The Influence of a Co-Design Model on Handicraft Innovation Projects
A Case Study on PACC Bamboo-Weaving Products

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ABSTRACT
This paper examines the manufacture of bamboo-weaving products and Chinese handicraft innovation projects. Three cases of PACC design projects for bamboo-weaving products are discussed according to the related theory of co-design. The realization of co-design requires three levels: preliminary communication; non-designer influences on the "FFE"; and non-designers proposing design ideas. Co-design requires the designer to give up some decision-making authority and believe that all members of the team have equal creativity. Once the team can cross the chasm of "mutual translation" successfully, co-construction and sharing will be easier. In terms of the method of cooperation, all three cases use the co-design method. However, the three cases each use a different type of collaboration pattern. The first model can be adopted when there are language barriers and cultural differences between participants. The second model is needed when time and space do not allow participants to gather in one place. The third model can be used when neither of these two limitations exists.

Keywords: *Co-design, Bamboo-weaving product, Handicraft innovation project.*

1. INTRODUCTION

With the rise of industrialization and consumer societies around the world, traditional handicrafts, which used to be an important part of the economy and culture, have been declining in terms of both production scale and production level [1]. However, the large-scale emergence of private customization after entering into the post-industrial period reflects that customers are no longer willing to passively adapt to singular products, and what is attractive is those products or services that meet the customer's personality and have a unique meaning. Due to their strong regional characteristics and humanistic value, traditional handicrafts will face opportunities and challenges in the new era. In 2017, the Craft Revitalization Plan was issued by the central government's State Council to reintroduce craft products into everyday life. The implementation of this policy promoted the rejuvenation of Chinese handicrafts and the development of cultural and creative industries. PACC is an organization, subordinate to the Shanghai Municipal Education Commission, whose purpose is to serve society with academic knowledge, promote social progress, and explore innovative educational mechanisms. In November 2017, the Shanghai University Traditional Craft Workstation was established at PACC by the Ministry of Culture and Tourism.

The innovative design projects for the three bamboo- weaving products involved in this study were not only initiated and promoted by the same institute (PACC) but also used the same material (bamboo) and the same weaving process, which is the subject of this study. In this project, the designers were not experts in bamboo-weaving, but finally completed the co-design and innovation of bamboo weaving products. Some of the works are more fashionable and modern in style and color matching, while others have broken through the functions and usage scenarios of the original products by being combined with other materials. This study not only used the observational method but also conducted a semi-structured interview with each project participant, which helped to analyze the co-design model and compare different projects. By analyzing how designers, craftsmen, and other participants communicated and shared with each

other and how they crossed the chasm of "mutual translation" successfully, researchers verified that the three co-design methods play an important role in promoting the innovation of bamboo-weaving products, which may have some reference value for innovation in other types of handicraft products.

2. RESEARCH AND CASE STUDIES

2.1 Bamboo Products

Bamboo is one of the fastest-growing and most versatile plants on earth. Most bamboo products can help to promote environmental protection and rural economic development as integral parts of sustainable development. Furthermore, using bamboo-based products can help to develop local culture, and more and more designers are selecting bamboo materials for innovative designs. China is one of the countries with the highest abundance of bamboo resources in the world, and its output and types of bamboo products and level of industrialization rank first in the world. However, the survey found that there are too many types of bamboo products and the process for their manufacture is extremely complicated. Therefore, the production of bamboo-weaving products has mainly been done in a traditional, hand-made way. In the survey, Yang found that the consumer group was highly satisfied with the production process for bamboo-weaving products, but was not satisfied with the shape, color, and functionality of the products, and the price factor had the lowest impact on the users' purchasing behavior [2]. These findings provide a theoretical basis for the innovative design of bamboo products.

2.2 Innovative Design of Handicrafts

Design is a behavior that changes the status quo and tries to achieve a better state, and innovation is an act that gives resources new value in a social system. While the process of designing requires a certain amount of resources, good design helps to drive new value and design has the potential to drive innovation. Design is a culturally based creative activity, and local designs (handicraft products) can reflect the characteristics of a regional culture. Usually, when a place is rich in a particular material, people will create a special production method based on the characteristics of the material, which shows their humanity. When people-oriented design is valued, the original mass-produced products will gradually turn into niche personalized products.

In 2016, China's Ministry of Culture and Education launched several intangible cultural heritage projects and training courses to support the inheritance and development of intangible cultural heritage handicrafts. As one of the hosts of China's Intangible Cultural Heritage Inheritors' Joint Training Program, PACC has effectively implemented the construction of and innovation on inheritors' training and the innovative transformation of techniques. This study selected three of PACC's bamboo projects for investigation and comparison. ("Table 1" and "Figure 1")

- Project 1: according to the International Contemporary Artists Resident Project, PACC invited Dutch product designers Erik and Yvonne to cooperate with Chinese bamboo-weaving artist He. The project's location was He's studio in, Dongyang City, Zhejiang Province. The project lasted for one month. Due to language barriers, the designers and craftsmen were unable to communicate directly, so PACC sent two graduate students to assist with translation and trouble shooting.
- Project 2: after communicating with the Qingshan bamboo-weaving craftsman Yin, fashion designer Ran was invited by visual designer Lily (the project manager of PACC) to join the design project. The project had a long completion cycle and all of the production processes were completed in their studios.
- Project 3: during the Intangible Cultural Heritage Inheritors Bamboo Training Program, which is a training course for bamboo art inheritors, PACC invited several designers and craftsmen to cooperate on a project. Shi, an industrial designer who has been focusing on the design of wooden acoustic boxes, collaborated with the Liang Ping bamboo craftsman Mou to create a new idea. They found that the Liang Ping bamboo-weaving textile is as thin as hairs, and almost transparent, which makes it suitable for the dustproof screen of the acoustic box.

Table 1. Three of PACC's bamboo-weaving projects

No.	Name	Types	Participants	Date
Project 1	Bamboo lantern	Lighting design	Erik, Yvonne, H.B.He, X.P.Zhang and Y.X.Hu	2019
Project 2	Grasp happiness	Fashion design	R.He, Y.Ying and L.L.Zhang	2020-2021
Project 3	Bluetooth Speaker	Product design	B.Shi, Y.C.Mou	2022

Figure 1 Three of PACC's bamboo-weaving products.

2.3 Co-Design

Collaborative behaviour is a genetic attribute of all social animals, which has always accompanied human existence and continues to evolve with the development of social, economic, technological, political systems and other factors. [3] Collaborative design is a special form of participatory design. It is related to the innovative activities that occur within an enterprise. It is usually applied in the commercial field, where the designer not only engages constructively with the customer but also with the technical staff and other stakeholders [4]. Murphy proposed the concept of the "Fuzzy Front End" [5] in the design process, which includes the concept generation stage, the product definition stage, and the project evaluation stage. Co-design allows relevant people to participate in the "Fuzzy Front End" of the innovation process, and each participant has the right to influence the design.

Although co-design was initially generated and applied in business and UR, it can also be applied to the design of different objects and practical activities with subsequent development. Zhang pointed out that co-design also plays an important role in the protection and development of intangible cultural heritage [6]. Designers and people who have no training in design (non-designers) work together [7], which not only subverts the traditional division of labor in the creative process [8] but also drives innovation. Therefore, co-design is widely regarded as "creativity in the process of design and development".

How do researchers determine whether an activity belongs to co-design? Three requirements have been put forward in [9]. Based on the existing research, this study proposed that the realization of co-design requires three levels: the "early stage of communication", "non-designer influences on the Fuzzy Front-End (FFE)" and "non-designers propose design ideas". This paper introduced cases of the design of bamboo products in PACC, which confirmed that collective creation behaviors occurred during the whole process of those projects in which co-design model was used. ("Table 2", "Table 3" and "Table 4")

Table 2. Three levels of co-design

Three levels of co-design	Form of expression
Level 1	Early stage of communication
Level 2	Non-designer influences FFE
Level 3	Non-designers propose design ideas

Table 3. Case analysis of the three bamboo-weaving projects

Project 1	I. The craftsman introduced the bamboo material to the designer, and then the designer put forward the home design direction.
	II. The designer came up with an idea about luminaire, and then the craftsman proposed several molding methods according to the properties of bamboo material.
	III. A multi-colored semicircular modeling design scheme was proposed by the designer, and then the craftsman improved the design.
Project 2	I. X(Visual Designer) communicated cooperation ideas with Y(Fashion Designer) and the craftsmen respectively.
	II. The craftsman introduced the bamboo material properties to the designer Y, and then Y discussed the handbag design scheme with X.
	III. After the discussion with designer X, the craftsman tried to design “Fu” pattern and was carried out the bamboo fiber dyeing experiments
Project 3	I. Designers and craftsmen introduced themselves to each other and proposed their own design ideas.
	II. After the evaluation of design ideas and techniques, designers and craftsmen finished grouping by real freedom of choice.
	III. Through discussion, craftsmen and designers established design objectives and improved the specific process and details of the design.

Table 4. Case analysis of the three bamboo-weaving projects

Three levels of co-design	Project 1	Project 2	Project 3
Level 1	√	√	√
Level 2	√	√	√
Level 3	√	√	√

In the three cases, researchers found that exploration activities were critical to the emergence of innovative ideas, and that designers and non-designers have the same ability to innovate. However, researchers need to consider the question of how do designers and craftsmen accurately express an idea when their knowledge structures and ways of thinking are quite different? On the one hand, they should overcome language barriers and seek common ground while reserving differences. On the other hand, designers should give up part of their decision-making authority and believe that all members of the team have equal creativity. “Mutual translation” needs to be done in a specific environment, and the key is to coordinate the relationship between people. (“Figure 2”)

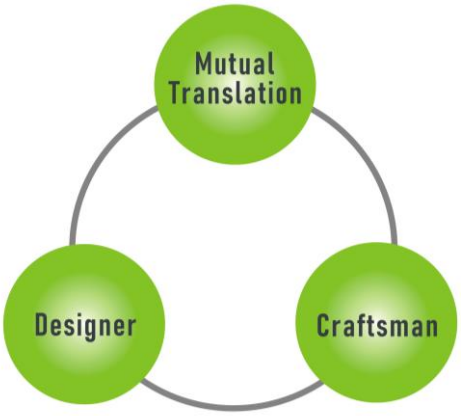

Figure 2 Analysis of co-design model.

3. COMPARISON AND EVALUATION

Below, researchers provide an analysis of the three co-design models for bamboo-weaving products in PACC(“Figure 3”, “Figure 4” and “Figure 5”)

Figure 3 Co-design model 1.

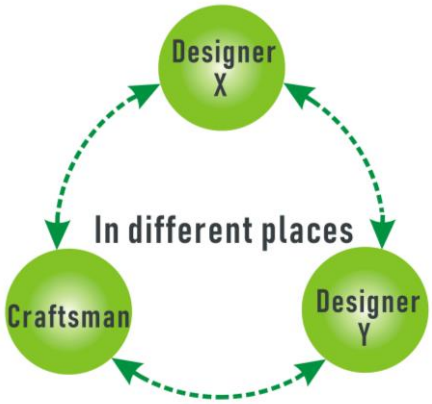

Figure 4 Co-design model 2.

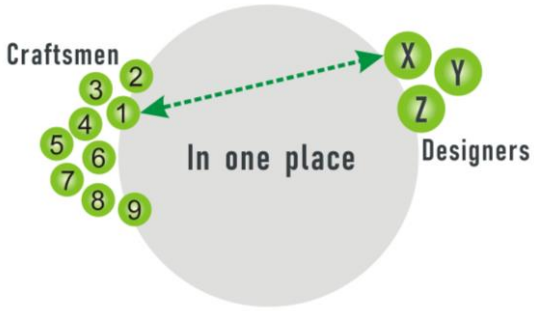

Figure 5 Co-design model 3.

- Model 1 is especially useful when there are language barriers and cultural differences in the team. The assistants were not only responsible for language translation but also needed to understand different cultures and knowledge structures. Assistants must have a certain professional background and project execution ability. They sometimes put forward their ideas and participated in the product's design. Besides this, working together in same place will create further opportunities for communication, such as making models, demonstrating techniques, and body language between designers and craftsmen.
- Model 2 is especially suitable when team members are unable to meet due to time and space constraints. For example, co-design must be done in different places when some of the tools and materials that are required to manufacture a handicraft can only be used in a specific geographical environment. In this model, team members communicate through a network and mail. This type of co-design model is flexible, but it needs a more powerful project leader or organizer.
- Model 3 can be used when neither of the above two restrictions exists. At the beginning, two or more groups that can communicate directly gather together at the same time. Then, they use a variety of media to introduce themselves and present their individual vision. Finally, each member finishes the grouping by a real freedom of choice. This model is more liberal, and the participants stimulate creativity through brainstorming and become active promoters of the whole process.

4. CONCLUSION

This paper discussed three PACC design projects for bamboo-weaving products and analyzed how designers, craftsmen, and other participants share with each other, cross the chasm of "mutual translation", and build common design goals. The three co-design models that PACC uses provide a great ability to innovate, especially the third one. The third co-design model not only provided participants with a sense of ownership over the contributions they made to the co-design process but also improved the efficiency of "co-construction".

The contributions of this article are twofold. Firstly, based on the recognition that co-design theory plays an important role in the innovation of handicrafts, it proposed that the realization of co-design requires three levels. Secondly, it verified that the three design projects all used the co-design model. By comparing the specific details of the projects and establishing the models, the three co-design models were deeply analyzed and evaluated. Co-design provides a "tool" for collaboration between designers and craftsmen. However, many factors influence innovation and, due to the limited number of subjects in the sample, the three co-

design models may not be fully applicable to all types of handicraft projects. Researchers hope that these models will be a reference for an innovative organization model for other types of handicraft products.

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