stars and “Tu Gui” is the oldest and simplest astronomical instrument used in China to measure the length of the sun's shadow. In this example, the designer not only extracted the shape elements of “Tu Gui”, but also expressed the hidden meaning through the decoration of “Gan Shi Xing Jing”. This product is one of the glass products with good sales and feedback on Taobao, which is one of the largest online sales platforms in China. Even though it has the same function as most products on the market, users are willing to pay for this innovation and its extra meaning. It can be said that this innovative form retains the original function but gives new meaning through design.



Figure 3. Rotating Star Night lamp (a) “Tu Gui” (b) “Gan Shi Xing Jing” (c)

## METHODOLOGY

### Initial Observations and Analysis of Glass Products Design with Cultural Elements

Based on the compilation and classification of glass product designs with cultural heritage elements, the researcher identified 88 glass products embedded with Chinese intangible and tangible cultural heritage elements. Initially, these examples were classified by the elements embedded according to the cultural heritage definition made by UNESCO and previous research as shown in Figure 4 below.



Figure 4. Initial Observations of Glass Product Design Incorporating Chinese Cultural Elements

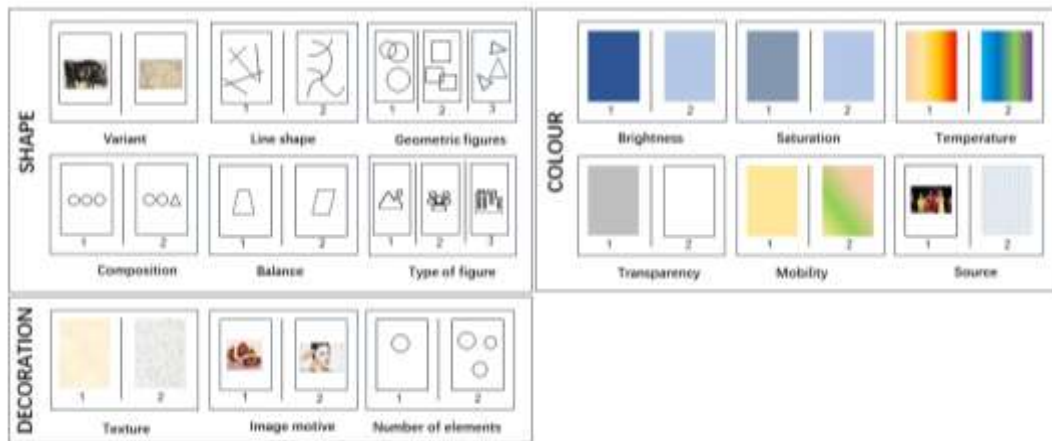


The essence of glass product design with cultural elements is to integrate visual components into glass products through innovative design techniques, and users can obtain visual elements through observation and experience of products to achieve cultural transmission. In this process, the glass products' bearing of visual components and the users' perception of meaning are the keys to achieving cultural transmission and also the core of the success of glass product design with cultural elements. In this study, the combination of their elements and glass products is analyzed according to the category of cultural heritage, and the three visual elements of color, shape, and decoration are classified and analyzed respectively, as shown in Figure 5 below.



Figure 5. Analysis of glass products with Chinese cultural heritage elements

Many different opinions have been expressed about the main components of product design. In general, visual components containing color, shape, and decoration are one of the most prominent components. Unlike pragmatic design, which focuses on products to better achieve functional differentiation, this innovative approach attempts to beautify the appearance through color, shape, and decoration, and convey hidden meaning. For most observers, visual design is probably the element closest to the meaning of design. This is because the human perception system includes sight, the essential element of emotional symbols. Glass product designers usually determine the shape of glass products based on aesthetic characteristics, and cultural heritage elements provide a source for designers. Visual elements become the interface between glass products and users, which affect the beauty of glass products and bring feelings of joy, pride, and other emotional meanings, and are crucial factors in the user's experience of glass products. For example, color affects users' emotional feedback, and red gives people a festive and warm feeling in China. Different decorative lines can also make people have different associations, the peony pattern in China represents peace and prosperity. The proposed visual component variables in glass product design with cultural elements can be seen in Figure 6.



**Figure 6.** Visual component variables in glass product design with cultural elements adapted from (Ampuero & Vila, 2006)

### Case Study

To better carry out this case study, according to the previous literature review, this paper intends to further decompose how cultural elements are applied to glass products through these three steps. The first is to investigate the background of cultural heritage, the second is to extract the cultural elements of cultural heritage from the visual component level, and the last is to analyze the composition of elements and the visual representation on the meaning level, as shown in Figure 7(a). The cultural totem of this glass product is the Chinese traditional festival element of Dragon Boat Festival which is a listed intangible cultural heritage. It is also the first Chinese festival to be included in the World Intangible Cultural Heritage. The Dragon Boat Festival is a traditional festival in the cultural circle of Chinese characters, which falls on the Fifth of May every year. There are many theories about the origin of the Dragon Boat Festival, the more common argument is that the patriotic poet Qu Yuan of Chu State jumped into the Miluo River and died on this day, and then people began to commemorate him, so some people also called this day the poet's day. The cultural context of the Dragon Boat Festival has been analyzed, as shown in Figure 7(b).

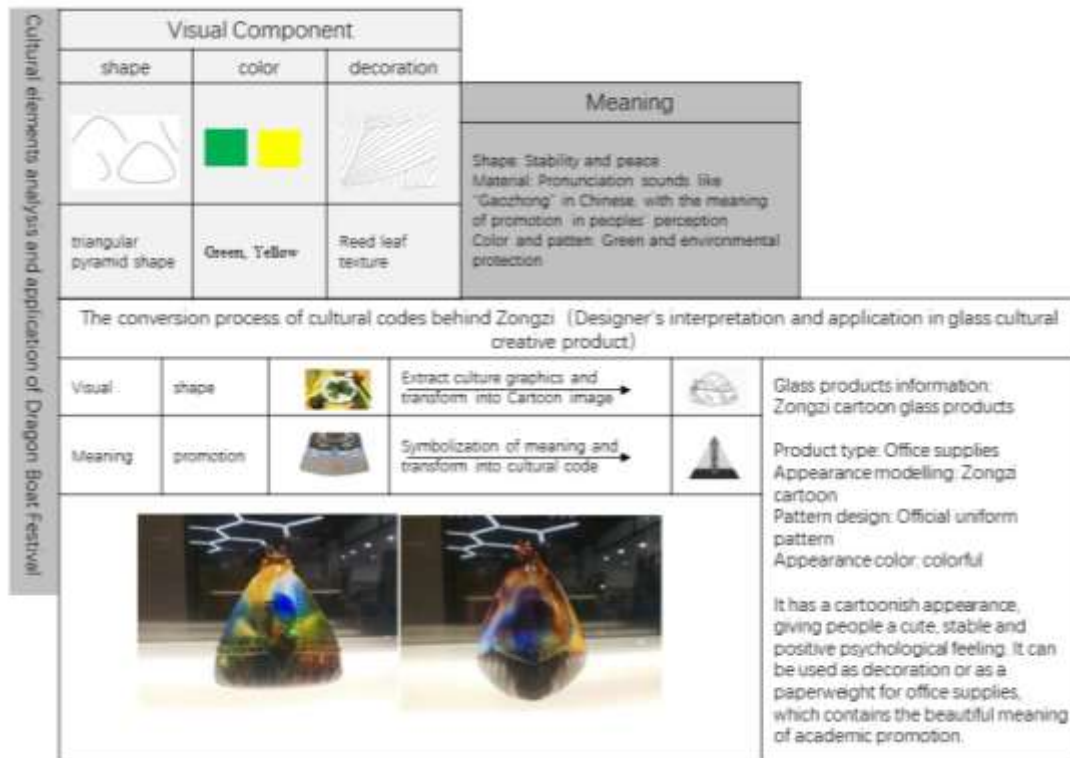
The customs of the Dragon Boat Festival vary according to different places, and the more common customs are dragon boat racing and eating "Zong Zi". Therefore, after understanding the context of the Dragon Boat Festival, visual cultural elements contained in these two customs are extracted according to proposed analytical models of cultural heritage elements. The elements will be extracted from color, shape, material, and decoration. This helps add the understanding and concretization of the meaning and strives to make this abstract culture perceptible, understandable, participatory, and researchable. In this table, two main cultural information is analyzed. The first one is dragon boat regatta which is a traditional activity in the Dragon Boat Festival. The second one is "Zong Zi", this is because no matter how different customs are, eating "Zong Zi" at the Dragon Boat Festival has become a consistent custom to remain. Visual cultural elements extracted from the Dragon Boat Festival can be seen in Figure 7 (c).



**Figure 7.** Proposed case decomposition steps(a) An Analysis of the Cultural Context of the Dragon Boat Festival(b) Visual Component of the Dragon Boat Festival(c) The conversion process of cultural codes behind “zongzi” (d)

In the third stage, the extracted cultural elements are transformed according to understanding. First of all, the boat and dragon images of the Dragon Boat Festival cultural elements were not used in the final design, as these two elements are also often found in other traditional Chinese images and are not representative of the Dragon Boat Festival. In the design of this cultural creative glass product, the typical appearance of the pyramidal “Zong Zi” in the visual layer was used, but the designer made appropriate changes to the appearance. This is because, in modern composition methods, graphic elements often need to be reorganized. Through design techniques such as copy, contrast, rotation, and exaggeration, traditional patterns are retained while visual symbols that conform to modern aesthetics are redesigned. Finally, the “Zong Zi” elements were integrated into the glass product design. At the same time, eating zongzi also has the meaning of academic promotion in traditional Chinese culture. In this case, anthropomorphism was first used to make the shape of “Zong Zi” cartoonish, and again the visual symbol of ancient official clothing was used to emphasize the hidden cultural significance of academic promotion. This transformation can be seen in Figure 7(d).

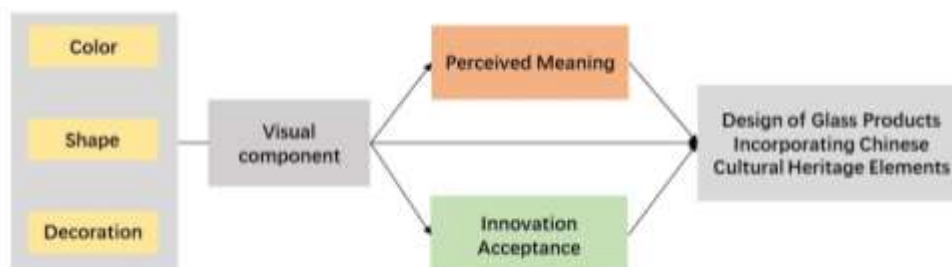
In conclusion, not only the visual elements of cultural heritage are extracted, but also the beautiful meaning of progress from the meaning level of the Dragon Boat Festival is found and further visualized the meaning with the pattern of official clothes, metaphorical people's beautiful longing for life. Combining these cultural elements with modern glass products and trying to strengthen the hidden cultural significance behind them again can inspire fresh design inspiration, which is helpful to the replication and dissemination of cultural heritage values, and allows users to get spiritual satisfaction and pleasure. The whole analysis of the cultural elements of the Dragon Boat Festival and their application in glass products are shown in Figure 8.



**Figure 8.** The application of visual elements and meanings of cultural heritage in glass products

## RESULTS AND DISCUSSION

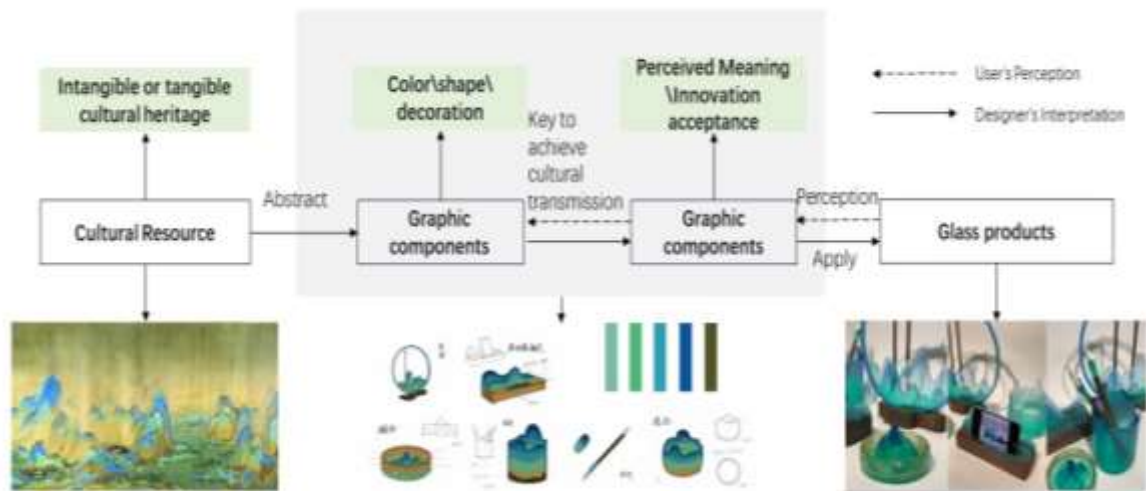
Through previous literature research and analysis of the different types of glass products with cultural elements, an initial conceptual model was developed to provide a theoretical background for the subsequent research project. The proposed conceptual framework comprises five agencies compiled in two levels: the first, main visual variables in the design of glass products, and the second, perceived meaning and innovation acceptance. These agencies are key to the success of applying Chinese traditional cultural elements to glass product design. These categories can be visualized in Figure 9 below.



**Figure 9.** The key agencies to the success of applying Chinese traditional cultural elements into glass product design

According to the statement of Y. Li and Zhang (2012), when people buy a product, they are looking for a feeling, an identity, or a story in the product and buying

emotion and value identification. The primary approach to achieve this is through graphic components that influence the user's perception and emotional response. In this model, perception is influenced by complex psychological factors, more of a subjective feeling that people have about things, while the human body mainly retrieves and processes information on two levels: physical and perceptual. The physical level refers to the aesthetic characteristics of the visual components presented in the glass products while the perceptual level refers to perceiving the meaning hidden behind the graphic elements. In addition, as a new way of product innovation, people's acceptance of it will also affect the success of the combination of cultural heritage elements and glass products. Therefore, its comparative advantages, compatibility, complexity, and observability (Rogers, 2003) should also be considered in practical applications from the perspective of designers and users. This study also shows that the processing of visual elements by the designer and the understanding of the meaning of the users are the keys to the success of the application.



**Figure 10.** The creative process of “Dan Qing Qian Li” study products

As a preliminary result of the research, a collection of study products named “Dan Qing Qian Li” including Inkstone, pen, pen holder, pen wash, and mobile phone support were created. The “Dan Qing Qian Li” school supplies provide a subtle example of how we integrate cultural heritage features into our product design and the key to achieving cultural transmission successfully. At the visual component level, the blue-green color of the cultural heritage "Qian Li Jiang Shan Tu", the changes in the undulating shape of the mountain, and the decoration of water patterns are extracted and applied to these products. On the level of cultural meaning, the ancient literati's unique understanding of landscape is expressed by the change of color. The design color inherited the blue-green painting method since the Tang Dynasty, and sought changes in the simple and unified blue-green tone, making it brighter and dazzling in contrast. Blue-green is a unique color in China, which is of great significance in ancient Chinese society and symbolizes strength, hope, simplicity, and solemnity. This makes the use of this collection of products, in addition to appreciating the aesthetic characteristics of the visual level, but also experience the ancient literati full of strong and hopeful mental state. In conclusion, based on literature and case studies, this study proposed an effective

application model for integrating cultural elements into glass product design and finally verified its feasibility through verification. Nonetheless, further empirical research needed to be done to better understand the difference between the meaning of graphic elements understood by designers and the emotional response of users in the application process.

## CONCLUSION

With changes in consumption and demand and an aversion to the homogenization of industrial products, stylistic and culturally distinctive products tend to monopolize aesthetic interest more quickly. Chinese glass products are facing the impact of scientific and technological modernization and foreign culture, how to adapt to the market while having distinct Chinese cultural characteristics, and extend the particularity of these design characteristics to the current product design practice, is worth discussing. The main achievement and contribution of this study is that a beneficial model and method of combining is provided for designers and scholars to apply Chinese cultural heritage elements to glass product design. In addition, a classification of cultural heritage is proposed, which helps to find the source of elements for the design of innovative glass products. In both of these cultural heritages, the mining of visual components and the meaning behind them can be applied to the innovative design of glass products. The innovative design and development of glass products can effectively promote the protection of cultural heritage and make glass cultural products have commercial value. This study also shows cases of exploring how to add cultural heritage elements into product design to make products more acceptable to people and deepen people's memory of traditional culture. It helps find a new way for the innovation of glass product design style and put forward how to inherit and innovate cultural heritage at the level of visual components and the level of cultural meaning.

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