Analysis of Application of Digital Archives to Value-Added Design in Cultural Creative Products

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Abstract. With the development of technology, we see more and more possibilities in the methods of conservation and application for traditional culture. Currently, the content in the data base of digital archives information in Taiwan is quite extensive and versatile. It is necessary to study future applications to add to its value. The purpose of this study explored the issue and procedure of value-added design on the basis of digital archives transformed into cultural creative. The research includes two phases. In the first phase, we had interviews with experts exploring the current application issues of digital archives in the design fields. By this way, we created the transforming model by collecting theories and principles of design and combining the experts' opinions. In the second phase, we carried out the design and application to review the possibility of digitally archived cultural instruments as applied to the design.

Keywords: Digital Archives, Cultural Creative Products.

1 Introduction

With changing customers' demands and perceptions, the consumer market advances in an era of experience and aesthetic economics. The distinctness of local culture and the structure of innovation-knowledge become the national core competency. Advanced countries already show their competitive edge which is based on technology and with designs and innovations that have added value through culture and aesthetics. Hence, activities and products related to the culture are gradually being deemed as a profitable commodity, which causes the culture to be commercialized and industrialized [1]. The phenomenon offers an opportunity of the development of cultural and creative industries. The UNESCO [2] being convinced that cultural products have both economic and cultural value, and through cultural embodiment and heritage, become a vehicle for cultural identity, value and meaning.

From the perspective of cultural and creative application, the design of cultural creative products must not only satisfy consumer needs but more importantly, through

the product form, transmit cultural heritage and manifest culturally distinctive aesthetics. Since the latter half of the 20th century, content-based cultural and creative industries have become a highly value-added market because of unique regional cultures and diverse creativity applications. As cultural and creative industry is the trend of economic development of many countries, the distinctive native cultural features and prosperous digital archives information of cultural instruments in Taiwan are of great value.

Conventional cultural documents are often limited by factors such as difficulties in preservation and sharing. However, with the development of technology, we see more and more possibilities in the methods of conservation and application for traditional culture. Digital archives are becoming more developed and common. Current digital archives in Taiwan are increasingly abundant and diverse, and their application and value-added have become noteworthy. This study examined value-added designs resulting from the transformation of digital archives into cultural creative.

2 Digital Archives and Cultural Creative Design

Industries are the driving force behind the development of cultural creativity, and added cultural value can result in innovative value in goods or services. The innovation and application of information technology and the internet have created a new industry in digital content. The Taiwan e-Learning and Digital Archives Program (2008-2012) established the Union Catalog of E-Learning and Digital Archives Program platform to showcase digital media such as digitalized images and audiovideo files in the fields of humanities and nature thereby also establishing a rich database of information. Moreover, through international information system that crosses disciplines and organizations, the preservation and innovation of cultural assets and academic research and teaching application can be pursued [3].

2.1 Taiwan e-Learning and Digital Archives Program

Innovations and applications of information technologies and the internet facilitate the emergence of the digital content industry. With the continuous promotion of the "Taiwan e-Learning and Digital Archives Program" (2008-2012), Taiwan, in addition to the digital preservation and innovation of important cultural assets, advances open learning resources and equal learning opportunities, and with the integration of information technology and humanities, promotes industrial and economic development [3] (Figure 1). Through the transformation of information technology and the establishment of digital archives, as well as through reorganization and innovation, the basis of industrial development was built. Since applications of digital archives materials have become more diverse, a variety of business models have gradually been developed. And in order to integrate the content of digital archives into industry, education and the humanistic and social development, the "Taiwan e-Learning and Digital Archives Commercial Application Competition" was started in 2006, the purpose of the contest is the promotion of value-added applications of

digital archives, highlighting the value of Taiwan's diverse and rich digital archives that invigorate Taiwan's cultural creative design capabilities and create business opportunities.



Fig. 1. Digital Taiwan - Culture & Nature [4]

2.2 The Application of Digital Archives

The development of digital technology has affected everyday life and changed conventional learning and research methods. From conceptualization to implementation, digital archives or digital museums have developed rapidly with advances in information technology. Many information technology significant terms have appeared, such as electronic museum, virtual museum and web museum, indicating that museums and archives are digitizing. Without time and space limitations, such digital archives are available to readers globally. Furthermore, cooperation with schools and community cultural organizations results in value-added information in the digital archives thereby achieving creative learning through their use [5]. Through restructuring and innovation, digital archives established by information technology and storage have become the foundation for developing digital content industries.

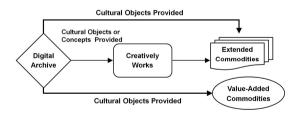


Fig. 2. The application of digital archives in digital content industry [6]

With increasing diversified applications of digital archives materials, a variety of business models have also emerged. Therefore, the use of digital archives and creative designs of the traditional cultural characteristics are turned into cultural creative products, which provide the source of creative design. Hsiang, Chen, Chen and Kuo [7] divided commercial models of digital archive application industries into five categories, namely (1)value-added digital content industry; (2)integrative products; (3)value-added cultural creative products and cultural innovation industry; (4)added content service for digital products; and (5)digital software technology and service. However, Hsiang, Chen, Cheng and Wei [8] also pointed out that digital archives cannot be completely and directly adopted, but through the application of cultural characteristics, story themes, anecdotal allusions and even the inspirations of the artist, value-added goods are produced (see Figure 2). For designers, a touchable product is designed with innovation by scratching elements of cultural characteristic.

2.3 Design Theories Relevant to Cultural Creative Products

Thanks to the improvement of technology, it is easier to implement innovation. In the future industrial design should concern aesthetics of humanity. Norman [9] also suggested that a successful design should consider the suitability, practicability and aesthetics of the product in which emotion is the most important factor. The design concept for emotion can be accomplished by the aesthetic value of the product. As a result, the intention of the design gradually focuses on humanity with consideration of the consumers' feelings when they use the product.

Designers often cleverly create innovative designs in some sort of logical thinking, and understanding the relationship between seemingly unrelated things. However, in order to run a business constantly, designers and producers rely not on sudden inspirations but on well-organized systems of creativity [10]. Tam, Au, and Taylor [11] have concluded that Planning and Collecting, Conceptualizing Ideas, Synthesizing Ideas and Evaluation are four common stages in the design process of Hong Kong fashion designers. Tim Brown [12], the CEO of IDEO, has ever mentioned the design thinking process is better thought of as a system of overlapping spaces rather than a sequence of orderly steps and there are three spaces to keep in mind: inspiration, ideation, and implementation. In summary, the four phases of inspiration, ideation, synthesizing idea and implementation can be the core concept of product design as the designer wants to do a cultural creative design. Furthermore, Stage-Gate System, designed by Cooper [13], is one of the tools of management during the process of new product development. Hung [14] added the phase of "transformation of cultural creative concepts" to the Stage-Gate System. They improved the development process applicable to cultural creative design. In this phase, cultural elements and innovation concepts should be reviewed, reselected and reconstituted. It declares the review of cultural creative concept should be the checkpoint in the development process of cultural creative product.

A good understanding of the cultural attributes will benefit articulating the context between the culture and product design and therefore accelerate concept development. Based on the cultural creative product design framework and process of Hsu, Lin, & Lin [15], the cultural creative product is designed using scenario and semantics approaches. And according to literature review and expert opinions, design guidelines are developed based on the research of consumers' needs, cultural content and design theories. Finally a ten step practical design process divided into four phases was provided to design a cultural creative product. The four phases are: identification (telling a situation), investigation (setting an objective), interaction (writing an analysis), and implementation (designing a product).

3 Research Method

The research includes two phases. In the first phase, we had interviews with experts exploring the current application issues of design fields after the digital archives in Taiwan was online. By this way, we created the transforming model by collecting theories and principles of design and combining the experts' opinions. In the second phase, we carried out the design and application to review the possibility of digitally archived cultural instruments as applied to the design.

This exploration is to build up the model of the transformation of cultural creative design integrating consumers' expectations and design behavior through the previous studies [11-14], the amendment of Hsu, Lin, & Lin's [15] steps six to ten of the design procedure of cultural creative products, the explorations in regards to cultural creative products derived from the ceramic pot and poetry [16-18], and Norman's (2004) three levels of emotional design: visceral, behavioral and reflective level. Having analyzed and synthesized a literature review, we constructed a model for transferring cultural elements into product design. The five design implementation steps are: (A) analyzing the culture; (B) connecting the relationships; (C) developing the concept; (D) examining the context; (E) completing the design. Steps A, B and C refer to the processes which reciprocally connect the cultural elements and the product. Steps D and E address the rationality and embodiment of the product and maturity of the transformation of the cultural elements.

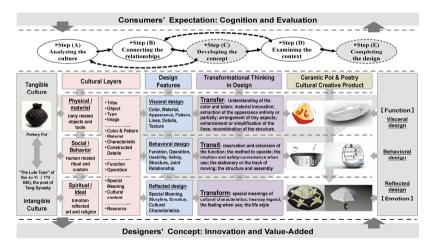


Fig. 3. The transformation model for cultural creative product design

When we design a cultural creative product, we must analyze its property first in order to discover the reasonable connection between cultural elements and the product in each culture. During the design procedure much uncertainty exists which is hard to control by designers. The "design features" and "transformation of design consideration" in Figure 3 help us not only to understand and explore the cultural elements but also to consider the application scope of a cultural creative product. We will be able to design a product in which there's cultural transformation of application and product design with cultural elements instead of merely copying the appearance of relics or totem. This model is a reference for designers which can lead logically to an adequate design transformation and expose the cultural elements properly no matter whether the design is transformed from a tangible or intangible culture.

4 Expert Interviews and Data Analysis

Based on the study prupose and the exploring results of the references, we gradually formulated interview questions and adopted semi-structured in-depth interiew. Formal interviews were conducted in the inviewee's laboratory or studio. Prior to the interview, the purpose of the interview was explained again and the interviewees were provided with interview question information on paper. The interviewer is to explain and clarify the meaning of the questions one by one to ensure that the respondents gained a clear understanding of the interview questions (Table 1). During the actual interview, after the interviewee replied, the interviewer is to continue to ask for more details regarding the responses. The interview is to use a digital voice recorder and camera to completely record the whole interview process.

For the content of the recorded interview content, a third person is to objectively compile them verbatim, and the content is subsequently re-compiled by the author. Due to the different interview subjects, interview time varies from 30 minutes to an hour. For the reliability and validity of data analysis, this study uses the triangulation method approach to ensure the quality of the data analysis. Triangulation method is a method that uses more than one point of view to observe the goal to obtain a more accurate view. These different perspectives can come from a variety of samples and databases, multiple investigators, and a variety of research methodology and theory[19]. To increase the objectivity and accuracy of the analysis, 3 researchers worked on focusing on the research purposes, subject interviews, and analysis of the verbatim content. Finally, the author compiled and summarized the data.

Interviewee/Current Occupation	Field of Expertise	Years of Experience	Education Background
A/ Professor	Craft product design, wood craft, aesthetics, art theory and education	2	PhD
B/ Assistant Professor	Product design and development, pleasure product design and research, model semantic research, toy design		PhD
C/ Company Director	Craft design, cultural product design	8 years of design practice	Master
D/ Company Director	Product design, graphic design, creative design	10 years of design practice	Master

Table 1. Background introduction of the intervewed experts

The 4 interviees of the study all had contact with or purchased cultural creative products. They also instructed students and used digital archive sites to conduct cultural creative product design. The intervewees shared their views on how what roles the Taiwan Digital Archives website in the cultural creative product design applications. Their interview opinions were compiled as follows:

- 1. Network information is currently well-developed; a lot of digital archives and digital data storage websites are available, and relevant information can easily be found. These sites also allow cultural resources to be not limited to a few people, so these sites are beneficial to the popularization of cultural knowledge (interviewee A, C).
- 2. Do not be one-sidedly impressed with cultural elements. Do not engage in design immediately after seeing the cultural elements of the image and picture or after hearing some stated opinions. The Digital Archives picture is taken from a photographer's point of view. Even if you can gather a wide range of angles with many different types of pictures, its effect for inspiration of design is still very limited (interviewee A, C).
- 3. Some digital archives are built adequately but some information is a little too complicated. Otherwise, only pictures are available without much explanation. When designing, the problem that designers usually encounter is that they cannot only use the data of the digital archives as a source of inspiration. The designers would like to know more content such as the background information, the history, and the uses of the antiques. Designers need to search in depth and summarize the data, actually come into contact with the antiques or personally experience the ceremony process. I believe they would have many more mature design ideas (interviewee A, C, D).
- 4. If the time for design is urgent, then designers can rapidly search for the data from the Digital Archives Web or Internet. These sites can temporarily help. However, the usefulness depends on the adequacy of the database (interviewee A).
- 5. In this Internet era, the amount of information is more than enough, but finding a way to interpret the information is crucial. Most current digital archives put a lot of pictures and information on the site. However, follow-up organization and compiling is required. Through analysis and integration of information, information can be effectively transformed and applied so they can become useful knowledge. Many fields have been engaging in discussion. However, in the application of design, the issues are not that clear (interviewee B, D).
- 6. Digital Archives websites seem to use the same method to compile artifacts. However, not all artifacts are suitable for organization in the same way. For example, we can hang up clothes to organize them but we cannot do the same thing for sneakers and furniture. Digital Archives should have different classifications according to the different types of artifacts, or have different arrangements and presentations on the web (interviewee D).
- 7. For promoting the use of the Archives, Taiwan Digital Archives website seems to require more work. When searching for information in general, most people directly search for the site from the search engine on the default homepage such as

Google or Yahoo. People only enter the site when there is a link to the Digital Archives Web site or when they think that the site may have required data. In addition, people often encounter problems when using keywords to search on the digital archives websites and not finding them (interviewee D).

8. Regardless of digital archive website or pictures and data of other network resources, issues on citation of design or copyright disputes require solutions. For some design projects, if the direct explanation is a quote from an artifact, they may have to pay licensing fees or face the issue of subsequent payment. Most companies or designers will want to dodge this issue, the use of cultural elements can only be limited for inspiration or partial usage (interviewee C).

5 Design Practices by Digital Archives

Currently, many design ideas arise gradually in the design field compared to the appearance of functional-orientation decades ago. The thought of design trend is not only in the consideration of product's function and manufacture, but also the focus on cultural heritage and connection, creation of lifestyle, experience of life-taste and the realization of life values. As we are in a period of the prosperous development of cultural and creative industry, the consumer market values the product which contains cultural and aesthetic characteristics.

Through the transformation model for cultural creative product design (Figure 3), the designer endeavors to design experience. As described below, in the actual design, the designer applies Transformational Thinking in Design to the cultural information from digital archives platforms to design different levels of cultural creations and explore the application of value-added designs.

5.1 The Taiwan's Endangered Species Application of the Cultural Creative Product

Designers show great interests for carpentry. They were fascinated after they are exposed to foreign famous wooden toy brand works. For example, the Japanese brand Take-g toy adopted splicing techniques of different colors of woods and showed excellent role characteristics. The Danish brand Kay Bojese provided traditional toys played by Danish children with new life and new fun. As a result, in the process of becoming exposed to cultural creative products, designers also became interested and were inspired to produce wooden playing objects that represented Taiwanese style and features. This design exemplifies was awarded honorable mention in the 2011 Creative Toy Design Competition of Maxim Enterprise. The design process are as follows (see Figure 4):

1. Analyzing the culture: Taiwan designers start thinking about what cultural features can be made into wooden objects. Their initial thoughts included gods, animals, and children toys. However, as the acceptance of animal imagery is more popular, animals were chosen as the sources of ideas. Designers first thought about Formosan Black Bear and Black-faced Spoonbill, and browsed the internet at related digital archives for text information and picture data.

- 2. Connecting the relationships: for animal appearance, some characteristics include the white v shape formed by white hairs on the chest of Formosan Black Bear; Formosan Sika Deer are named for their white plum-like spots on their back; and Formosan rock-monkeys have obvious large reddish brown sports between their two bottoms. Designers want to make functional wooden playing toys, so they focus on the outer features and actions of the animals. They try to think of ideas that can link the characteristics with the product function.
- 3. Developing the concept: the special features found on the body of animals are transformed to functional office wooden playing objects that allow office workers to enjoy their time at work. The objects used a variety of wooden materials and they were used to make collages of special designs. People can also touch the different wood grains and fulfill their psychological needs of owning a small pet.
- 4. Examining the context: the designers discuss whether the outer features or actions of the animal can match the set function of the wooden playing object. The designers also want to produce a style similar to the Japanese brand Take-g toy's. However, the production technical capacity is technically insufficient at the moment, and this would be the future working goal.
- 5. Completing the design: the primary materials of the finished products are rose-wood and cedar. Formosan Black Bear playing object can use its strong body and wave its arms to meet the function of lifting objects or placing glasses. Formosan Sika Deer playing objects can use its unique deer antlers as a place to put pens and hang accessories, and the deer head can be used to place post-it notes. Formosan rock-monkey playing objects' long arms can be used for hanging small items, and its mouth is designed with a magnet inside, which can clamp memo pads.



Fig. 4. "Taiwan's endangered species" office playing objects, design by Lin, S. E. (2011)

5.2 The Poetry Application of the Cultural Creative Product

The character is the most important tool to record the history and culture. The Chinese character presents not only the heritage and development of the culture but also the symbol of the traditional esthetics. Literary works as rhymes derived from Chinese character, such as classical poetry, tune, are very touching and worthwhile exploring. Sometimes the wording of Chinese poetry describes concrete articles but other times the feeling hiding behind the articles or circumstances. As a result, the reference information for design will be rich with good understanding of the poetic rhymes. This design was honored by being nominated for the 2012 Taiwan e-Learning and

Digital Archives Application Competition. The design process are as follows (see Figure 5):

- 1. Analyzing the culture: Chinese literature is full of literati's insights, ideas, and feelings regarding the world. These feelings and thoughts produce many poetic writings that were passed down for many generations. Designers obtained inspiration from the more familiar and common poetic writings, and selected Song dynasty's poet Su, Shih's poetic writings from *Recalling the Old Days at Mianchi*. They tried to feel the atmosphere of the words to design their ideas: "To what can we liken human life? Perhaps to a flying bird's footprints on snow and mud."
- 2. Connecting the relationships: the meaning of the words is that birds resting on the snow ground and occasionally leave their claw prints. The timing may be a slight instant and the birds immediately fly far away. The designers want to link the idea that the flying birds taking a rest on the snow ground to leave slight claw print marks shortly and then flying away with the action of using a stapler to staple papers.
- 3. Developing the concept: the mood of the flying birds stepping on the snow mud is integrated with the operation of the stapler. The action of briefly stapling the mark on paper is like that of the flying birds leaving footprints when stepping on snow mud. The appearance of the stapler is the shape of a flying bird. However, the style of the birds was abstract and simplified. The designers made sketches of the design drawing.
- 4. Examining the context: the designers discuss whether the bird's head should be facing forward or backward and the shape of the wings. These features can affect having the feelings of a flying bird stepping on snow mud and then flying away when the stapler staples the paper in that instant. Also, the features should make the stapler easy to grip and use.
- 5. Completing the design: the final design decision is a product that integrates the colors of black, gray and white. The colors intend to convey the cultural beauty of Chinese water ink painting. After users finish stapling papers, the stapled marks would be in the shape of the claw. This incorporation of poetry into stationery products allow the products to carry a story-like east literati thinking and feelings.

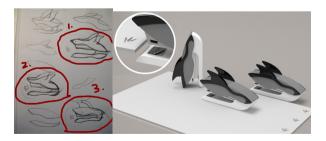


Fig. 5. "A flying bird stepping on snow mud" stapler, design by Lu, Y. (2012)

6 Conclusions and Recommendations

Globalization brings people convenience in life but their localized culture drives people to look for a prosperous quality in their life and mind-set. In cultural creative product design and application, development and innovation are critical for creating products that not only pass on cultural assets and demonstrate cultural aesthetics, but are also practical in daily life so that consumers can once again realize the beauty of traditional culture. Digital Archives websites are conducive to the popularization of cultural knowledge. However, the sites may also lead to controversies related to ownership of intellectual property rights. Currently, the completeness of the various types of digital archive data is different, and the web page presentation effect also differs. When engaging in design, digital archives website is conducive to quick access regarding cultural information and pictures. However, to know more about the background, history, and uses of the artifacts, continuous in-depth search, analysis, and compilation of the cultural context are required. Having an actual access to the artifact in person would be more helpful in inspiring design ideas.

The transformation of digital archives into cultural innovations has become a practice in value-added designs and creations so that through analyzing and exploring product presentation, designers can bring out the cultural significance in their product designs and applications. However, during the process, designers often encounter difficulties in obtaining cultural information, and hence establishing digital archives for cultural relics can help fulfill such needs. Through the design practices based on the transformation model for cultural creative product design, we participated in various competition and had good performance. We expect this innovative learning with digital archives will help to improve the teaching and cultural creative product design. The results of this study can be used as future reference for designers in their value-added application of digital archives and designing cultural creative products or products in other domains.

The unique ethnic cultures in Taiwan and rich diversity of digital cultural archives are not only of historical significance but are also important assets in the development of cultural and creative industries and therefore their creative applications are worthy of further exploration. More in-depth studies on creative design can be conducted to facilitate more unique depth and substance in the development of Taiwan industries.

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