

# The digital application of intangible cultural heritage protection takes "Qin Bricks and Han tiles" as an example

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**Abstract.** In today's digital media era, the protection and inheritance of intangible cultural heritage are very important to enhance the cultural literacy and cultural confidence of citizens. This paper is based on the "Qin Brick and Han Tile Museum" in Xi'an, Shaanxi Province, China, which has the most complete variety of tiles, well-preserved and exquisite patterns to digitally transform this intangible cultural heritage into cultural and creative products that represent the concept of intangible cultural heritage design. Analyzed the current situation and digital design concepts according to 1,300 questionnaire data, and puts forward the strategy to enhance the protection, display, and sale of the intangible cultural heritage protection to meet the viewing of more groups and promote the concept of intangible cultural heritage protection.

**Keywords:** digital application, Art design, intangible cultural heritage protection, Cultural and creative products

## 1. Introduction

"Qin Bricks and Han Tile" is not limited to specifically referring to "the bricks of the Qin Dynasty and the tiles of the Han Dynasty", but to commemorating and explaining the glory and heyday of architectural decoration in this period. Using traditional Chinese cultural style to describe ancient buildings is a bright pearl in the treasure house of Chinese civilization. Its exquisite characters, peculiar animal images, gorgeous and peculiar patterns, and other cultural relics have an irreplaceable special position in the research of archaeology, history, ancient writing art, calligraphy art, ideology, culture, etc, and are also of great value in art appreciation and cultural studies. Starting from the intangible cultural heritage protection design of "Qin Bricks and Han tiles", combined with digital design, the intangible cultural heritage after the digital design has the characteristics of easier dissemination and preservation. Digital collection, arrangement, and redesign can better reflect the emotional communication of humanistic feelings. Among various digital products, cultural and creative products in digital design is good carriers for display, sales, and dissemination.

Cultural and creative products refer to the creation and promotion of cultural resources and cultural goods by means of modern technology, relying on the designer's wisdom, skills, and talents, and through the development and application of intellectual property rights, resulting in high value-added products<sup>[1]</sup>. Through market research on cultural and creative products<sup>[2]</sup>, we adopt industrial design-based design methods and integrate cultural elements to design cultural and creative products of "art + technology", "ancient + modern" and "humanities + science". This is an effective means of cultural protection and publicity, and it can also promote the concept of environmental protection and sustainable development<sup>[3,4]</sup>.

## 2. Ease of Use

### 2.1. Selecting a Template

This research first selects and investigates cultural and creative products that use digital IP images as a marketing method. In the market case study, it was found that the digital IP design of Disney cartoon animal figures was the main research object. Disney Studios, with Mickey Mouse, Donald Duck, Goofy, Pluto, Mermaid, Snow White, and many other classic characters, has accompanied generations for generations, leaving us with a wonderful childhood full of imagination and dreams. After these animated characters are digitally designed as cultural and creative IP, the promotion and sales of cultural and creative products are carried out. After the creation of the digital IP of Disney cartoon characters, the sales model in China adopts the "flash sale model", that is, in the central shopping malls of big cities, only a one-week sales model (hunger sales) is carried out. Disney fans made a special trip to buy it, as shown in Fig. 1. Available in glass jars, the glass jar sells for \$51. Pack cute digitally designed movie characters in glass jars according to personal preference. At the same time, such a marketing model is commonly known as "cuteness in a jar", which summarizes the marketing model sold in "cans" and redesigns the "cuteness" of digital movie characters. It can be seen that after digitizing movie characters and converting them into cultural and creative products, their value far exceeds the manufacturing value of the toy itself.



**Figure 1.** Disney animated characters digitally design cultural and creative products

### 2.2. “Qin Brick and Han Tile” Digital Design Process

In the digital design process of Qin Brick and Han Tile, the overall design concept is based on human factors engineering design. That is to say, the design is people-oriented, and the design of excellent ergonomic products has the connotative elements of inheriting and protecting intangible cultural heritage<sup>[5-7]</sup>. In the process of digitalization of the intangible cultural heritage protection of "Qin Bricks and Han tiles", this paper draws on the design methods, design elements, and design concepts in industrial design to promote the design of cultural and creative products in this discipline to achieve a high degree of unity between rational digitalization and perceptual aesthetics.<sup>[8-11]</sup> Digitizing and presenting intangible cultural heritage in a non-destructive manner is not only conducive to its protection and inheritance, but also meets the needs of tourists who cannot visit the site in person. When the tourist season comes, the number of tourists is huge, but the number of tourists that can be accommodated in the exhibition hall is limited. Therefore, the digitally displayed

videos, photos and cultural and creative products of "Qin Brick and Han Tile" can be used as preview content for tourists to visit, which can not only disperse crowds, but also meet the normal operation of the "Qin Brick and Han Tile" museum.

### 2.2.1 Hand Drawing Exhibition Creation and Display

Take the photos of the "Qin Bricks and Han Tiles" Museum, and create the first hand-painted manuscripts from the photos. The students who collaborated with this research are first-year design students majoring in Fine Arts and Design at Xi'an University (Xi'an, Shaanxi, China). After the students finished their creations, they displayed their hand-painted works in the square, launched online and offline questionnaires, and then screened the most popular elements to create a first draft image. Figure 2 is the hand-painted exhibition voting session.

### 2.2.2 Digital Design Questionnaire Survey

How to design digital intangible cultural heritage products that consumers love? A questionnaire survey was conducted on the sales price of cultural and creative products. After analyzing 1,300 valid survey data, the following conclusions are drawn: The sales price of cultural and creative products is acceptable according to the sales price of ordinary similar products. When encountering beautifully designed cultural and creative products, consumers do not seem to care about the price, but more about the intangible value of the creativity of the digital design itself.

### 2.2.3 interesting sales model

The traditional sales model, that is, the transparent sales model of "what you see is what you get, clearly marked price", such a sales model is not challenging and exploratory. In the current era of rapid development of science and technology, an interesting sales model is being opened. For example, "blind box marketing" is more popular among young people. On the outer packaging of the product, only the possible product types and hidden product types are marked, which makes buyers have a "gambling" mentality, and such consumers will have more purchasing motivation. The product type can only be randomly obtained after a sufficient number of products have been purchased. This "blind box marketing" sales model will inevitably lead to the type of products that consumers buy repeatedly, which will stimulate consumption virtually.



**Figure 2.** The hand-drawing exhibition

### 3. Transforming intangible heritage protection into digital

#### 3.1. Choose a tile pattern

##### 3.1.1 Black and white line drawing manuscript

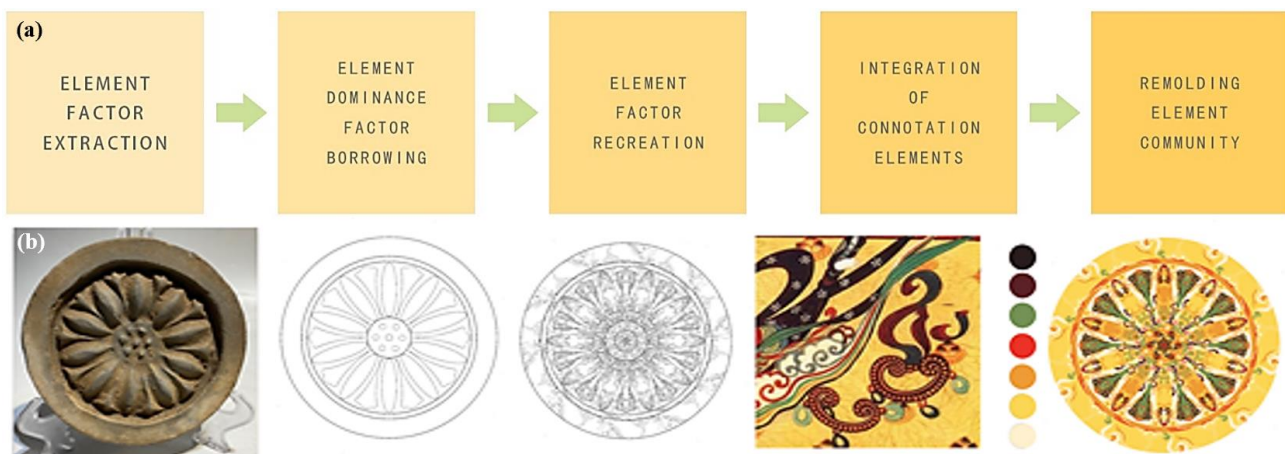
The sunflower-shaped tile pattern was chosen as the basis for the digital makeover, extracting sunflower-shaped lines. In this digital transformation process, physical lines are extracted as objects, which are then converted into a black and white line drawing manuscripts with geometric perspective relationships.

##### 3.1.2 Using retro color language

Color has its characteristic attributes and connotative meaning. Using different colors will bring a different color experience to the viewer. According to the results of 1,300 questionnaires, cultural and creative products should choose "colors with a sense of age" as the best solution. An "aged color" is a color that is more saturated, darker, and lighter. Filling the extracted "age-sense color" into the black and white line drawing manuscript is an important process of digital transformation, which is related to the direct effect of cultural creative design.

##### 3.1.3 Preliminary digital pattern formation

Figure 3 shows a schematic diagram of the display process of digital pattern extraction and design, which mainly includes five steps: element factor extraction, element dominance factor borrowing, element factor recreation, integration of connotation elements, and remolding element community. Taking cultural relic tiles as an example, the processing is carried out according to the above steps, that is, from cultural relic tiles to real objects, to digital creation, and finally to form the color meaning of color images (Figure 3b). In this digital transformation design, most of the circular design patterns are the result of the digital transformation design, and a few design elements contain square and other rectangular patterns. In actual design, circular patterns are also easier to apply, which is mainly due to the fact that most of the cultural and creative products in life are circular in shape, such as scarves, plates, fans, brooches, etc.

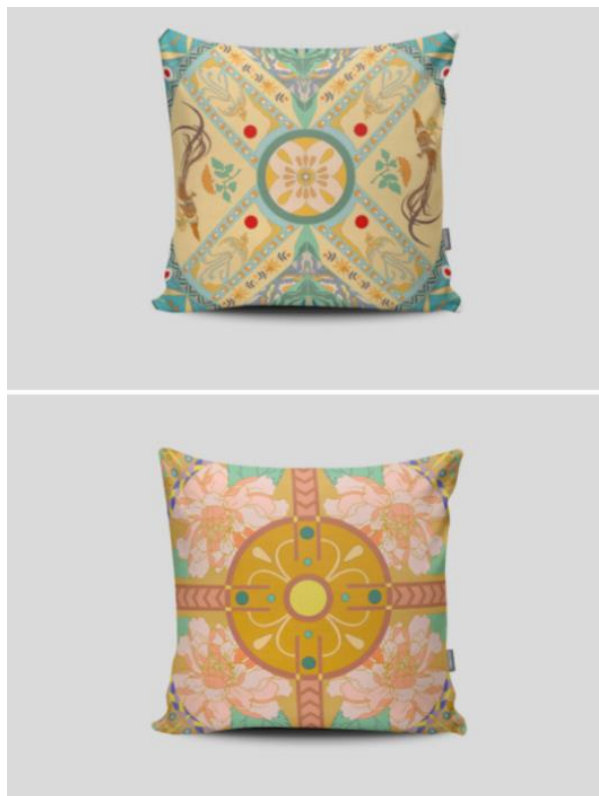


**Figure 3.** (a) Element extraction design process diagram, and (b) display of digital pattern extraction and design.

#### 3.2. Select the display form of cultural and creative products

##### 3.2.1 Pillow cultural and creative products

To sum up, the steps required to digitally transform an intangible cultural heritage graphic include digitizing the intangible cultural heritage graphic, selecting the type of product to be designed and produced, and assigning the extracted digital elements to the object itself to form a digital pattern. Figure 4 is a pillow-shaped demonstration diagram formed by digitally transforming the elements extracted in Figure 3 into cultural and creative products.



**Figure 4.** Intangible cultural heritage products after digital design

### **3.2.2 Income from cultural and creative products**

Taking the actual pillow as an example, the price of a 30cm\*30cm ordinary industrially produced pillow is only \$1, while the digitally extracted and shaped pillow from cultural and creative products costs \$8 for the same size. The use value of the pillow itself has not changed, but the additional price of \$7 is the value-added price that consumers are willing to pay for "cultural inheritance and protection" and "cultural exchange and exchange".

### **3.2.3 Exhibition and sales of cultural and creative products**

The program encourages college students to actively participate in the entire process of research, design and sales. The last link in the digital design and transformation of intangible cultural heritage products is sales. Only cultural and creative products that can be sold are cultural and creative products that are accepted by the public.

In the sales link, we set up the source of campus sales for graduates to choose to buy as graduation souvenirs, and in the square for tourists to buy as souvenirs. At the college student entrepreneurship sales expo held by the government, 80% of the design products of this theme were sold out, which achieved a complete result. The design results of digital protection of intangible cultural heritage displayed in this project are shown in Figure 5.



Figure 5. Digital display of cultural and creative products

#### 4. Conclusion

The purpose of this research is to digitally protect the intangible cultural heritage of "Qin Bricks and Han Tile", adopting excellent industrial design concepts, and extracting the cultural representative symbols of the city and the design of cultural and creative products through digital processing of "Qin Bricks and Han Tile" And sales test, and achieved a good social response.

In the process of intangible cultural heritage protection, the digital transformation adopted in this study is only a very limited part of the research content. The inheritance and protection of culture require the joint efforts of more scholars and professors, governments and policies, schools and people. Creating a sustainable green and harmonious ecological living environment is the mission of intangible cultural heritage protection.

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