



EXPLORING CHINESE CONTEMPORARY XIANGSHENG HOME DECOR ON TEA-BASED
MATERIAL WITH ECOLOGICAL AND SUSTAINABLE DESIGN CONCEPTS: CASE STUDY ON
PLANT IMAGERY



By
Miss Muran HUANG

A Thesis Submitted in Partial Fulfillment of the Requirements
for Doctor of Philosophy Design Arts (International Program)

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Miss Muran HUANG : EXPLORING CHINESE CONTEMPORARY XIANGSHENG HOME DECOR ON TEA-BASED MATERIAL WITH ECOLOGICAL AND SUSTAINABLE DESIGN CONCEPTS: CASE STUDY ON PLANT IMAGERY Thesis advisor : Assistant Professor Jirawat Vongphantuset, Ph.D.

In the context of sustainable development and the ongoing process of globalization, Chinese modern design, while continuously learning from the technological expertise and design methods of developed countries, has yet to establish a unique position within the global design context. The excessive imitation of Western design has overlooked the distinctiveness and identity of local culture, which has led to a lag in the development of localized design methodologies. Therefore, this study focuses on exploring the integration of localized artistic design practices with agricultural waste, particularly the feasibility of tea-based materials in the field of home decoration.

The aim of this research is to explore the potential of converting waste tea into tea-based materials and to analyze their material characteristics and artistic expression in xiangsheng home decoration. Through literature review and case analysis, the research constructs a theoretical framework of "xiangsheng" based on plant imagery and applies it to the practice of xiangsheng home design. A mixed-methods research approach was employed, involving multiple material experiments, design experiments, and in-depth interviews to collect first-hand data on the application of tea-based materials, followed by statistical analysis.

The results show that converting waste tea into tea-based materials is technically feasible and practically viable. The application of these materials in home decoration not only provides new avenues for artistic expression but also brings innovative possibilities to users' sensory experiences. Furthermore, this research proposes a plant-based "xiangsheng" design framework, laying a new theoretical foundation for the future development of "xiangsheng" design.

In conclusion, design practices based on agricultural waste can significantly advance the development of design arts, offering new possibilities for the innovation of traditional "xiangsheng" design and the spreading of local culture. Future research should further explore the unique characteristics and in-depth applications of plant-based materials in various design fields.

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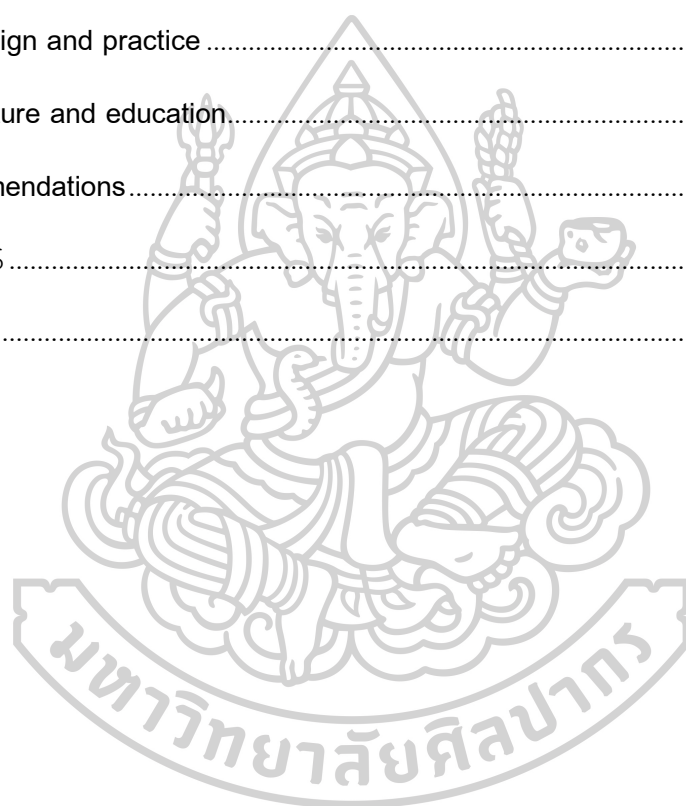
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Chapter 1

Introduction

1.1 Background

Contemporary design emerged in the 1990s, primarily excelling in architectural design, environmental art design, and display design. The most characteristic trait is the coexistence and integration of diversified design styles. Despite the variety of design styles, existing research reveals certain commonalities in describing contemporary design. Contemporary design emphasizes the permeability and interaction relationship between persons and their environment (Zhang, 2023). Sustainable design, ecological design, and green design are associated with design trends (Ruan, 2023). Besides, Contemporary design prioritizes emotion, aesthetics, and ethical responsibility (Ye & Li, 2019). The Dutch De Stijl School advocates for the cultivation of a shared cultural perspective among artists and designers, emphasizing the integration of nature and emotion into design (Wu, 2018). Although the performance forms and styles are diversities, contemporary design emphasizes natural, ecological, emotional, and aesthetic considerations. The term bionics pertains to the original definition of biomimicry (bios – life, mimesis – imitation). Biomimicry is an emerging trend that emphasizes the development of innovative and ecologically sustainable designs inspired by natural processes (Bumgardner & Nicholls, 2020). In ancient China, the concept of Xiangsheng is very similar to the essence of bionics. To split the word "Xiangsheng", "Xiang" means image and imitation, whereas "Sheng" signifies creature and vivid presentation. Xiangsheng can thus be defined as the imitation of natural items, and presenting vividly. The similarity between Chinese Xiangsheng and modern bionics lies in their essence of human observation and imitation of nature. Xiangsheng is characterized by an incredible similarity to natural items and a notable lack of innovation among its imitators, resulting in a realistic representation that evokes feelings in the audience with the vivid creatures (Li, 2017). This also distinguishes Xiangsheng from bionics, with the former being closer to the category of art, while the latter is more suitable for the design context. However, most Chinese scholars generally use the term bionics instead of xiangsheng. There are approximately two main reasons for this: the increasingly blurred boundaries between art and design and the accuracy of modern professional terminology.

A thorough exploration of Xiangsheng shows that its essence reveals the human activities to convey emotions, aspirations, and aesthetics through natural imagery. Consequently, choosing Xiangsheng objects frequently has significant cultural implications and aesthetic values. Imagery refers to the object that encompasses cultural symbols. Imagery is utilized across diverse domains of Chinese literature, calligraphy, fine arts, and philosophy. It constitutes the essence of art and beauty (Ye, 2010). Plant imagery is cultivated in the process and outcomes of art practice (Liu, 2023). The creation of plant imagery arises from aesthetic perceptions of plants, and traditional culture (Du, 2009). Plant imagery is extensively employed in creative projects, facilitating the attainment of cultural identification and the ongoing preservation and evolution of Chinese traditional culture. The emulation of nature by artists promotes the aesthetic merit of Xiangsheng's works and spreads the cultural significance of plant images.

The design of nature-inspired elements not only guides the creative direction but also satisfies the spiritual needs of humanity. Yu (2013) asserts that "returning to humanity and nature" constitutes a significant aspect of modern design concepts in the 21st century. Bionic and traditional Xiangsheng derive from nature, reflecting human society's awe and admiration for the natural, while also conveying human aesthetics and emotions. Modern designers and artists consistently derive design elements from nature, examining the distinctive traits of natural organisms. They utilize the structure, color, sound, form, and functional principles of these organisms in their design activities, integrating technical methods and applying nature's wisdom to products, apparel, architecture, and other fields. Design thinking is important, but the innovation of technology and materials and the practice of new materials also play a vital role in the development of the design industry. Dykes et al. (2009) pointed out that interdisciplinary integration is the characteristic of today's design. The application of materials plays an important role in the design process. Materials have two overlapping roles: that of providing technical functionality and that of creating product personality. According to Ashby & Johnson (2013), materials are the ingredients designers use to imagine, create, and modify an idea so that when it is made it becomes more than an object or a product, part of a bigger system of storytelling and experiences.

Bio-based materials are different from traditional chemical materials produced from non-renewable petrochemical resources such as coal and oil. Their advantages are

renewable raw materials, reduced carbon emissions, and energy conservation. Therefore, bio-based materials are an important direction for the development of the international new materials industry. The research and development of bio-based materials is in line with the development trend of contemporary design. Chele, E. S., et.al, said that, companies increasingly bet on the use of natural fibers in an attempt to be "green", which increases their philosophical points of view about "eco" (2012). Design theorist Victor Papanek mentioned in his book *Designing for the Real World* that design should consider the use of limited resources in the world and serve the protection of environmental resources (1971). As sustainable materials, the research and development and application of bio-based materials can promote the process of circular economy and sustainable development. According to Reichert (2020), The issue of sustainability is crucial, encouraging politics, academia, and industry to develop sustainable and circular alternatives for preserving resources for future generations, focusing on biodegradable and bio-renewable materials.

1.2 Statement of problem

1.2.1 Problem 1- the lost of traditional Xiangsheng

With the continuous development of human civilization, especially the progress in science, technology, academia, and culture, the precision of modern professional terms has been increasingly enhanced, which has led to the gradual blurring and even abandonment of the concepts of traditional words. New professional terms have not only changed the way traditional words are used, blurred their original meanings, but even directly replaced them. Although this process is similar to the natural evolution of language, this phenomenon is catastrophic for both traditional crafts and traditional culture. With the continuous development of Chinese design, in terms of design practice, Chinese design has shown convergence with internationalism, while from a theoretical point of view, when referring to Xiangsheng, most scholars replace it with the concept of bionics. As an important component of Chinese plastic culture, Xiangsheng is a remarkable chapter in the evolution of Chinese arts and crafts. Chinese Xiangsheng has similarities with modern bionics, and their essence is people's imitation of nature. However, when the concept of Xiangsheng is consistently obscured and even forgotten, what is abandoned is not merely the term itself, but also the traditional cultural identity.

1.2.2 Problem 2- the spread of plant imagery

Plant imagery is a traditional Chinese culture. It originated from the ancients' worship of nature. As human civilization progressed, plant imagery became extensively utilized in literature, painting, sculpture, and other fields, ultimately developing into a unique cultural symbol. In creative practice, creators express emotions via plant imagery and convey aesthetics with plant shapes, while simultaneously enriching the cultural significance of plant imagery through their creations. The term imagery possesses significant art and humanistic attributes, hence generally reflecting in the fields of art and literature. With the acceleration of the modernization process, the cognition of plant imagery in contemporary Chinese society has gradually become blurred, and globalization has caused the younger generation to feel alienated from local culture. The inheritance and dissemination of plant imagery must establish a stronger relationship with the public, indicating that it is far from enough to use art as a medium of the creative process. Plant imagery ought to be incorporated into public life scenarios.

1.2.3 Problem 3- the reuse of agriculture waste

If the application of nature-inspired in the field of design is an "evolution" process, then the development of design is inseparable from the "innovation" of materials. Tackling global climate change is urgent, and advancing sustainable development is the duty of every conscientious art and design practitioner. The renewability and environmental benefits of bio-based materials render their research, development, and application significant topics in the field of art and design. An increasing number of producers and designers are integrating bio-based materials into clothing, products, architecture, art, and various other industries. In 2015, the German design firm Kaffeeform introduced its first espresso cup made with coffee grounds. In 2022, the Canadian fashion firm Lululemon created "the world's first series of yoga accessories composed of mushrooms." The R&D team utilized the new substance "mushroom mycelium" to advance significantly towards a pure and sustainable future. Really Clever, a UK firm, is creating 100% biodegradable leather composed solely of mushrooms and algae. These examples demonstrate the viability of utilizing bio-based materials in products. Agricultural waste is a renewable resource. As a major tea producer, China produces a large amount of expired and wasted tea every year. Traditional waste disposal methods,

such as landfills, composting, and incineration, always aggravate environmental pollution. Transforming tea waste into tea-based materials will enhance the resource usage of agricultural waste and relieve environmental stress. However, the investigation of tea-based materials within the field of design remains unexplored. The transformation of tea into tea-based materials and the application of the material for home decor remains an unexplored subject.

Traditional Xiangsheng is an important component of Chinese plastic culture, with plant imagery serving as a central element in its performances. How to integrate plant Xiangsheng into contemporary home decor from a sustainable development perspective remains an area that requires further exploration.

1.3 Significant of the research

This study illustrates its research significance from theoretical, practical, and societal viewpoints. The study commences with innovative reuse of agriculture waste, focuses on cultural inheritance and dissemination, adopts diverse research methods, and provides valuable insights and inspiration for researchers, art design practitioners, and other fields.

1.3.1 The implication to research

1. Enhanced the Xiangsheng theory: This research advanced the Xiangsheng theory by analysing its relevance and cultural background through literature, use case studies to clarify its features and expressions. Moreover, from the perspective of plant images and bio-based materials, Xiangsheng practice was implemented to augment the depth and breadth of Xiangsheng theory. The research supports design practitioners in comprehending Chinese Xiangsheng and promotes the spreading of Xiangsheng concepts within the field of art design.
2. Expanded the Xiangsheng paradigm: Throughout the research process, the researcher engaged in Xiangsheng practice with new materials, thereby broadening the Xiangsheng paradigm and offering scholars and practitioners both practical approaches and theoretical frameworks.
3. Enriched the significance of plant imagery: This study combed the typical traditional plant images in China through observation and literature, and summarized the plant images from multiple perspectives, such as biological characteristics, religious

meanings, and cultural meanings. This research can potentially enhance the comprehension of traditional plant imagery among the general public.

4. The viability of utilizing tea-based materials in Xiangsheng practice has been proved: The research employed material and design experiments to illustrate the procedure of transforming tea into tea-based materials and its approach in Xiangsheng practice. Empirical research has revealed the feasibility and uniqueness of tea-based materials in home decor.

5. The development of interdisciplinary theories: This study combines the relevant knowledge of materials science, botany, literature, bionics, and art design to a certain extent, forming an interdisciplinary integration. This interdisciplinary theory and practice has promoted mutual learning and reference in various fields, thus achieving the sustainability of disciplines.

1.3.2 The implication to practice

1. Advanced sustainable development: The reuse of agricultural waste aligns with the principles of sustainable development. This study explored the transformation of waste tea into tea-based materials from a practice perspective and implemented design methods for these materials, providing practical solutions for designers and manufacturers, thereby improving the utilization of agricultural waste.

2. Improved material innovation and artistic performance: The study found methods to convert tea into tea-derived materials, thus promoting the development of bio-based materials. The incorporation of tea-based material in home décor elevates aesthetic expression through multiple dimensions, such as flavor, texture, color, and tactile sensation. The combination of materials and Xiangsheng enriches the visual performance of Xiangsheng works. Presenting Chinese Xiangsheng through new materials enables peers to gain new ideas and creative techniques.

3. Enhance the quality of life for tea farmers: Conventional landfill, composting, and incineration techniques exacerbate environmental pressure. This study has identified a method for reusing agricultural waste, which will encourage policies and manufacturers to recycle tea waste. This initiative can assist tea farmers in addressing the concealed risks of residual and waste tea, while also transforming waste tea into a valuable resource, enhancing farmers' revenue, and improving the quality of life for individuals in tea-producing regions.

4. Facilitate knowledge dissemination and talent development: This study has generated new insights across the fields of cultural innovation, design innovation, and material innovation and described related methods of study. These contributions will enhance the dissemination and development of interdisciplinary knowledge, allowing for the application of new insights across various sectors. Moreover, from an educational perspective, the research will encourage the development of professional talents with creative capabilities.

1.3.3 The implication to stakeholders

1. The significance to users: This study adopted the methods of questionnaire survey and in-depth interview to understand the needs and emotional appeals of the target customer group, which will help researchers better grasp the expectations of consumers and design home products that better meet the needs of consumers, thereby improving the quality of life of consumers.

2. The significance to peers: This study conducted theoretical exploration and practice from multiple dimensions such as culture, art design, and materials, which can provide new perspectives and paradigms for scholars, design practitioners, artists, and environmentalists in related fields, which will encourage stakeholders to create more possibilities in their fields.

3. The significance for manufacturers: Tea-based materials differ from conventional industrial materials and show unique properties as demonstrated in the study. The incorporation of tea-based materials in home decor will distinguish products and boost their competitiveness within the market. Furthermore, from an industrial development view, the findings of this study will facilitate innovation and advancement within the home decoration industry.

4. The significance to the government: This study offers realistic cases for the research, development, and application of agricultural waste in art design, thereby motivating the government to establish effective agricultural waste recycling policies, enhance resource reuse, and foster sustainable societal development.

5. The significance to the macro-society: The content of this research reflects the sustainable development of resources and culture. Therefore, the research can help all sectors of society pay attention to issues such as sustainable development and social responsibility, thereby guiding all sectors of society to balance economic interests and social values.

1.4 Research objectives

1.4.1 To comb the historical context of Xiangsheng, and identify the significance of Xiangsheng for the implementation of design

This research uses literature to study the related knowledge of Chinese Xiangsheng and analyzes the differences and commonalities between Xiangsheng and bionics through case studies.

1.4.2 To establish Xiangsheng theory system based on plant imagery

This study focuses on representative traditional plant images as research objects, and analyzes the significance of plant imagery from the perspectives of cultural value, aesthetic value, functional value and communication value through case studies, and thus constructs a theoretical system of plant Xiangsheng.

1.4.3 To explore and identify the method of transforming tea waste into tea-based materials, and to design home decor with tea-based materials, based on plant Xiangsheng theory

This study verifies the feasibility of converting tea waste into tea-based materials through material experiments. This study aims to conduct home decor design through tea-based materials to obtain methods for applying agricultural waste in the field of Xiangsheng home decor. In the meantime, this study intends to provide new ideas for the expression of traditional imagery, material innovation of home decoration, and cultural communication of traditional plant images.

1.5 Scopes of the research and limitations

1. Xiangsheng includes three meanings in Chinese traditional culture: Xiangsheng sacrifice implements, Xiangsheng decorations, and vocal mimicry. This study will focus on the significance of Xiangsheng decorations and analyze their characteristics and related cases.
2. This study focuses on traditional plant imagery, especially the representative tree images and scented tea imagery in Chinese culture.
3. The objective of this study is to conduct home decor design with tea-based materials. Consequently, the investigation of the related cases is limited to home decor.

4. Since the relevant knowledge of bio-based is relatively extensive and the content is numerous when sorting out and analyzing relevant cases, the research will be limited to the research and application of agricultural waste in the design field.

5. This study examines the process of transforming tea waste into tea-based materials from a practical perspective and conducts design practice with these materials. This study's investigation of material features has certain limitations. Future research will investigate more professional and complete material properties in detail to enhance relevant concepts and applications.

1.6 Research process and method

As shown in Figure 1, the research progresses through four phases. The first phase involves data collection, where the researcher gathers knowledge related to the research keywords through surveys, literature review, and case studies. In the second phase, material experiments are conducted to explore methods for transforming tea leaves into tea-based materials. In the third phase, building on the previous findings, design experiments are carried out, and in-depth interviews are conducted to gather stakeholder feedback on the design outcomes. This data will serve as a key foundation for the design development in the fourth stage. Finally, the researcher will create and implement a series of Xiangsheng home decor designs.

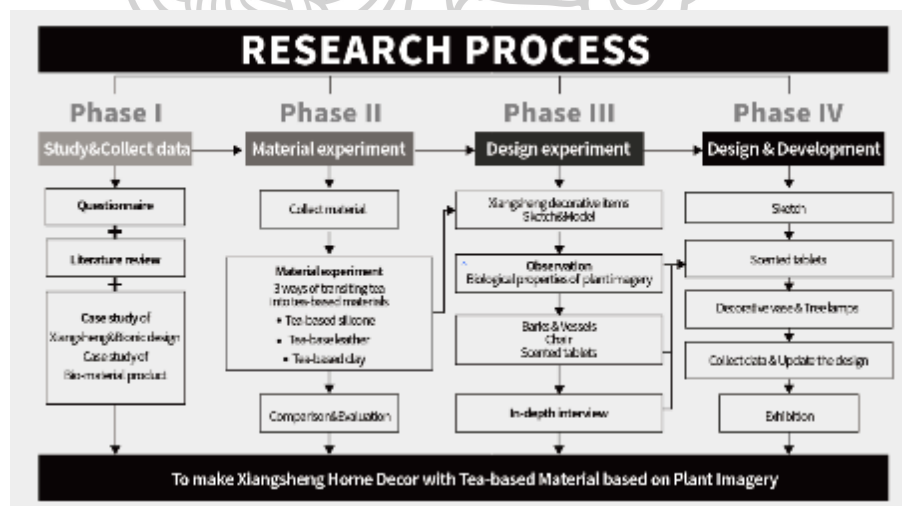


Figure 1: Research process

Source: Author (2024)

This study employs a mixed research method. The research method is divided into the following phases, which will be implemented in order:

Literature review - This involves the systematic collection and organization of literature related to the research objectives in various fields. The researcher will organize and integrate relevant data about traditional Xiangsheng, modern bionic design, plant imagery, and plant-based materials, utilizing these as the foundation for discussion and design experiments in this project.

Case study - Analysis of traditional Xiangsheng crafts and modern bionic home decor.

Online questionnaire - The study adopts an online questionnaire to assess the public's awareness of traditional plant imagery and their acceptance of bio-based products.

Material experiment - Material experiments are conducted in three ways, and this research will analyze the outcomes of material experiments and assess the material directions suitable for design experiments.

Observation - Intuitively observe plant images to obtain a realistic basis for later application in the design stage. Observe the biological properties of plant images in the natural environment, take photos and record them, and use narrative descriptions to form a textual summary.

Design experiment - In this process, the researcher draws sketches, observes the effects of the design plan in the form of digital modeling, and evaluates possible issues in the project stage. In addition, the design experiment produces physical outcomes for in-depth interviews with stakeholders in the next stage, aimed at optimizing the design plan.

In-depth interviews - The researcher divides stakeholders into three groups, users, designers, and academic experts, and conducts individual in-depth interviews with them to gather their recommendations and suggestions for the design outputs. This method will assist research in refining the design plan and establishing a realistic foundation for the design elements.

1.7 Research output

This study aims to explore tea-based materials in Xiangsheng home decor within the context of sustainable development. The primary research outputs are summarised in the following three parts:

1. The study identified three approaches for transforming tea into tea-based materials, offering practice procedures for the reuse of agricultural waste.

2. The study designed home decorations of various types using tea-based materials, verifying the feasibility of these materials in product applications.
3. The study combined traditional culture with home items through Xiangsheng, enhancing cultural performance and facilitating the dissemination and inheritance of culture.

This study adopted mixed research methods. Initially, literature research was conducted to clarify the meaning and historical background of Xiangsheng, revealing differences between Chinese Xiangsheng and contemporary bionics through case analysis. A questionnaire survey was subsequently undertaken to assess the public's awareness and acceptance of traditional culture and new materials. Then, the study combined material testing to verify the feasibility of transforming tea into tea-based materials and utilized the results to conduct design experiments evaluating the materials' performance in home decor. Finally, this study gathered perspectives via in-depth interviews with 14 stakeholders, further validating the feasibility and efficacy of the proposed design scheme.

The main findings of the study show that it is feasible to transform tea leaves into tea-based materials. In comparison with industrial materials, the natural texture, color, and flavor of tea provide a unique sensory experience to tea-based materials; furthermore, when these materials are utilized in plant Xiangsheng, particularly tree imagery, they exhibit a remarkable visual performance. In the study, respondents provided positive feedback on the touch, flavor, and texture of tea-based products; moreover, the integration of plant imagery and home décor facilitates the spread of traditional culture. The survey results indicate that most Chinese people have a preference for plant imagery that has positive connotations, and product designs with cultural attributes can better influence consumers' purchasing decisions.

Although the material test and design experiment conducted by this study on waste tea has achieved positive results, due to the limitations of research time and disciplines, the universality of the research results still needs to be further verified. In addition, future research can explore how to improve the performance of tea-based materials and better apply them to the field of art design through technological innovation and other interdisciplinary cooperation.

1.8 Definition of Terms

“Xiangsheng” - Imitating natural things to achieve realistic and vividly.

“Bio-based material” - Materials whose raw materials themselves are derived entirely or partially from biomass (plants and vegetables).

“Tea-based material” - The material, which main ingredient is tea leaves.

“Plant imagery” - The plant images with symbolism.

“Biophilic design” - Using direct or indirect natural elements to improve connections between people and nature.

“Bixing” - The concept comes from The Book of Songs, using an objective thing as a metaphor for emotions, things, feelings and thought.

“Bide” - Means likening certain characteristics of things in nature, including plants and animals, to human virtues.



Chapter 2

Literature Review

2.1 The overview of modern Design in China

This part will analyze the existing circumstances and challenges of modern Chinese design while reviewing relevant literature to propose strategies and perspectives for addressing the developmental dilemma of modern Chinese design. This part seeks to establish a solid theoretical foundation for the research direction. This study discusses contemporary Chinese home decor. However, the term "design" did not exist in China before the 1980s. China's contemporary design has gradually moved towards modernization in alignment with the reforms and opening-up policies. The worldwide design style and trend can be regarded as the direction of Chinese design. The design progress in China after the reform and opening up is inextricably linked to the assimilation of knowledge from other countries. Throughout Chinese history, the ancient term "Zao", which means creating, closely resembles "design." Zao is rooted in the "Xiang," and Xiang comes from nature, thus, China's cultural heritage has produced multiple artistic treasures inspired by natural forms. However, in the process of globalization, contemporary Chinese design appears to have forfeited its Indigenous characteristics, and the rich cultural heritage of China, developed over thousands of years, seems to lack significance in the design process.

2.1.1 The Development Context of Modern Design in China

Liu (2011) claimed that contemporary is a temporal category term. In the context of Chinese literature, 1949, the establishment of the People's Republic of China, is typically considered to be the start of "contemporary" literature; in the fields of economics and politics, "contemporary" is commonly defined as the "new period" and "transition period" following China's reform and opening up (1978); and in the more recent history of photographic art, the term contemporary generally pertains to the 1980s. The terms "design" and "art design" were introduced to China alongside the advent of Western modern design. Cao (2020) defines Chinese contemporary design as design in China since the reform and opening up in 1978. At the beginning of reform and opening up, Pierre Cardin's impact on Chinese design sparked grassroots people's introspection, catalyzing everyone's pursuit of enhanced value for daily necessities (Gu & Gu, 2019). This prompted the Chinese to gradually emerge from the silence of

"design". In 1984, the Central Academy of Arts and Crafts, which merged with Tsinghua University in 1999, divided the Department of Industrial Art into Industrial Design and Environmental Art Design. Since then, the Industrial Design major has gained widespread popularity across the country. In 1998, the term "art design" was included in the "Catalogue of Majors of Ordinary Institutions of Higher Education" published by the Ministry of Education of China, replacing the previous term "crafts and arts". Since then, Chinese colleges have formally established art design majors. This action signifies China's "integration" with the global community and reflects the modernization of its design (Cao, 2018). The phrase "Made in China" is inescapable when discussing Chinese design in the 1980s and for an extended duration thereafter. Behind the "prosperous" appearance of China is the long-term lack of the soul of Chinese design. Cheap and "copycat" practices have emerged as major issues in the development of contemporary design in China (Gu, 2019). Liu (2011) asserted that, according to the regulations of economic development, this is the only way for economically underdeveloped countries. Following the advancement of design education in China after 1992, students from Chinese institutions increasingly transitioned from theoretical knowledge to practical application in the field of design. However, although the state of modern Chinese design has left the low-level "imitation" stage, it is still placed in a passive state in the global design environment. As global design developed rapidly and emerged as a part of national comprehensive power, nearly every academic in the Chinese design industry felt powerless when confronted with reality. They became confused regarding the fundamental issues of Chinese design (Hang, 2011).

Cao (2018) believes that after 2000, China has reached an unprecedented height in terms of the design system, the overall level of designers, and the degree of social attention to design. Whether it is the linear rise of design practice or the spiral growth of design theory after the debate, it is closely related to the efforts of the design community in the interaction of subjective and objective factors after the reform and opening up. In the early 21st century, significant events in contemporary Chinese society propelled advancements in Chinese design. At the end of 2001, China joined the WTO. In 2003, Wuxi, China established China's first industrial design park. In 2005, Shanghai established 20 creative industrial parks. With the holding of the Beijing Olympics in 2008 and the Shanghai World Expo in 2010, China's modern design has been constantly evaluated and judged. Despite the advancements in China's

contemporary design in the early 21st century, it continues to encounter many challenges. The Chinese market lacks an adequate intellectual property protection mechanism against the copying and imitation of innovative products. The homogenization resulting from "copied" goods limits the diversity and originality of Chinese design (Xu, 2005). Furthermore, China's cultural identity has constantly been ignored in the course of global "integration". Despite an increasing number of designers seeking inspiration from local culture and striving for cross-disciplinary cultural and design integration, Zhang & Jia (2023) noted that many contemporary design practices merely emphasize the superficial application of traditional Chinese patterns and styles. They often lack an in-depth comprehension of traditional culture and creative strategies, failing to adequately consider the usage scenarios and lifestyles of modern individuals. Cao (2020) mentioned that Chinese contemporary design remains trapped in the postmodern logic after all. Whether they appear in an experimental, avant-garde, or local form, they are making a fuss over the culture or context. From the perspective of cross-disciplinary, it is still homogeneous, while it is urgent to move closer to technology and science. After nearly 40 years of development of modern Chinese design, designers are still exploring the development direction of Chinese design, eager to transition from "Made in China" to "Created in China".

2.1.2 Approach to Overcoming the Impasse

Although Chinese design continuously draws inspiration from global design trends, it still faces significant challenges in establishing a strong presence on the international stage. The difficulties in Chinese design can be summarized in the following aspects: 1. The lack of a robust protection mechanism has led to frequent instances of plagiarism and imitation, which limits the originality and diversity of Chinese design; 2. Contemporary Chinese design lacks a deep understanding of traditional and local cultures, resulting in a blurred cultural identity; 3. The interdisciplinary development trend in design requires Chinese design to increasingly align with science and technology. This section reviews strategies for addressing these design challenges through literature, exploring them from three key dimensions.

2.1.2.1 Inheritance of Local Culture

In the rapid advancement stage of Chinese modern design, it is essential to identify a developmental pathway for modern design that adapts to Chinese society. Some

scholars have suggested that the development of contemporary Chinese design should commence with the exploration of local culture. Professor Hang used the term "local" to describe the spatial dimension of traditional culture, that is, "regionality" (Huang, 2017). The globalization of culture is a direct consequence of economic globalization, which, to some extent, results in the loss of local cultures. Consequently, from a deeper standpoint, culture constitutes a form of capability, and design, as a component of cultural power, is essential for our involvement in global economic and cultural advancement (Cao, 2018). Professor Zou from the School of Design and Innovation at Tongji University stated in an interview on "The Chinese Design Theory System in the Digital Era" that "modern design" reflects characteristics of Western modern civilization within the context of Western modern design theory and practice. "Chinese contemporary design" denotes an original design culture that emerges from the integration of Western modern civilization with China's native cultural resources, while extensively inheriting and absorbing the superior civilizational elements of other nations, ultimately transcending the prevailing Western modern civilization. Reconstructing and rearranging traditional Chinese cultural elements in a new order allows "local design" to attain cultural openness while preserving regional and national identity. Hang stated, "By prioritizing local design, we may foster some advancement in creativity." This advancement may alter China's industrial framework and facilitate the transition from "Made in China" to "Created in China" (2002).

In the 21st century, Chinese society has entered a period of cultural industrialization. This age is characterized by a decline in the material content of consumed and circulated commodities, accompanied by an increase in cultural proportion. Culture increasingly emerges as a vital element of commodities; hence, enhancing and transforming the cultural value during product circulation has become a crucial aspect, which is exactly our design objective (Cao, 2018). Jiang & Zhou (2013) assert that only seeking evidence of local culture is insufficient to address the effects of the globalized cultural sector. It is essential to comprehend the integration of local culture within the globalized cultural sector and to identify effective methods for utilizing the global context through practice. Hang (2002) indicated that, with its long history, "crafts and arts" might

as a significant source for presenting Chinese local design to an international public. If we examine traditional crafts influenced by different philosophies, religions, ethnic groups, and regions in China from the perspective of modern design, we will uncover immense cultural value. These traditional cultures will then serve as a cultural identity for "Chinese design in the world," making it more accessible to other cultures. Therefore, craft and art hold a unique and irreplaceable value, which is the significance of design history and original design. The innovation of Chinese traditional culture would surely facilitate China's local globalization amidst the significant wave of globalization. Local globalization is a theoretical notion about innovation within the context of globalization (Chew, 2010). Local globalization refers to the steady acquisition of cultural discourse power by nations and regions, particularly developing ones, as their economic strength develops, thereby reflecting their historical process formation. The discourse practice of postmodern culture aims to dismantle or deconstruct Western cultural centrism (Jin, 2013). In this context, local globalization represents the cultural expression of the weaker Eastern culture about the dominant Western culture and thus constitutes a "decentralization" process of economic and cultural globalization (Feng, 2023). Consequently, grounding oneself in local culture can assist contemporary designers in identifying the appropriate trajectory for "Chinese-style" modern design, while also enabling Chinese modern design to escape the predicament of being speechless in the global design environment.

2.1.2.2 Interdisciplinary and Innovation

Some scholars explore the development direction of contemporary design from the perspectives of "interdisciplinary" and "innovation-driven". They believe that cross-disciplinary innovation between design and other fields will renew China's industrial design and the broader design field. Art design has gradually developed into a highly applied cross-disciplinary discipline with ecological, digital, interdisciplinary, and diverse characteristics (Tong, 2012). Cao (2018) pointed out the "breakthrough" significance of "cross-border" to the current Chinese design dilemma. The marriage of design and science, or the sparks of the collision of different scientific categories, is particularly precious in the face of the saturated development dilemma of contemporary society. Wei & Xi (2021) pointed out that interdisciplinary disciplines can not only cover the

knowledge areas that the original disciplines have not yet covered, fill the gaps in the original knowledge system, but also become a link to connect disciplinary knowledge and promote the overall integration and revolutionary changes of science. In 2021, the Academic Degrees Committee of the State Council of China elaborated on the significance of "vigorously developing interdisciplinary disciplines". The relevant person in charge believed that cross-disciplinary integration is a major feature of the current development of science and technology, an important source of new disciplines, an effective path to cultivate innovative talents, and an inherent need for economic and social development. Multidisciplinary integration has emerged as a development trend in contemporary society. Art and design are not exceptions. Consequently, regarding the growth path of modern design, interdisciplinary and innovation is essential. Cross-border design is not a simple splicing of one object with another, or a simple superposition of two ways of thinking, but a brand-new reconstruction (Chen & Lu, 2022). This reconstruction process is innovative, and the works produced by a multidisciplinary crossover in the field of design are also innovative. In an interview with the Academy of Fine Arts of Tsinghua University, Xu Yingqing mentioned: "Whether in the past, today, or in the future, interdisciplinary studies have been and will continue to be the inevitable path for the development of design (2022).

In addition, some scholars have discussed "innovation-driven". Tang (2017) believes that in the process of social innovation-driven development, the value of "innovative design" should be fully valued. Liu (2021) believes that social development has shifted from factor-driven to innovation-driven, and proposed an innovation-driven model of design-driven upgrading. Jiang (2023) pointed out that the primary goal of contemporary design aesthetics is "new". The "new" here refers to a brand-new design, which is specifically reflected in the innovation of aesthetic standards and design concepts.

2.1.2.3 Way of Heaven and Goodness

Some experts argue that tackling the challenges of modern design is intrinsically linked to the philosophical wisdom of the ancients. Dai (2017) asserted that the designer's concept of a "user-centric approach" will incite individuals' material aspirations and lead to several negative social issues. We should find solutions to the problems from the Chinese "Way of Heaven" thought, and find unity and harmony between individuals, society, and nature. The "Way of Heaven" thought contains the wisdom of the ancients and is one of the core concepts of Chinese classical philosophy. The literal meaning of

"Way of Heaven" refers to the laws of movement and change of celestial bodies. The ancients believed that the movement of the sun, moon, and stars has a subtle connection with all things in the world, so the "Way of Heaven" is derived from the rules and principles followed by the life course of all things in the world (Li, 2023). The idea of "Way of Heaven" is systematically expounded in Confucianism represented by Confucius and Mencius, and Taoism represented by Laozi and Zhuangzi. In Confucian philosophical thought, "Heaven" has three meanings, namely, the dominant heaven, the natural heaven, and the righteous heaven. According to Zhao (2023), the description of the natural heaven in the Way of Heaven is reflected in the laws followed by all natural things, and it is also the object that human beings need to imitate for survival. From the perspective of "Taoism", although Taoism as a philosophical school and Taoism as a religion have similarities, they are not the same. The core concepts of both are based on Lao Tzu's "Tao follows nature", and "nature" is the attribute of Lao Tzu's "Tao". The Taoist view of heaven is based on "Tao". Lao Tzu emphasized: "Man follows the earth, the earth follows the heavens, the heavens follow Tao, and Tao follows nature". "Tao follows nature" means that all things in the universe born from "Tao" must follow the objective laws of movement and change of "nature", which is the thing itself, and are not affected by external factors, subjective factors, etc., and use this law to guide and restrain their behavior (Wu & Wang 2023). The Taoist thought of the Han Dynasty annotated the view of "Tao" with "Tao follows nature, and there is no way to escape". The so-called "Tao follows nature, and there is no way to escape", which means that "Tao" has no object to imitate. Whether it is the ontological Tao or the specific Tao, what is imitated is the natural attribute of "Tao" itself (Zheng, 2016). However, The Book of Great Peace, Taoist texts of the late Eastern Han period, further proposed the view that "Heaven fears Tao, Tao fears nature" based on Laozi's "Heaven follows Tao, Tao follows nature". "Fear" has two meanings, one is awe, and the other is fear. This view emphasizes the importance of "following the laws of nature". If the laws are not followed, the world will be in chaos or even destroyed. Taoism regards "Tao" as a personal god and portrays "Tao" as an emotional basis. With the personification of "Tao", "nature" has to be concretized and personified (Huang, 2024). Although there are some differences between the Confucian view of the Way of Heaven and the Taoist view of the Way of Heaven and the Taoist view of the Way of Heaven, we can find a unified thought from the ancients' propositions, that is, the theoretical core of the

harmonious coexistence of man and nature. Therefore, the idea of "the Way of Heaven" can be reflected as: respecting nature, observing nature, imitating nature, and becoming nature.

The ideal state of good design is to "seek goodness", "do goodness", and even achieve the spiritual convergence of "supreme goodness" (Cao, 2018). Mencius proposed the "Theory of the Innate Goodness of Human Nature" in Chinese Confucianism, centering on the concept of "goodness." He contended that individuals exhibiting poor behavior and character were so due to their inability to perform "good deeds," rather than a lack of "good hearts." Han (2014) summarized Mencius's core of "doing good" into four points, namely, a sense of compassion, a sense of shame and disgust, respect and deference, and a sense of propriety, namely "four ends". These four points also correspond to "benevolence, righteousness, propriety, and wisdom". Benevolence is the root of the four ends. In the Book of Songs, benevolence is often used to describe the appearance of people, such as "the person is beautiful and benevolent". In the pre-Qin literature, there is often such a definition "benevolent is a human being", which means that benevolence is what people should be like. Mencius wrote in Li Lou Xia and Jin Xin Xia that "those who love others will always be loved by others", "be kind to people and love things", and "think that those who are hungry in the world are hungry because of yourself", which refers to the extended meaning of benevolence, that is, love others, love yourself, love things, sympathy and joy. Yan (2008) summarized the characteristics of "righteousness" in Mencius as fairness, justice, rationality, shame, and sacrifice of one's life for righteousness. Therefore, "righteousness" can be understood as a moral category beyond personal interests. "Ritual" also has many characteristics, such as politeness, restraint, respect, harmony, etc., as Mencius said, "The weather is not as good as the location, and the location is not as good as the harmony of people", and "harmony of people" refers to harmonious interpersonal relationships. "Wisdom" does not refer to scientific wisdom, but a kind of moral wisdom, which is the wisdom that can distinguish right from wrong and good from evil. These four points are both the basis for judging whether a person can be good and the specific manifestation of judging whether a person is good.

Hence, it is evident that ancient perspectives on "goodness" focus on interpersonal relationships and the connection between individuals and society. However, if we apply the method and way of thinking of "Perform good deeds" to the relationship between

people and nature, it can be summarized into the following four points: 1. Be friendly to the ecological environment, and take care of flowers, plants, animals, rivers, lakes, soil and forests. 2. Be restrained in natural resources, and do not occupy or destroy natural resources without restraint for human interests. 3. Be respectful to all living things, respect the growth laws of all things, and live in harmony with nature. 4. Be discerning about your behavior, establish a good moral value and a positive way of thinking, start from action, treat nature well, and take the initiative to explore and think about the operating principles of nature. In addition, as a pioneering figure in Western philosophy, Plato did not give a clear definition of goodness, but he advocated that justice is the embodiment of goodness, so we should attach importance to the cultivation of "justice" (Wang, 2024). Xie (2023) pointed out that Plato believed that true freedom is a process of starting from goodness, pursuing goodness, and obtaining goodness. Although there are differences in the philosophical thought systems and research scopes of ancient Chinese and Western people, their core ideas about "goodness" are still effective when applied to the modern design industry. It is only via "seek goodness" and "perform good deeds" that designers may produce "perfect" design.

2.2 Traditional Xiangsheng and Modern Bionic

Traditional xiangsheng has been gradually forgotten in the process of China's modernization. A large number of scholars have replaced "xiangsheng" with "bionic" in academic research, resulting in a serious loss of traditional culture. One of the main objectives of this study is to understand the relevant knowledge of traditional xiangsheng, find the difference between xiangsheng and modern bionics, and thus explore the innovation points of modern Chinese design from the local culture. Therefore, it is very important to study and analyze the literature and cases related to Xiangsheng.

2.2.1 Definition and Development Threads of Xiangsheng

From the perspective of word segmentation, the noun interpretation of "Xiang" includes form, appearance, symbol, etc. The verb form of "Xiang" is often used to mean imagine, "follow the example of", imitate and etc. In addition, the verb interpretation of "Sheng" includes birth, happen, produce, grow, live, and etc., and its noun meaning includes life, creature, livelihood, and etc. Li (2017) systematically expounded on the evolution of the concept of Xiangsheng in Xiangsheng: Field Research on Ancient Chinese Art. The concept of "Observe things and derive symbols" mentioned in the Book of Changes is

characterized by the observation and thinking of nature, thus, to a certain extent, it is the original concept prototype of Xiangsheng. Later, Confucius proposed the concept of Xiangshi based on Rites of Zhou, that is, to replace the previous system of burying slaves with the deceased with images and the deceased's belongings during his lifetime during sacrifices. Xiangshi is a symbol of the progress of social civilization. The History of the Later Han in the Southern Dynasty first proposed the concept of Xiangsheng, which was based on Confucius' concept of xiangshi. There are two kinds of xiangsheng: visible xiangsheng and invisible xiangsheng. The former exhibits three forms through visual modeling: xiangsheng sacrifice utensils, xiangsheng fruit vessels, and xiangsheng decorations. The latter displays through auditory means, such as vocal mimicry, and occasionally involves behaviors that coordinate with its performance (Hong & Cui, 2020). According to Li (2017), there are three interpretations of the term Xiangsheng in China: the original concept of Xiangsheng refers to the objects used by the deceased during his or her lifetime, which are sacrificial utensils, however, in later social life, Xiangsheng refers to lifelike vocal mimicry and handicrafts that are almost realistic. The source comes from the following two ancient books. First, the description of Zhang Heng in The History of the Later Han: "He rarely indulged in playful banter or gossip in the market, but was skilled at singing, especially in mimicking animal sounds. His imitations of animal noises, such as the fluttering and flying of birds, were so lifelike and intricate that they resembled the sounds of a cat. Hence, people called him the "Cat of the Han"."; Second, the Song Dynasty poet Yang wrote "The modeling of the lively sounds were so vivid and realistic, and the imitations of fruit were even more refreshing and new". Interpreting Xiangsheng from the perspective of art design, we can find that Xiangsheng, as a part of traditional Chinese culture, has promoted the development of Chinese plastic arts.

According to Li (2017), Xiangsheng is the fundamental component of ancient Chinese artistic activities that imitated nature. It was recorded in Dream Record of the Capital, History of the Yuan Dynasty, and Tao's Elegance that ancient China often used certain materials to integrate natural elements into handicrafts to achieve a realistic and vivid effect. "Xiang" comes from nature, and "sheng" is a vivid presentation. Thus, the ancients interpreted Xiangsheng as a realistic presentation of natural elements. During the Song Dynasty, Xiangsheng fruits emerged, which are realistic handicrafts that replicate fruits. During the Qing Dynasty, artisans were not restricted to imitating fruits,

they absorbed inspiration from various creatures' shapes. Xiangsheng utensils made of copper, red sandalwood, ceramics, and other materials emerged in an endless stream, and the shapes were realistic and lifelike in the Qing dynasty. Throughout the handicrafts in the past dynasties in China, it is evident that artisans have applied Xiangsheng thinking in their artistic practices. Xiangsheng originated from nature worship, however, it lost its initial religious significance over age and evolved into a representation of folk art. Xiangsheng refers to "learning from nature". Relying on traditional Xiangsheng may be an important path for the development of Chinese design (Li, 2017).

2.2.2 The related cases of Xiangsheng

Professor Li Lixin's original intention in proposing "Xiangsheng" was not to highlight the realist and lifelike of xiangsheng works, but to emphasize that artistic and design practices ought to prioritize local traditions and folk culture (Han, 2018). Throughout history, the essence of Chinese folk culture can be found in numerous artistic artworks rooted in the philosophy of "xiangsheng". Among them, the most common is the extensive use of symbolic elements in xiangsheng practice. Figure 2 displays a fish-shaped kettle from the early Warring States period. The kettle is designed in the shape of a standing fish, with the fish's mouth serving as the spout and its tail forming the feet. The upper part of the kettle features a pair of beast-head handles holding rings, and the fish's eyes are inlaid with gold as decoration. The design of bronze ware from the Warring States period shows characteristics of realism and everyday life. With its exquisite and unique shape, smooth lines, and lifelike appearance, this kettle also carries rich cultural connotations. In ancient China, fish were commonly associated with concepts such as good fortune, wealth, prosperity, and the blessings of many children. Due to the similarity in pronunciation between the Chinese character for "fish" (鱼) and the word for "abundance", fish is often regarded as a symbol of wealth and prosperity. Artistic works featuring fish are commonly seen during major festivals, weddings, and other significant occasions, symbolizing good fortune, prosperity, and longevity.

Figure 3 displays a Zisha Hundred Fruits Teapot from the Qianlong period of the Qing Dynasty. Also known as the "Flower and Fruit Teapot," the Hundred Fruits Teapot was pioneered by the renowned early Qing artist Chen Mingyuan and became quite popular during the Qianlong and Jiaqing reigns. The teapot features a round body, with sculpted

fruits ingeniously forming the handle, lid, and base. The lid and lid knob are shaped like an inverted mushroom, while the shoulder of the teapot is adorned with sculpted peanuts, melon seeds, cloud peas, dates, and lotus seeds. The spout is modeled after a lotus stem, and the handle is shaped like a water chestnut. Near the base, sculpted fruits such as lychee, lotus seeds, walnuts, and lotus pods are featured, with the walnut, lotus pod, and water chestnut being larger and forming three feet. The center of the base is decorated with a small flower-shaped false foot. The entire body of the teapot is decorated with more than ten types of fruits, with realistic and vivid representations. The design of the Zisha Hundred Fruits Teapot reflects profound cultural significance. In Chinese culture, the lychee represents beauty and affection. The most famous love story related to lychee is the legendary romance between Emperor Xuanzong of the Tang Dynasty and his beloved Yang, the Noble Consort. According to historical records, Yang, the Noble Consort had a deep fondness for lychees, and to win her favor, Emperor Xuanzong often sent people to great lengths to transport fresh lychees from the southern regions. As a result, lychee gradually became a symbol of beautiful and passionate love. Lotus seeds are frequently linked to completeness and familial harmony. In Chinese literary works, scholars use the phrase "emerging from the mud without being tainted" to describe the lotus, which, despite growing in muddy water, can maintain its purity and flawlessness. Thus, the lotus has come to symbolize purity and incorruptibility. From the perspective of religion, the lotus was a revered flower in Buddhism, with its seeds representing prosperity and generational continuation. Furthermore, walnuts are frequently employed in Chinese culture to represent inner wisdom and strong vitality. The Zisha Hundred Fruits Teapot is themed around the ideas of bestowing blessings, bringing good fortune, and symbolizing happiness and harmony. It showcases the artistic accomplishments of the artisans, as well as the profound traditional culture and distinctive craftsmanship techniques.



Figure 2: Fish-shaped kettle kettle (Warring States Period)

Source: <https://www.dpm.org.cn/collection/bronze/230129.html>



Figure 3: Zisha Hundred Fruits Teapot (Qing Dynasty)

Source: <https://www.dpm.org.cn/collection/ceramic/227619.html>

2.2.3 The Principle and Characteristic of Bionic Design

Benyus (1997) proposed that the evolution of nature has provided humans with many paradigms for solving problems, and people's imitation of nature can be divided into

form biomimicry, functional biomimicry, and structural biomimicry. Li (2014) stated that bionic design is a field that integrates bionics into industrial design to guide design practices; thus, the principles of bionic design must align with the principles of industrial design, which are: 1. Human-centric 2. Functionality 3. Safety of Materials 4. Structural Rationality 5. Cost-effective and practical 6. Innovative design 7. Serialisation, standardisation, and generalisation 8. Integration of creativity and scientific principles 9. Judicious utilization of resources. Wang & Chu (2024) believes that bionic design possesses three primary characteristics: creativity, uniqueness, and harmonious living with nature. Nature offers designers abundant creative inspiration, and its diversity imparts individuality and innovation to bionic products. Qin (2008) noted that similar to other design disciplines, bionic design shares common characteristics, namely artistry while differing from design and bionics. Art's scientific essence is the principal characteristic of bionic design. Specifically, as the bionic design is founded on design principles and informed by bionic theories and research findings, it possesses a rigorous scientific nature. Moreover, bionic design shows infinite reversibility, the object of bionic design is limitless, and consequently, the design output is also infinite. In addition, reversibility is reflected in the fact that designers and manufacturers can get feedback and summarize experience during the design, production, and sales of bionic products, thereby promoting the research and development of bionic design; Reversibility is reflected in the fact that designers and manufacturers can get feedback and summarize experience during the design, production, and sales of bionic products, thereby promoting the research and development of bionic design; Furthermore, bionic design shows the cross-disciplinary comprehensiveness: bionic design is a new interdisciplinary subject that arises at the intersection of several disciplines. To be familiar with the use of bionic design, one must have a certain basic knowledge of mathematics, biology, ergonomics, psychology, materials science, color science, aesthetics, and other related disciplines. To deeply study and understand bionic design, one must understand the basic knowledge of biology and social sciences based on design, and have a clear understanding of the current research results of bionics.

2.2.4 Related Cases of Bionic Home Decor

Japanese modern furniture designer Masanori Umeda was born in Kanagawa, Japan in 1941 and graduated from Kuwasawa Design College in Tokyo in 1962. As shown in Figure 4, he designed a series of flower chairs that combine the characteristics of lilies

and orchids with furniture shapes in a bionic form. This case preserves traditional Japanese culture while seeking a new design style. Masanori Umeda tried to find a point of convergence between traditional Japanese culture and modern Western culture. Hanami, also known as flower viewing, is a traditional Japanese custom. He believes that modern commercial society has destroyed Japan's natural environment. He intends to utilize the form of flowers to explore Japanese traditional culture, reproduce the beauty of nature, and discover a modern aesthetic that reflects Japanese cultural values within the balance between tradition and modernity.

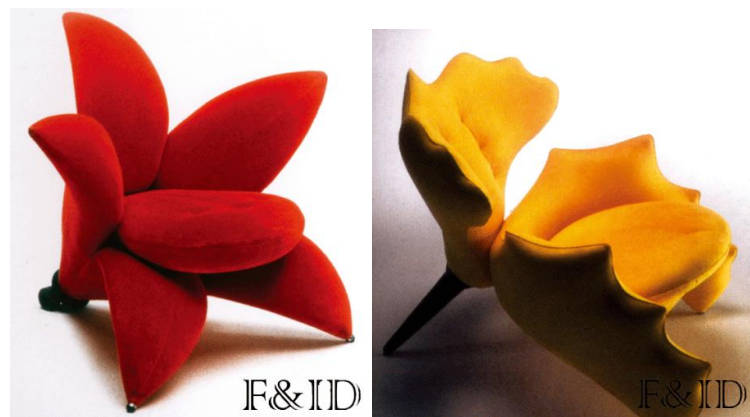


Figure 4: Getsuen armchair

Source: Masanori Umeda (1990)

The birth of BROKEN MIRROR can be said to be an aesthetic experiment of texture bionics. As shown in Figure 5, BROKEN MIRROR was designed by visual artist Daniel Arsham and is the first mirror from Gufram. Daniel Arsham relied on the concept of "soft and not soft" to imitate concrete with polyurethane. In order to achieve the texture of the concrete wall, Gufram's special patented coating Guflac® was applied entirely by hand to keep the polyurethane elastic. This series of polyurethane is completely handmade by Gufram's craftsmen, so each item is unique. The product is soft in texture but looks like hard concrete, which also gives life another dimension of feeling. This case demonstrates the ingenious integration of materials and art design, enhancing the product with a diverse sensory experience while fulfilling its functional requirements.



Figure 5: BROKEN MIRROR

Source: Daniel Arsham (2017)

Figure 6 shows the CACTUS coat rack of the Gufram brand. This case shows the result of form and structural biomimicry. The Cactus, designed in 1972 by Guido Drocco and Franco Mello, is a rejection of functionalism in its visual language. This coat rack possesses decorative and artistic attributes, mostly like an art piece within the home space. This product is made with flexible polyurethane, which shows excellent flexibility and elasticity. This coat rack features four cantilevered arms, which can be used to place clothes and the whole product at approximately human height. The design represents the creativity and humor characteristic of 1970s design. Its bright colors and cactus-like form captivate attention and serve as both a decorative feature and a functional element. Currently, it is a coveted artwork and is displayed in famous museums worldwide, including the Milan Triennale, the National Art Museum of China in Beijing, and the Barbican Arts Centre in London.



Figure 6: CACTUS

Source: Guido Drocco & Franco Mello (1972)

As shown in Figure 7, this home decoration work "Sedilsasso" was created by artist Piero Gilardi and shows the design results of form biomimicry. The artist introduced "stone" elements of different sizes into the home space, giving the decoration an ecological sense and practical functions. The material of the design is polyurethane, with a maximum size of 56cm×70cm×48cm, which can be used as a seat; the smaller stones (12cm×19cm×11cm) are used as decorations and are connected with other elements to present a natural and harmonious indoor atmosphere. The work's uniqueness lies in the use of Guflac paint, which realistically simulates the shape and texture of the stone, thus creating a natural ecological home atmosphere. "Sedilsasso" debuted at the Milan Triennale in 1968 and quickly became one of the symbols of the Gufram brand's naturalistic inspiration and the concept of "true and false".



Figure 7: Sedilsasso
Source: Piero Gilardi (1968)

2.3 Plant Imagery and Plant Xiangsheng

This study aims to develop a theoretical framework of xiangsheng based on plant imagery. Consequently, it is important to review and analyze the literature and cases related to plant culture and plant imagery. As a part of Chinese local culture, plant culture involves different aspects such as language culture, religion culture, landscape culture, folk culture, and moral culture. A search for the term "plant imagery" on China's academic platform, CNKI, yielded a total of 522 relevant Chinese-language publications. When categorized by subject, 320 of these were related to Chinese literature, 55 to world literature, 16 to the arts, and only 5 to light industry and handicrafts. At present, few scholars in design have integrated design theory and practice to study plant imagery. Consequently, the majority of the literature in this chapter originates from the fields of literature and art.

2.3.1 Definition and significance of plant imagery

In his congratulatory letter to the 19th International Botanical Congress, President Xi Jinping (2017) said: "China is one of the nations with the most abundant plant diversity worldwide. The Chinese people have always admired nature and loved plants. Chinese civilization contains a profound plant culture." The essence of plant culture resides in conveying aesthetics and fostering inspiration for individuality and spirit (Liu, 2017). Plant culture refers to the unique ideological connotations of different plants given by people's emotions in the long process of social development, which runs through the entire history of Chinese cultural development and forms a unique culture (Lv, 2021). Liu (2023) believes that plant culture includes the innovative process and outcomes of incorporating plant elements into folk culture and imbuing them with diverse cultural significances. Plant imagery is extensively maintained within Chinese society. From this viewpoint, plant culture has established a cultural identity to a certain extent, which has also evolved into a spiritual foundation and an inexhaustible force for the continued inheritance and advancement of Chinese traditional culture. Jia (2011) points out that the different roles played by plant imagery reflect its four typical identities in human social life and the progress of civilization: as an aesthetic product, a linguistic symbol, an embodiment of personality, and an emotional carrier. Correspondingly, plant imagery holds four important values: the aesthetic value derived from its rich beauty as an aesthetic product, the communicative value in facilitating interaction as a linguistic symbol, the educational value in enhancing personal cultivation as an embodiment of personality, and the therapeutic value in soothing the soul as an emotional carrier. The existence of plant elements has enhanced the diversity of Chinese folk culture and enriched the connotation of folk culture. Plant culture has developed into a unique traditional culture of the Chinese nation. People integrate plant culture into their daily lives through poetry, painting, sculpture, and other forms. This reflects not only an affection for plants but also a desire and pursuit for the spirit symbolized by plants (Li et al., 2021).

"Imagery" is a philosophical proposition. In ancient Chinese aesthetic thinking, aesthetic objects might appear as tangible material forms or as intangible emotions and sensations (Zhang, 2023). Li (2007) believes that imagery is both the primary method of artistic creation and an essential form of aesthetic involvement with artistic activities. People have reached a consensus on the relationship between imagery and physical

images, believing that imagery is an objective physical image that incorporates subjective feelings (Yuan, 1998). Jia (2011) pointed out that the generation of plant imagery is based on plant images as a material premise, and plant images are divided into two directions. The first is the aesthetic characteristics of the natural attributes of plants, such as the appearance and habit characteristics of plants; the second is the aesthetic potential of the social attributes of plants, such as social functions, homophonic, and human influences added to plants. The basic symbol of artistic language is imagery, which is an element of artistic conception, and artistic conception is the sublimation of imagery (Zhang, 2006). Consequently, plant imagery has been extensively employed in folklore, myths, legends, literary works, operatic performances, garden design, and various other fields, and gradually improved Chinese traditional plant culture. The application of plant imagery contributes to the development of a more powerful cultural system, making plant culture deeper and more enduring.

2.3.2 Related cases of plant imagery in Xiangsheng

Huang (2024) states that Xiangsheng is a traditional creative approach in art activity. In the field of Chinese arts and crafts, Xiangsheng normally refers to realistic vessels and decorations, such as ancient Chinese adornments and decorative ornaments, inspired by natural forms. The earliest evidence of Xiangsheng plants and animals is found in artifacts excavated from the Neolithic period. Xiangsheng reflects the biological characteristics, functionalities, and cultural meanings of flora. By mimicking nature, Xiangsheng can convey the beauty of culture and nature, so reaching both its social and aesthetic value (Yang, 2022). Xiangsheng has long been ingrained in folk culture and has become an integral part of social life. Xiangsheng is a reflection of the essential artistic essence of Chinese culture and the basic appearance of Chinese civilization (Shi, 2021). Xiangsheng establishes a connection between "artworks" and "people" in three principal ways. Firstly, the vivid representation of plants immerses viewers in the spiritual atmosphere, with the inherent vitality of "plants" fostering profound emotional resonance with viewers (Li, 2017). Secondly, the anthropomorphism of plant characteristics assigns human-like attributes to plants, thereby infusing the artworks with personalities. Lastly, the positive connotation conveys expectations and aspirations through metaphors, associations, and homophony. When plants are regarded as beautiful entities infused with emotional value, they serve as instruments for emotional expression (Du, 2009). Dong (2003) defines aesthetic empathy in the

aesthetic activity as the behavior in which individuals engage with objective entities through aesthetic contemplation, projecting their emotions, moods, and personalities onto these entities, thereby imbuing the object with cultural significance. Zhang (2008) views this as a unique aesthetic state of mind, in which, when observing external objects, inanimate things seem to be endowed with human will and emotions. The incorporation of plant imagery in artistic practice enriches the visual performance and cultural value of xiangsheng artworks.

Figure 8 illustrates the "Painted Pottery Gourd Bottle" from the Neolithic era. Crafted from clay, the bottle features painted patterns on its surface, and its shape is inspired by a gourd. The gourd, with its numerous vines and seeds, is an early representation of Xiangsheng plants. This case demonstrates that people in the Neolithic period were already capable of creating utilitarian tools with both practical functions and symbolic meanings. The painted pottery gourd bottle may have been used as a container for storing food or other items, while its decorative shape and cultural significance imbue it with rich humanistic connotations. In Chinese culture, the homophone for gourd closely resembles the word for "fortune," making it a symbol of blessings and good luck. During the Neolithic period, gourds were revered as fertility totems by matriarchal societies, symbolizing reproduction and fertility (Lin, Ren, & Jin, 2023). Figure 9 shows a Yellow Jade Buddha's Hand Flower Vase from the Qing Dynasty, measuring 16.3 cm in height, with a mouth diameter of 8.2×4.5 cm and a foot diameter of 5.2×5 cm. This vase is made of yellow jade, and its shape is inspired by the Buddha's hand fruit. The outer surface of the vase is intricately carved with winding branches and leaves, which also form the base, and it is set on a wooden stand with an intricate plum blossom motif. The vase is crafted from high-quality material and features a rounded, lively shape, representing a prime example of mid-Qing Dynasty jade craftsmanship. The Buddha's hand is a type of fruit, commonly known as Buddha's hand citron, named for its resemblance to a human hand. In Chinese culture, the Buddha's hand is considered a symbol of good fortune and blessings due to the homophony of "Buddha" and "fortune". Besides, it is often seen alongside peaches and pomegranates, collectively referred to as the "Three Abundances," symbolizing abundance in blessings, longevity, and offspring. Figure 10 illustrates a bamboo-carved brush pot in the shape of a pine tree from the Ming Dynasty, standing 14.6 cm tall, with a mouth diameter of 15.5 cm and a

base diameter of 14 cm. The brush pot, constructed from bamboo, is designed in the form of a pine tree. The surface features delicate carvings of dense pine needles, while the pot is embellished with sculpted cloud patterns that imitate the texture of tree bark. In traditional Chinese culture, the pine tree conveys profound symbolic significance. Due to its evergreen nature, flourishing in winter's chill, it is often regarded as a symbol of longevity, resilience, and upright character.



Figure 8: Painted pottery gourd bottle

Source: <http://dadiwan.tianshui.com.cn/?cpxs/103.html>



Figure 9: Yellow Jade Buddha's Hand Flower Vase (Mid-Qing Dynasty)

Source: <https://www.dpm.org.cn/collection/jade/230844.html>



Figure 10: Bamboo-carved pine tree-shaped brush pot (Ming Dynasty)

Source: <https://www.dpm.org.cn/collection/bamboo/228493.html>

2.3.3 The overview of typical plant Imagery in China

Plants have been endowed with cultural connotations in Chinese social civilization and gradually developed into "cultural symbols" (Liu, 2023). The application of cultural symbols is of great significance in artistic practice (Xu, 2020). Imagery is a significant topic for artisans to participate in creative endeavors, positioning plant imagery as a vital component in xiangsheng creation. In the vast plant culture system of China, tree imagery constitutes the essence of the plant cultural system. From a religious standpoint, early plant worship regarded trees as paramount gods and emblems of universal reproduction. The ancients believed that trees possess significant fertility and enduring vitality. The representation of trees exists in multiple artistic fields, including literature, painting, and sculpture. Artists convert an intangible concept of trees into real artworks, which constantly present profound tree imagery (Huang, 2024). In Chinese culture, imagery typically refers to the method of expressing and conveying ideas, emotions, concepts, or spiritual meanings through sensory experiences, metaphors, or symbolism. The generation of imagery can be summarized into two main approaches: Bi Xing (parallelism and association) and Bi De (metaphor and virtue). The term Bi Xing originates from *the Book of Songs* and represents a traditional expressive technique in

Chinese poetry. The word Bi refers to analogy and metaphor, while Xing has two meanings: one is spontaneous inspiration, and the other is using external objects to indirectly express a certain thought or emotion during the process of inspiration. Therefore, Bi Xing involves using vivid metaphors for people or things to express specific emotions or aspirations through their distinctive characteristics. For example, phoenix is regarded as the king of birds in ancient Chinese mythology, which particularly favors residing in the phoenix tree. The phoenix represents the ultimate creature and supreme power. Consequently, the Phoenix tree typically symbolises strength and prosperity. On the other hand, Bi De refers to the concept of virtue, specifically the moral character and personality of an individual. Bi De is a form of metaphor that seeks to find similarities between the natural attributes of an object and human personality or spirit, thus personifying the metaphorical subject. For instance, the quality of lotus leaves "emerging from the mud without being stained" is linked to the "noble and incorruptible character" of persons in the Chinese context.

From the viewpoints of religion, literary references, and natural characteristics, some scholars have carried out methodical or targeted studies on tree imagery. According to Yang (2016), the symbolism of the Chinese scholar tree includes three aspects: its political importance for national tranquility, its metaphysical connection to the path of immortals, and its emotional value in individuals' lives. Ginkgo is widely regarded as a symbol of China and is commonly found in Chinese Buddhist temples. Ginkgo is the sacred tree in Buddhist culture (Liang, 2002). Following the Song Dynasty, the ginkgo gained emotional significance as a symbol of friendship, and because of its limited supply, it became a prized gift among friends (Chen, 2013). The employment of pine and cypress motifs during the Ming and Qing Dynasties was the most diverse. According to Yang (2019), the spiritual significance of the pine and cypress embodies the ancients' quest for ethics, Buddhism, and wellness. China is the first nation to cultivate mulberry and breed silkworms. Thanks to its long history of sericulture and silk production, China is also known as the "Country of silk." Thus, mulberry trees play an important part in traditional culture, as evidenced by the development of the ancient production economy through the manufacture of mulberry silk. The mulberry imagery in the Book of Songs generally connects to women. The ancients linked mulberry and silkworm to the nurturing qualities of feminine impulses, resulting in the emergence of the "mulberry girl" as a literary figure in Chinese literature (Wen, 2010).

Moreover, the mulberry imagery pertains to the appearances and emotions of women (Chen, 2004).

2.3.4 The Biophilia of human

From the initial religiously charged primitive worship to the extensive humanistic application of plant imagery, the development of traditional Chinese culture is inseparable from its vast plant culture system. As time flows, this cultural river has nourished and fostered numerous artistic treasures. These practical outcomes, whether presented in the form of text, painting, crafts, or installations, all reflect the "silent" communication between humans and plants. The human curiosity and affection for plants, as well as all creatures, is by no means coincidental. The term "biophilia" originates from the Greek terms *bios* (life) and *philia* (love or affection), and it was popularized by American biologist Edward O. Wilson in the 1980s. Edward (1984) proposed the "Biophilia Hypothesis", which explains the innate dependence and preference of human beings for nature. Since then, based on this theory, many designers have begun to explore how to incorporate natural elements into design to improve human health and happiness. The theory of Biophilia reveals that human evolution has conditioned us to have a deep emotional reliance on natural landscapes, plants, animals, and the natural environment and that this connection is essential for psychological, emotional, and physical health.

2.4 Plant-based materials

Plant-based materials are materials derived from plants, with common examples including wood, bamboo, natural fibers, bioplastics, and plant oils. Due to their sustainability and renewability, these materials are receiving growing attention across various industries. This study aims to explore ways to convert tea into tea-based materials and evaluate their potential for use in home decor. Therefore, case studies on plant-based materials, particularly agricultural waste, in the design sector are crucial.

2.4.1 Materials and sustainability

The concept of sustainable design can be traced back to the early 1970s. Papanek (1971) argued that design should focus on social welfare, environmental protection, resource conservation, and meeting genuine needs, rather than catering to market demands or pursuing luxury design. According to the World Commission on Environment and Development (WCED), sustainable development is defined as

"meeting the needs of the present without compromising the ability of future generations to meet their own needs." This concept emphasizes the importance of the triple bottom line (environmental protection, social equity, and economic development) for sustainable design (1987). Keoleian & Menerey (1994) noted that sustainable development is a dynamic state in which human economic activities and natural ecological processes are harmonized. The principles for achieving sustainable development include the following: 1. sustainable resource use, such as conserving resources, minimizing the consumption of non-renewable resources, and using renewable resources; 2. maintaining the structure and function of ecosystems; 3. environmental justice principles.

To promote sustainability, consider actions in various areas: use indigenous materials, protect and cultivate rich soil, preserve open spaces within urban environments, utilize rainwater and gray-water for water conservation, prioritize recycling for waste management, ensure clean air quality, harness solar and wind energy while recycling waste energy, protect nature by creating quiet spaces, and ensure responsibility to future generations by eliminating the need for constant maintenance (Naik & Moriconi, 2005). According to Zhao (2019), indigenous materials can be categorized into local plants, local building materials, and local waste materials based on their uses and properties. Wang (2024) emphasized that the advantages of using indigenous materials are reflected in several aspects: 1. cost savings (such as transportation costs for imported materials); 2. promoting local economic development through the use of indigenous materials; 3. creating designs with stronger local cultural attributes; 4. sustainability (reducing waste and harmful emissions during construction, as well as conserving resources, which helps protect the local environment).

William McDonough, an architect and a prominent figure in the sustainable design movement, advocates the closed-loop principle that "waste equals food." This idea suggests that materials typically regarded as waste can be repurposed into something valuable and functional (Braungart & McDonough, 1998). Young et al. (2004) noted that this biological cycle serves as a metaphor for addressing human-generated waste. Dumée (2022) argued that implementing innovative circular design not only benefits society but also provides opportunities for businesses, positively impacting economic growth and reducing negative environmental effects.

2.4.2 Localized application of plant-based materials

The first step in producing plant-based materials is to obtain raw materials. Due to the differences in geographical location, climate, and culture of each country and region, the types of biomass suitable for their growth are also very different. For example, Malaysia is rich in pineapples, and a large amount of pineapple leaf waste is generated every year. Ananas Anam is a company dedicated to converting pineapple plant leaf fibers into plant-based leather. They obtain raw materials by recycling pineapple leaves and converting agricultural waste into sustainable products, and Malaysia is their material recycling area. Another typical case is PooPooPaper, an ecological papermaking company in Chiang Mai, northern Thailand. The elephant is the mascot of Thailand. This brand uses elephant dung as raw material and mixes it with other agricultural waste through technical means to convert it into products such as bookmarks and notebooks. Therefore, from the perspective of objective regularity, the types of recycled biomass are best based on methods that adapt to local conditions. In the recycling stage of waste, attention to the "locality" of recycled materials can greatly improve recycling efficiency and reduce recycling costs.

2.4.3 The related cases of plant-based materials

Figure 10 shows the Ohmie orange peel lamp design, introduced by Italy's Krill Design in 2021. Krill Design utilizes additive manufacturing to replace traditional production methods, recycling natural waste and adopting a more environmentally respectful manufacturing approach. The team transforms Sicilian orange peels into natural, compostable biopolymers, which are then used in the creation of 3D-printed desk lamps. The process involves drying the orange peels, grinding them into powder, and converting them into granules. The orange peel-based material is printed using an FDM machine, and the distinct scent of the material gives the Ohmie lamp a fragrance reminiscent of orange cookies. Each lamp is made from two Sicilian oranges and weighs only 153 grams.



Figure 11: Ohmie lamp

Source: Krill Design (2021)

Figure 11 illustrates the Coffire series of lamps designed by Chinese designer Zhekai Zhang. He used Jingdezhen porcelain clay as the base material, firing the lamp to create a smooth surface, then substituting coffee grounds for glaze to color the lampshade. During the low-temperature firing process, which ranges from 700 to 1000°C, the coffee grounds release biodiesel and sugar. As these components interact, the lampshade develops a unique texture, influenced by factors such as temperature, humidity, and coffee ground density, resulting in a surface resembling pink marble. By replacing toxic metal paints with natural coffee grounds, the design ensures safer production and use. Additionally, from a visual perspective, the irregular texture created by the coffee ground dye and the lamp surface showcases a distinct material aesthetic.



Figure 12: Coffire series of lamps

Source: Zhekai Zhang (2019)

Figure 12 shows the Mat stool, designed by renowned Danish designer Peter Hiort-Lorenzen and his studio Foersom & Hiort-Lorenzen. The idea for this product began in the late 1990s, when Peter wanted to create a sustainable alternative to the plastic

stools that dominated the market at the time. Peter spent more than two decades researching, prototyping, and testing new materials. In 2008, the designer began experimenting with hemp, a tough natural resource that laid the foundation for his subsequent products. The production process of the Mat stool follows sustainable principles, taking into account both aesthetics and product durability. The stool uses hemp fibers and dried eel grass, which go through multiple stages of crushing, grinding, and compression. Importantly, this process emphasizes zero waste, and even the residue is reused in the production of new stools, reflecting the core of the circular economy. It is important to emphasize that a key innovation introduced in the production process of the product is a two-component adhesive, which is used to increase the strength and durability of the product. This fully recyclable adhesive is non-toxic chemicals, further strengthening the circularity of the series.



Figure 13: Mat project

Source: Peter Hiort-Lorenzen

2.5 Summary

Framework and Purpose: This study reviews relevant literature from four key areas: the current state of modern design in China, traditional Xiangsheng, plant imagery, and plant-based materials. To address the challenges faced by modern Chinese design, some scholars emphasize the critical role of culture in design, particularly local culture, traditional culture, and craftsmanship. They argue that integrating cultural elements into design is a key driver of innovation. Starting from a cultural foundation helps contemporary designers find a path for "Chinese-style" design, while also enabling Chinese design to establish its position on the global design stage. Additionally, many scholars affirm the profound impact of interdisciplinary collaboration on art and design,

as it provides new perspectives for design practices and artistic creation, filling gaps in traditional knowledge systems. Thus, contemporary Chinese design can follow this trend, fostering innovation and diverse design approaches through the exchange and collision of different disciplines. Furthermore, some scholars seek to find the development direction for modern Chinese design in ancient philosophical thought. Although different philosophical schools vary in their approaches, most are based on the concepts of "Taoism" (the way of heaven) and "goodness". From the perspective of "Taoism," literature discusses how "Dao follows nature" emphasizes the unity and harmony between the individual, society, and nature, where adhering to natural laws leads to harmonious coexistence between humanity and nature, aligning with current sustainability issues. From the perspective of "goodness," the core idea is self-discipline and cultivation of the individual, emphasizing compassion, shame, respect, and righteousness. This concept, when reflected in design thinking, manifests as the pursuit and practice of goodness, guiding designers to create works of the highest virtue.

With the advancement of Chinese social civilization, the meaning of Xiangsheng gradually evolved from its initial role as ritualistic sacrificial objects to vivid vocal imitations and nearly lifelike craftsmanship. During the Song Dynasty, Xiangsheng crafts began to be modeled after fruits, and by the Qing Dynasty, artisans expanded their creative scope, drawing inspiration not only from fruits but from various biological forms. As times changed, Xiangsheng gradually developed into a form of folk art, with an increasing diversity of materials used, such as copper, rosewood, and ceramics, resulting in a large quantity of Xiangsheng artworks. The essence of Xiangsheng thinking lies in the observation and imitation of nature, while Xiangsheng practice represents a tangible expression of an intangible affection for natural forms. The research defines and characterizes both xiangsheng and bionic design, using case studies to illustrate the relevant features of Xiangsheng and biomimicry in artistic design practice. The purpose is to identify the commonalities and differences between traditional xiangsheng and modern bionic design and to refine the cultural identity of traditional xiangsheng in China. Additionally, the research explores plant culture and plant imagery, highlighting their significance in xiangsheng practices through three artistic works from different historical periods. This part contributes to the establishment of the xiangsheng theory system based on plant imagery. Furthermore, the study presents three case studies of plant-based materials made from agricultural waste and

applied in product development, revealing the trend of collaborative development between materials, design, art, and technology within a sustainable context.

Core Viewpoint: The literature indicates that the development of modern Chinese design will be driven by the inheritance of local culture, the integration and innovation of disciplines, and the ancient view of the "Way of Heaven." As a traditional element of Chinese culture, Xiangsheng shares both commonalities and differences with modern bionic design, which are reflected in the following aspects:

Commonalities:

Essence: Both Xiangsheng and bionic design are processes of human imitation of nature.

Philosophical Perspective: From a philosophical viewpoint, Xiangsheng embodies the philosophy of "Dao follows nature" (道法自然), while modern biomimicry aligns with Western ecological philosophy. Both reflect the harmonious coexistence between humans and nature.

Artistic and Design Outcomes: In terms of artistic design practice, both Xiangsheng and biomimetic design often meet the dual criteria of functionality and artistry.

Differences:

Selection of Imitated Objects: The scope of imitation in bionic design is broader and more focused on the diversity and scientific characteristics of biological forms, such as the optical properties of marine creatures, the flight mechanisms of birds, or the organic forms of plants. In contrast, Xiangsheng emphasizes objects' cultural and symbolic properties, such as the meanings of plants or anthropomorphized characters.

Classification: Bionic design can be categorized into structural biomimicry, functional biomimicry, and form biomimicry, etc., Traditional Xiangsheng, on the other hand, is divided into tangible (form) and intangible (voice) forms of imitation.

Disciplinary Nature: Modern bionic design is design-driven, and aimed at solving practical problems, whereas traditional Xiangsheng is culture-driven, emphasizing emotional and cultural expression. Xiangsheng activities encapsulate the cultural essence of countless natural images, positioning it more closely to the realm of art.

As shown in Figure 14, the Xiangsheng based on plant imagery can be summarized into three main steps. The first step is the selection of plant imagery, typically choosing plants that possess cultural, communicative, aesthetic, or functional value, with these

four values being interrelated and complementary. For example, the lotus leaf possesses a natural self-cleaning function, which allows it to maintain a clean surface. Inspired by its characteristics, ancient Chinese used the expression "out of the mud but not stained" to describe the lotus leaf, thereby enhancing its cultural value. The lotus leaf gradually came to symbolize purity and noble character and was applied in poetry, painting, gardens, and crafts, further enriching its aesthetic and communicative value. The second step involves the artisans' careful observation and refinement of plant forms. The ability of xiangsheng to vividly replicate natural objects is due to the artisans' profound observation and precise extraction of the plant's characteristics. Finally, based on the previous steps, artisans proceed with the creation process, incorporating appropriate materials and techniques. Common materials used in xiangsheng include ceramics, clay, wood, stone, and others. The practice of Xiangsheng based on plant imagery adheres to four key principles: 1. The cultural attributes of the Xiangsheng object, meaning that the object must carry cultural connotations to realize the cultural value of the Xiangsheng work; 2. The decorative quality of the Xiangsheng work, where the plant imagery provides natural beauty through its form, endowing the work with unique aesthetic value; 3. The symbolism of the Xiangsheng object, where the imitated objects are predominantly drawn from plants that embody positive meanings and beautiful symbols. These symbols reflect human aspirations and desires, thereby imparting a communicative value to the Xiangsheng work; 4. The functionality of the Xiangsheng work. While these works exhibit distinctive visual characteristics, they must also fulfill their basic functional roles as products.

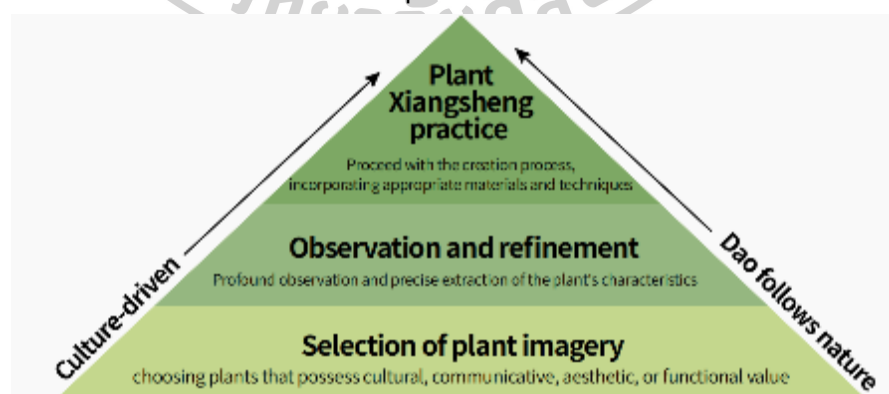


Figure 14: Three main steps of Xiangsheng practice

Source: Author

The study reveals that, in the context of sustainable development, there is widespread attention across sectors regarding the research, development, and application of plant-based materials. The cases demonstrate that material innovation, technological advancements, and interdisciplinary collaboration are trends in the evolution of art and design. The synergy of various disciplines will accelerate the development of new materials, designs, and technologies. In addition, material selection plays a crucial role in achieving sustainability. Designers can integrate indigenous materials, such as local plants, building materials, and waste materials, into their design practices. This approach not only supports the sustainability of local economies and resources but also imbues the design with distinct regional cultural characteristics.

Gap: Throughout Chinese history, countless exquisitely crafted and culturally rich works of art have been created through the practice of Xiangsheng. While many scholars equate Xiangsheng with bionics, there is a noticeable lack of Xiangsheng practices in modern design. Furthermore, traditional plant imagery is widely applied in literature, art, and landscaping, yet few scholars have explored its application from a design perspective. Additionally, plant-based materials are a hot topic in contemporary art and design, but as a major producer of tea, China has yet to explore design practices or theories focused on tea-based materials. Questions such as how to incorporate plant imagery into localized Chinese design, how to utilize tea waste in material research and Xiangsheng practices, and how to apply Xiangsheng in contemporary home decor remain largely unexplored.

Motivation and innovation: This study takes plant imagery as the starting point and tea-based materials as the innovation point, and uses a mixed research method to explore the feasibility of tea-based materials in the field of Xiangsheng home decoration. The study combines a large amount of literature to understand the relevant knowledge of Xiangsheng and plant imagery and secondly finds a breakthrough in Chinese modern design from the perspective of cultural heritage. In addition, the study intends to innovate materials and demonstrate the production process and material properties of tea-based materials from a practical perspective.

Chapter 3

Research Methodology

3.1 Introduction

This chapter primarily outlines the research methods and processes employed in the study. In the second part of the study, data was collected from a range of case studies and literature reviews. The objectives of this research method are threefold: first, to compare traditional Chinese Xiangsheng with modern bionic design and identify their differences; second, to establish a theoretical framework for Xiangsheng based on plant imagery; and third, to explore the current status and trends of plant-based materials in design.



Sample method: This study employed two sampling methods. In the questionnaire survey phase, random sampling was used to assess the public's awareness of plant imagery, xiangsheng products, and bio-based materials. The aim of this method was to enhance the diversity of the sample, ensuring that the data collected would be more impartial and objective. The questionnaire was distributed through the online platform "Wenjuanxing," with a total of 300 responses, of which 265 were valid.

In the in-depth interview phase, purposive sampling was employed to gather feedback from experts, designers, and target users regarding the interim design outcomes. This approach was chosen to ensure that the sample included individuals with relevant expertise, thereby providing accurate and professional data for the study. A total of 14 participants were involved in the interviews, including 5 designers, 3 academic experts, and 6 target users. Inclusion criteria were as follows: (1) Designers must have at least five years of professional experience; (2) Target users must have experience purchasing or a strong interest in home decor; (3) Academic experts must have a background in art or design.

Data collection: To ensure the validity of the questionnaire, the researcher integrated key research topics such as plant imagery, Xiangsheng products, bio-based materials, and tea-based materials into the questionnaire design, ensuring that relevant dimensions of the study were covered. Additionally, to enhance the questionnaire's comprehensibility, simple and easy-to-understand language was used, avoiding overly technical terms, which improved the clarity and validity of the questionnaire.

Furthermore, the use of random sampling helped ensure the diversity of the sample and the objectivity of the data, thereby further enhancing the validity of the research results.

Data analyze: The researcher removed invalid responses, resulting in a final sample of 265 valid questionnaires. For the questionnaire data, descriptive statistical analysis was performed using Excel to generate charts. For the in-depth interview data, the researcher applied content analysis, converting the interview content into textual data and categorizing and organizing it according to the research objectives.

In the initial phase, the researcher conducted public surveys to assess the general public's awareness, acceptance, and purchasing intentions concerning Xiangsheng decorative items, traditional plant imagery, and plant-based products. Additionally, the chapter addresses two key experimental areas: the material experiment focused on transforming tea into tea-based materials, and the design experiment aimed at presenting plant imagery through these tea-based materials.

The material experiment uses tea as the primary raw material, which is combined with other substances through physical or chemical processes to test the feasibility of converting tea into tea-based materials. Tea waste, including expired and leftover tea, is collected at a low cost for these experiments. Three specific approaches were explored: the tea-based silicone experiment, the tea-based leather experiment, and the tea-based clay experiment. Comparative analyses of the experimental outcomes were conducted to identify tea-based materials that best lend themselves to representing plant imagery. Additionally, observation plays a vital role in this study. By observing the biological characteristics of representative plant images, a clearer and more accurate basis for plant-based Xiangsheng design is established. The researcher systematically organizes the observational data, which provides essential design elements for the subsequent design experiments.

Furthermore, the research methods and data collected will inform the design experiments. Following these experiments, in-depth interviews will be conducted to gather evaluation and feedback from stakeholders. This chapter is organized into the following five sections:

Part 01: Questionnaire survey.

Part 02: Material experiment.

Part 03: Observation method.

Part 04: Design experiment.

Part 05: In-depth interview.

3.2 Public Questionnaire

It is important to note that participants will be provided with an informed consent form before participating in the questionnaire survey, as outlined in Table 1. Participants will be informed about the purpose, potential benefits, risks, and funding sources of the research before they are asked to provide consent to participate. Furthermore, all personal information collected from participants will be kept confidential, and they will have the right to withdraw from the survey at any time, for any reason, during the participation process.

Table 1: Informed consent form

| Informed consent |
|---|
| <p>Before participating in this questionnaire, please take a moment to review the purpose of this research. If at any point you wish to discontinue your participation for any reason, you may click the "Disagree to Continue Participation" button to stop answering. Additionally, all information you provide in this questionnaire will be used solely for academic purposes. Your personal data will be kept confidential and will not be used for commercial purposes.</p> <p>Purpose of the Research: This research is part of a doctoral project at Silpakorn University, focusing on "The Application of Tea-Based Materials in Xiangsheng Home Decor." The study aims to explore the uniqueness and innovation of tea-based materials and evaluate their practicality in the context of plant Xiangsheng.</p> <p>The questionnaire will take approximately 5 minutes to complete. Your participation is invaluable and will greatly contribute to the effectiveness and validity of this research. We sincerely appreciate your involvement.</p> |

The researcher employed an online questionnaire survey to assess the Chinese public's awareness of plant-based materials and traditional plant imagery, as well as their purchasing intentions for Xiangsheng home decor. During the questionnaire design process, the researcher highlighted key study terms to gather essential information that would guide the experimental design. As shown in Table 2, questions Q1-Q3 were designed to capture basic information about the participants, while questions Q4-Q9

focused on understanding participants' awareness, acceptance, and purchasing intentions regarding plant-based materials and products. Questions Q10-Q13 were aimed at gauging public awareness and purchase intent for Xiangsheng products. Additionally, based on prior research, the researcher identified 10 representative traditional Chinese tree images to evaluate the public's familiarity with these symbols. Questions Q16-Q17 were included to explore participants' preferences in home decor and their interest in plant-inspired Xiangsheng elements. In the data analysis phase, the researcher employed data visualization techniques to present the findings in the form of charts and tables, ensuring a more intuitive presentation of the results.

Table 2: Online questionnaire

| Xiangsheng Home Decor with Tea-based Material Questionnaire | |
|---|---|
| 1. What is your gender? | <input type="radio"/> MALE <input type="radio"/> FEMALE |
| 2. What is your age group? | <input type="radio"/> UNDER18 <input type="radio"/> 18-25 <input type="radio"/> 26-30 <input type="radio"/> 31-40 <input type="radio"/> 41-50 <input type="radio"/> 51-60 <input type="radio"/> OVER60 |
| 3. Which of the following categories do you work in? | <input type="radio"/> CULTURE AND ART <input type="radio"/> EDUCATION <input type="radio"/> FINANCE <input type="radio"/> INTERNET <input type="radio"/> OTHERS |
| 4. Do you know what bio-based or plant-based materials are? | <input type="radio"/> YES <input type="radio"/> NO |
| 5. Do you think that the research and development and application of plant-based materials contribute to sustainable development? | <input type="radio"/> YES <input type="radio"/> NO |
| 6. Have you ever bought environmentally friendly crafts or home decorations (such as paper, bamboo, wood and other materials)? | <input type="radio"/> YES <input type="radio"/> NO |
| 7. Have you ever bought products made of plant-based materials? | <input type="radio"/> YES <input type="radio"/> NO |
| 8. Are you willing to try buying crafts made with plant-based materials? | <input type="radio"/> YES <input type="radio"/> NO |

| | |
|--|--|
| 9. Are you willing to try to buy crafts or home decorations made with Tea-based material? | <input type="radio"/> YES <input type="radio"/> NO |
| 10. Do you know about Xiangsheng or bionic product design? | <input type="radio"/> YES <input type="radio"/> NO |
| 11. Have you ever bought home products with Xiangsheng elements in your life? | <input type="radio"/> YES <input type="radio"/> NO |
| 12. Do you think products with animal or plant elements are more attractive? | <input type="radio"/> YES <input type="radio"/> NO |
| 13. In the field of Home Decor, compared with conventional product shapes, are you more inclined to buy products with plant shapes as design elements? | <input type="radio"/> YES <input type="radio"/> NO |
| 14. Do you know about traditional Chinese plant imagery? | <input type="radio"/> YES <input type="radio"/> NO |
| 15. Which of the following do you think are traditional Chinese plant images? (Please select 3 of options at least) | <input type="radio"/> Mulberry <input type="radio"/> Phoenix tree <input type="radio"/> Pagoda tree <input type="radio"/> Goldenrain tree <input type="radio"/> Kapok <input type="radio"/> Plum blossom <input type="radio"/> Pine and cypress <input type="radio"/> Ginkgo <input type="radio"/> Soapberry |
| 16. Which plant elements do you want to keep in Xiangsheng decorative items? (Please select 2 of options) | <input type="radio"/> Shape <input type="radio"/> Texture <input type="radio"/> Color <input type="radio"/> Smell |
| 17. Which of the following two types of products do you prefer to buy in home decoration? (Please select 2 of options) | <input type="radio"/> Flower vases <input type="radio"/> Plates and dishes <input type="radio"/> Desktop ornaments <input type="radio"/> Decorative paintings <input type="radio"/> Storage racks & storage boxes |

After completing the questionnaire design, the researcher entered the questions into the professional questionnaire survey, evaluation, and voting online platform "Wenjuanxing", and generated a QR code for online distribution of the questionnaire. The research adopted a convenient sampling technique to distribute online questionnaires, achieving a sample size of 300 and a valid response count of 265.

The statistics are as follows:

As shown in Figure 15, nearly 60% of the respondents were unfamiliar with the concepts of bio-based or plant-based materials. Nevertheless, Figure 16 demonstrates that almost 60% of the respondents have purchased products made from plant-based materials (materials that are entirely or partially derived from plants). According to Figure 17, over 80% of the respondents believe that the research, development, and utilization of plant-based materials contribute positively to sustainable development. Additionally, Figure 18 reveals that nearly 90% of respondents expressed a willingness to try purchasing plant-based products. While over 80% of the respondents find home decorations featuring plant or animal shapes more attractive (Figure 19) and are more inclined to purchase products incorporating such elements rather than conventional designs (Figure 20), nearly half of the participants have never bought products with Xiangsheng elements (Figure 21). Furthermore, Figure 22 indicates that more than 62% of respondents feel they are familiar with traditional Chinese plant imagery. As shown in Figure 23, among the ten traditional plant images, the public is most acquainted with pine and cypress, followed by Chinese plum and Chinese phoenix tree, while the recognition of the Golden Rain Tree and Soap Berry is notably lower, with only 11.7% of respondents identifying Soap Berry as part of Chinese traditional plant imagery. In terms of extracting plant elements, respondents primarily favored reflecting the shape and texture of plants in products, as seen in Figure 24, which presents data across the four dimensions of shape, texture, color, and taste. Among the five common categories of home decor products, most respondents tend to purchase desktop ornaments, followed by products with storage and organizational functions. The number of participants selecting plate and dish decorations, decorative paintings, and flower vases was approximately the same..



Figure 15: Awareness about Bionic material



Figure 16: Consumption in plant-based products

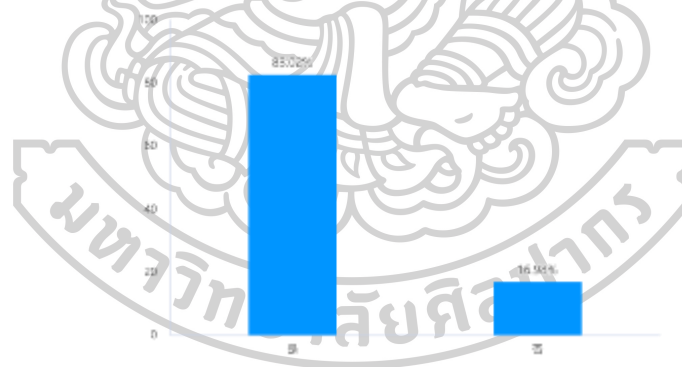


Figure 17: Awareness about Bionic material

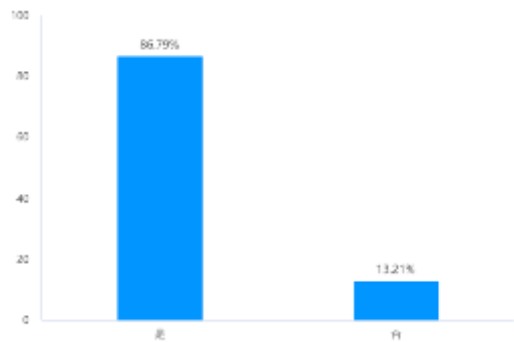


Figure 18: Purchase intention of plant-base products

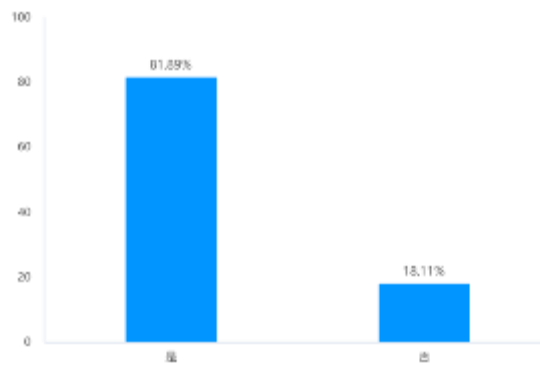


Figure 19: Public preference of shape bionic

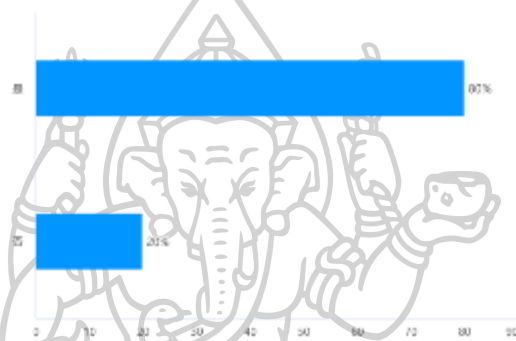


Figure 20: Purchase intention of Xiangsheng home decor

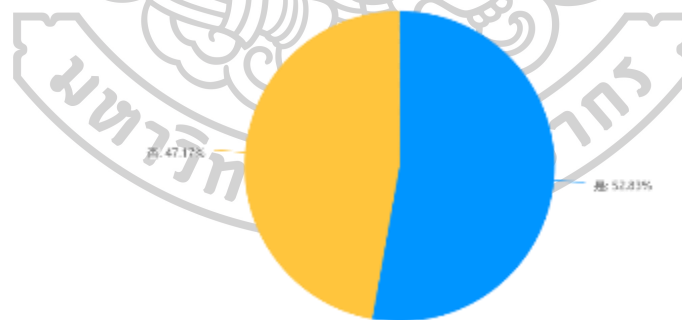


Figure 21: Consumption in Xiangsheng products

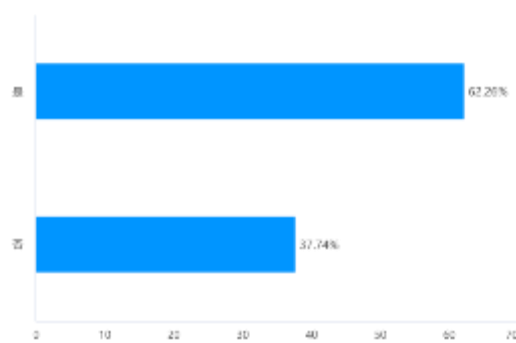


Figure 22: Awareness about Chinese traditional plant imagery

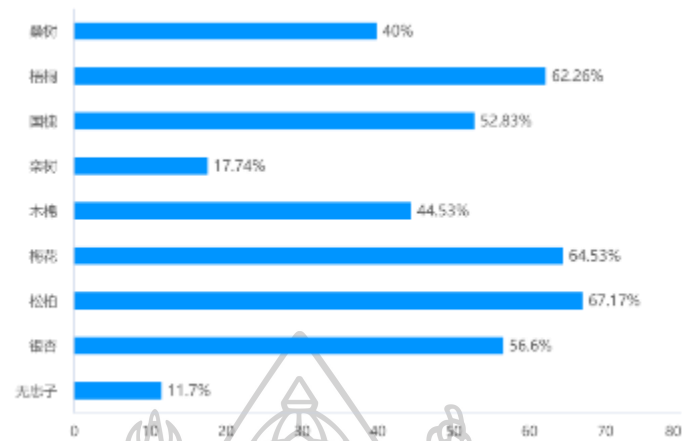


Figure 23: Awareness about Chinese traditional tree imagery

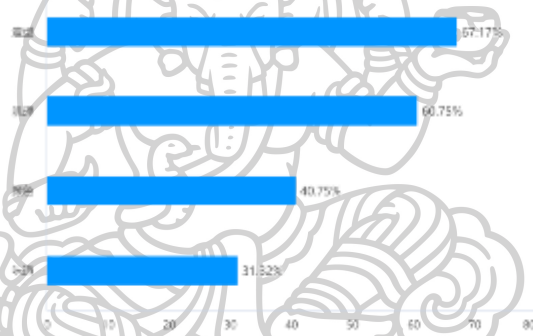


Figure 24: Public preference of plant elements

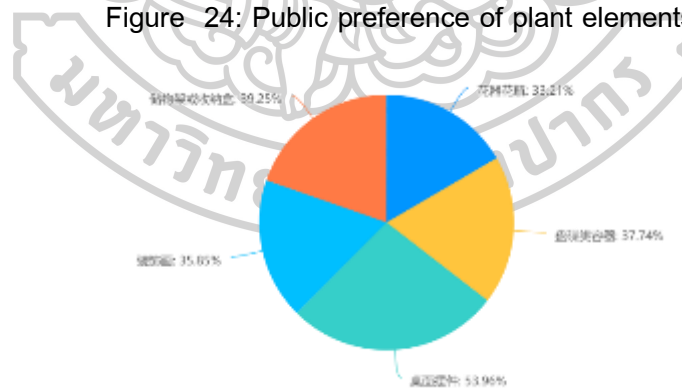


Figure 25: Public preference of product categories

The questionnaire was designed to assess the public's awareness of plant-based materials and traditional plant imagery, as well as their purchasing intentions concerning bionic home decor. The questions were constructed to cover a broad range of topics without delving into extensive detail, and the total number of questions was minimized

to enhance participant engagement. As a result, the data collected from the questionnaire will primarily serve as a reference for the research process. The researcher abstracted the findings into four key conclusions:

1. A significant majority of participants express a high level of acceptance toward the use of plant-based materials in home decor, suggesting substantial potential for products made from such materials in the Chinese home decoration market.
2. While most participants favor products incorporating plant or animal elements, only about half have purchased such items. This indicates a considerable untapped market for Xiangsheng products.
3. The majority of participants are not familiar with traditional Chinese plant imagery, with only a few well-known plant symbols being recognized. This points to the necessity of further promoting and educating the public about traditional plant imagery.
4. Regarding plant Xiangsheng, most participants prefer the preservation of the shape and texture of Xiangsheng objects, while a smaller proportion express preference for elements related to color and taste.

3.3 Material experiments

The tea-based material experiment was conducted in three ways, the tea-based silicone experiment, the tea-based leather experiment, and the tea-based clay experiment (Huang, 2024). In the step of material preparation, the research collected the tea waste via two channels, daily home tea waste and expired tea from merchants. This part illustrates the process of transforming tea into tea-based materials, and the outcomes will be assessed based on color expression, texture, smell, plasticity, and other factors. The evaluation result will be beneficial for choosing suitable Xiangsheng material for the next stage.

3.3.1 Tea-based silicone experiment

The essential materials for the material experiment include tea waste and food-grade silicone, while the necessary tools include an oven, molds, and stirring rods. The research utilized household waste, like plastic packaging boxes as molds, to enhance waste reuse. Figure 26 illustrates the process of transforming tea leaves into tea-based silicone. The whole process includes three main stages: material preparation, material mixing, and curing. At the first stage, the recycled tea waste is initially washed, drained, and broiled in an oven until thoroughly dried. Then, AB glue is formulated in

1:1 ratio, amounting to 100g, while 10g of tea leaves are ground into granulated form. During the second stage, the AB glue is combined and rapidly stirred along the cup's wall in a clockwise direction, while the tea residue is mixed during the stirring process, and this procedure might take 3-5 minutes. Entering the final stage, the mixture is poured into a mold and left to cure at room temperature. It takes about an hour to solidify, after which the mixture will be a tea-base silicon panel. The experiment was conducted in China, and the whole process lasted 4 hours, Figures 27-28 show the experiment process of making tea-based silicone.



Figure 26: The process of material experiment with Silica Gel

Source: Author (2024)



Figure 27: Preparation of materials

Source: Author (2024)



Figure 28: Mixing materials

Source: Author (2024)

Figure 29 illustrates the experimental outcomes of tea-based silicone. The result shows that the tea-based silicone exhibits elasticity while preserving the texture, color, and aroma of tea. Further material evaluation requires comparison and analysis following the completion of studies.



Figure 29: Tea-based silica gel

Source: Author (2024)

3.3.2 Tea-base leather experiment

Glycerin, gelatin, water, and tea waste will be used in this experiment. Glycerin is a non-toxic, colorless, odorless, and natural substance derived from vegetable oil. Gelatin is a food-grade natural material primarily composed of protein. Therefore, the experimental procedure and results are sustainable and environmentally friendly. The tools for the material experiment are a cooking pot, an induction cooker, a stirring stick, and a tray. Figure 30 illustrates the procedure for transforming tea into tea-based leather. The entire process includes three main stages: material preparation, material mixing, and curing. Firstly, the tea leaves are ground into granules, and other materials are measured and prepared. Then, water and glycerin are poured into the pot and heated at a low temperature, followed by the sequential addition of gelatin and tea waste, which are agitated in a clockwise direction until the mixture approaches boiling. Finally, the mixture is poured into a tray, it takes 24 to 30 hours to cure at room temperature, after which it turns into a tea-based leather.






Figure 30: The process of material experiment with glycerin and gelatin





Source: Author (2024)

The research conducted seven experiments based on different material ratios and summarized the ratio details and experimental outcomes in Table 3. The results were categorized into six levels: excellent, very good, good, fair, poor, and very poor, with a preliminary assessment based on softness, tensile strength, and waterproofing capabilities. Due to the limitations of professional equipment, the research made evaluations through touching, pulling, and soaking, and the test results are for reference only. Results from this experiment are summarized as follows:

1. Tea-based leather with tea, gelatin, glycerin, and water as raw materials is feasible.
2. The lesser the quantity of tea added during the experiment, the smoother the texture of the leather' surface.
3. During the experiment process, the colors of different tea leaves become darker with increasing temperature, and the experimental outcomes will lose the original color of tea.
4. The combination of tea with other substances will ruin its original smell during the experiment.

Table 3: Detailed information of tea-based leather experiment

| No. | Weight of different ingredients | | | | Images of result | Softness | Tear resistance | Waterproof |
|-----------------|---------------------------------|----------|---------|---------------------|---|----------|-----------------|------------|
| | Water | Glycerin | Gelatin | Tea leaves | | | | |
| 1 st | 250g | 10g | 5g | 0.1g (Green tea) |  | Good | Good | Good |
| 2 nd | 250g | 50g | 15g | 5g (Black tea) |  | Fair | Poor | Good |
| 3 rd | 250g | 5g | 45g | 40g (Green tea) |  | Poor | Poor | Good |

| | | | | | | | | |
|-----------------|------|-----|-----|----------------------------|---|--------------|-----------|------|
| | | | | tea) | | | | |
| 4 th | 250g | 20g | 60g | 20g (chrysanthemum tea) |  | Unacceptable | Very good | Good |
| 5 th | 250g | 5g | 15g | 5g (Rose tea) |  | Fair | Very good | Good |
| 6 th | 250g | 5g | 15g | 5g (Green tea) |  | Fair | Good | Good |
| 7 th | 250g | 5g | 10g | 0.1g (Green tea) |  | Good | Good | Good |

This experiment utilized natural materials, and no preservative treatment was applied during the procedure. Tea-based leather showed mildew growth after being stored at room temperature for several months. In addition, it should be noted that this study emphasizes the method of converting tea leaves into tea-based materials and their artistic expression. Therefore, the evaluation of material qualities and in-depth material testing will not be extended in this study. A comprehensive study on tea-based leather requires meticulous and varied material tests, together with the utilization of specialized equipment for result evaluation in the future.

3.3.3 Tea-based clay experiment

Tea leaves, gypsum powder, and Chinese paste will be used in the tea-based clay experiment. Chinese paste is a natural adhesive derived from sticky rice or various starch-laden crops. Its function resembles that of glue and provides a bonding effect in the experiment. In comparison with industrial glue, Chinese paste offers the benefit of

being natural and non-toxic due to its composition of organic components. It should be noted that when paste is not available, white latex can be used as a substitute. Gypsum powder's function in the experiment is to improve the sticking capacity of tea-based clay and boost the hardness of the result once drying. Although there is no clay component in tea-based clay, the researcher named it as such due to experimental results that make its physical characteristics similar to clay. The detailed process stages of the tea-based clay experiment are illustrated in Figure 31. The process starts with grinding tea leaves and preparing the gypsum powder and paste. In the next step, the three materials are blended and rubbed by hand until the components are uniformly combined. Finally, the tea-based clay must be placed in a well-ventilated area to air dry, thereby preventing mold growth.



Figure 31: The process of tea-based clay experiment

Source: Author (2024)

Figure 32 illustrates the experimental process of tea-based clay, experiment was conducted in Bangkok, Thailand. The researcher set the total weight of each experiment to 100g and conducted experiments with different material proportions. The experimental findings indicate that the three raw materials show plasticity when combined in different proportions, and final products may be dried in the ventilated

environment, although the curing duration and hardness were different. The curing duration generally relies on the proportion of gypsum powder used during the experiment. In general, a higher percentage of gypsum powder leads to shorter drying time and better hardness of the tea-based clay. As the proportion of paste remains constant, an increased quantity of tea leaves leads to the tea-based clay's color near that of the original tea. In contrast, an increased application of gypsum powder results in a lighter color of the tea-based clay.



Figure 32: Making tea-based clay

Source: Author (2024)

3.3.4 Evaluation of Tea-based materials

The research evaluated the material experiment from six dimensions: operability, sustainability, color performance, plasticity, Smell, and texture. Operability is related to the difficulty of the experiment, such as whether the materials and equipment in the experiment are easy to obtain, whether the experiment process is easy to advance, and whether the experimental results are easy to produce. The sustainability is based on the material composition, including the utilization of natural materials and the carbon emissions produced throughout the experimental process. The performance of color and texture refers to the level to which the color and texture of the tea-based material align with the attributes of the Xiangsheng objects. Using mulberry as an example, it is necessary to determine if the tea-based material can replicate its gray-brown bark with longitudinal cracks. Furthermore, plasticity refers to whether the material is easy to be shaped and sculpted. Materials with strong plasticity are conducive to promoting design experiments. Tea has a natural aroma that can make people feel comfortable and relaxed. Consequently, the persistence of the smell is also an important element of the

evaluation. As shown in Table 4, the researchers evaluated the three tea-based materials with six levels: excellent, very good, good, fair, poor, and very poor.

Table 4: Evaluation information of tea-based materials

Source: Author (2024)

| | Operability | Sustainability | Color performance | Shaping ability | Smell | Texture |
|--------------------|-------------|----------------|-------------------|-----------------|-----------|-----------|
| Tea-based silicone | good | fair | good | fair | excellent | fair |
| Tea-based leather | fair | fair | very poor | very poor | very poor | poor |
| Tea-based clay | very good | very good | Very good | Very good | good | excellent |

The evaluation result indicates that, compared with tea-based silicon and tea-based leather, tea-based clay shows superior flexibility and texture performance. Tea-based leather has the lowest practicality due to a large number of experimental materials and equipment. While tea-based silicone can preserve the flavors of tea for a longer time, its plasticity is average because the experimental process requires a mold. In addition, the material evaluation of this study is only for the next step of the design experiment, and in-depth material performance evaluation may be carried out in future research.





3.4 Observation

The observation results provide a significant practical foundation for the following design stage. As presented in Table 5-6, the observation table focused on 6 typical imagery of scented tea and 10 traditional tree imagery. The researcher investigated the biological characteristics of flowers, fruits, bark, and leaves in succession. The 6 types of scented tea are lotus leaves, chrysanthemums, jasmine, roses, osmanthus, and lilies. Three main considerations justify the selection of these 6 plant imagery: From the standpoint

of edible value, these are popular scented teas in everyday life, with unique flavors and health benefits; from the viewpoint of cultural value, they constitute an integral aspect of traditional Chinese plant culture and represent significant cultural symbols; from the perspective of aesthetic value, the forms of these plants exhibit organic and ecological beauty, capable of expressing natural, harmonious, and dynamic beauty. In addition, tree imagery is a significant aspect of traditional Chinese plant culture. As an important cultural symbol, its cultural features and biological characteristics will be a source of inspiration for the design phase. The researcher concentrated on 10 tree imagery: Chinese scholar tree, Mulberry, Phoenix tree, Ginkgo, Pine, Cypress, Golden rain tree, Plum, Soap berry, and Kapok.

Table 5: Observation table of 6 scented tea imagery

Source: Author (2024)

| Observation table | | | | | |
|-----------------------------|--------|---|---|--------------------------------------|---|
| Name of plants | Types | Image | Shape | Flavor | Color |
| Lotus leaves | Leaf |  | Semicircular, sector and circular | Fresh and elegant | Emerald Green |
| Chrysanthemums (Morifolium) | Flower |  | Short and numerous petals, and golden stamens. | Herbal freshness and sweetness | White or light yellow petals with golden stamens. |
| Jasmine | Flower |  | The leaves are round or oval, and the flowers are umbrella-shaped | The sweet and fresh aroma of jasmine | White corolla |
| Roses | Flower |  | The flowers are spherical, jar-shaped or cup-shaped | Aromatic, sweet floral scent | Rose red |










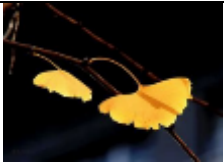












| | | | | | |
|-----------|--------|---|--|-------------------------------------|-------------------------------|
| Osmanthus | Flower |  | Each flower has 4 petals, and the petals are like four small spoons | Sweet and fresh osmanthus fragrance | Light yellow, Golden yellow |
| Lilies | Flower |  | There are usually 6 petals, which are lanceolate or long oval in shape | Warm, sweet, pure flavor | White and orange-red (common) |

Table 6: Observation table of 10 typical tree imagery

| Observation table | | | | | |
|----------------------|------------|---|--|--|---|
| Name of plants | Family | Image of barks | Features (barks) | Image of fruits, leaves or flower | Features |
| Chinese Scholar Tree | Leguminous |  | Color: Taupe Texture: Ridged |  Locust bean | The shape is like a string of green beads |
| Mulberry | Moraceae |  | Color: Taupe Texture: Longitudinal cracks |  Mulberry | Dark purple spherical |

| | | | | | |
|--------------|--------------|---|--|---|---|
| Phoenix tree | Malvaceae |  | Color: Olive green Texture: Smooth |  Phoenix tree's fruit | 5-6 green peels, seeds attached to the edge of the peel |
| Ginkgo | Ginkgoaceae |  | Color: Taupe Texture: Irregular cracks |  Ginkgo leaves | The shape is like a golden fan, with irregular curved edges |
| Pine | Pine |  | Color: Gray-brown Texture: Scaly |  Pine cone | The shape is like a brown peak tower, and the texture is like fish scales |
| Cypress | Cupressaceae |  | Color: gray-brown, reddish-brown Texture: longitudinal cracks |  Cypress's fruits | The shape is green spherical, with an irregular pentagon |

| | | | | | |
|------------------|-----------------------------|---|---|---|--|
| | | | | | or square top |
| Golden rain tree | Sapindaceae |  | Color: Gray-brown Texture: Armor-like cracks |  Flower | The shape is cone-shaped, like a red lantern |
| Chinese plum | Rosaceae |  | Color: Brown-purple Texture: Mottled |  Flower | Five-petal or multi-petal flower structure, mostly pink |
| Soap berry | Sapindaceae |  | Color: Off-white Texture: Smooth |  Fruits | The seeds are black ball shape and the fruit is like a golden ball |
| Kapok | Bombacaceae |  | Color: Gray-brown Texture: Long conical thorns |  Flower | Five petals, mostly orange-red |

The researcher chose the Wuhan Botanical Garden of the Chinese Academy of

Sciences as the site for observation, with a total observation duration of four hours. Established in 1958, the botanical garden serves as a comprehensive research institution focused on scientific inquiry, species conservation, and public education. It is recognized as one of China's three major scientific botanical gardens. The garden's extensive collection of plant species, coupled with its expertise in botanical science, offers considerable value for the research.

3.5 Design experiment

3.5.1 Design experiment with Tea-based silicone

In order to further study the performance of tea-based silicone in home decoration, the researcher designed two sets of aromatherapy decorations using osmanthus, tea, lotus leaves, and chrysanthemum as design elements and materials. There are two main reasons for designing aromatherapy decorations. First, tea-based silicone exhibits the unique smell of tea during the material testing phase. Applying it to fresh products may create a relaxing and refreshing atmosphere for users. Second, silicone material has adsorption properties, which can absorb unpleasant odors. Based on the above two points, the researchers designed a set of shoe freshness decorations and a set of scented tablets.

3.5.1.1 Fresh decorative items for shoes

In the process of fresh decorative design of shoes, the researcher made sketches based on four plants: osmanthus, tea leaves, chrysanthemums, and lotus leaves. As shown in Figure 33, the researchers presented flowers, leaves, and rhizomes in a three-dimensional form. Similar structures and bases can be seen in each sketch. The design of the base can not only improve the structural stability, but also facilitate the user to place the product into the shoe.



Figure 33: Sketch of fresh decoration items for shoes

Source: Author (2024)

After the sketch was drawn, the researchers used digital modeling methods to further improve the product shape and details, Figure 34 shows the three views of the product, and Figure 35 shows the digital modeling process. The size of each product is set to no more than 7cm*10cm*10cm, the purpose is to facilitate users to pick up and observe during actual use. Subsequently, the model was produced by 3D printing, and Figure 36 shows the outcomes of 3D printing.

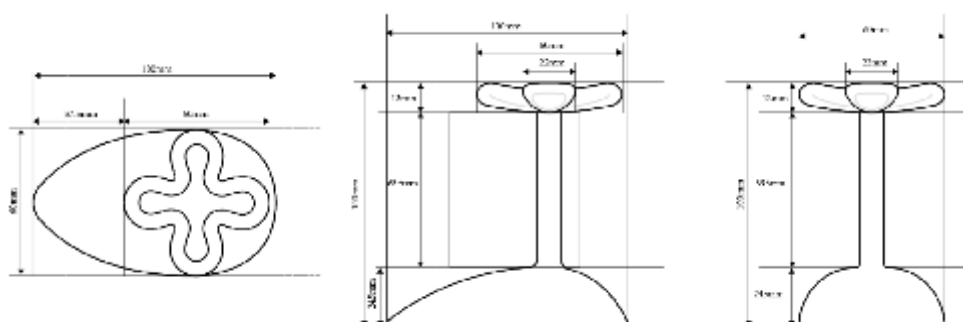


Figure 34: The three views of the product

Source: Author (2024)

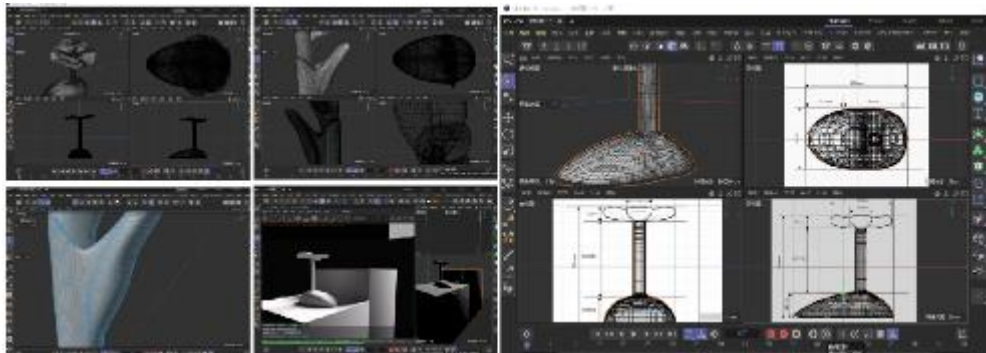


Figure 35: Digital modeling process by C4D

Source: Author (2024)



Figure 36: Results of 3D printing

Source: Author (2024)

Taking the fresh product of osmanthus flavor as an example, Figure 37 shows the mold turning process. The researcher used silicone to mold the printed item to obtain the mold. The researchers mixed the recycled osmanthus with food-grade silicone to obtain tea-based silicone, and injected it into the mold. After it solidified, it formed a fresh decoration with osmanthus flavor. However, the researcher found that the tea-based silicone' texture was too soft to shape the experimental product during the experiment process. Therefore, the researcher supposes that the tea-based silicone showed poor performance in terms of the product's plasticity. In future experiments, the researcher will consider simplifying the product shape or combining tea-based silicone with other materials to overcome the limitations of the material.



Figure 37: Mold turning process of osmanthus item

Source: Author (2024)

3.5.1.2 Scented tablets

In the design experiment of the previous stage, the researcher found the limitations of tea-based silicone. During the mold remodeling process, the silicone mold and tea-based silicone are prone to allergic reactions, which will cause the surface of the product to be sticky. The large-scale use of tea-based silicone makes the product visually monotonous and easily causes visually fatigue. Therefore, in order to optimize the design, the researcher changed the material of the mold in this stage of the design and tried to combine other materials with tea-based silicone. In addition, for visual design, the researcher presented plant images in the form of plant patterns and font engravings. In the design experiment of this stage, the researcher combined tea-based silicone with gypsum. Due to its adsorption and fragrance diffusion function, gypsum is often used in the production of scented tablets. Figure 38 shows a sketch of the design, the researcher divided the product structure into two parts, the outer shell of the product is made of gypsum, and the central part is made of tea-based silicone. During the use of users, they can feel the plant image through the pattern of the tea-based silicone part and smell its taste. In addition, users can drip essential oils on the gypsum part according to their preferences to create a multi-fragrance experience. This product can be used in home environments such as wardrobes, bathrooms, and bedrooms. Taking tea image as an example, as shown in Figure 39, tea' pattern design is demonstrated.

Chinese characters are the most intuitive expression elements, and font engraving is part of Chinese traditional culture. Based on the concept of engraving, the researchers used abstract plant shapes as outlines and font design as elements to design a graphic that combines fonts and patterns. Taking osmanthus imagery as an example, Figure 40 shows the pattern design of osmanthus.



Figure 38: Sketch of the scented tablets design

Source: Author (2024)

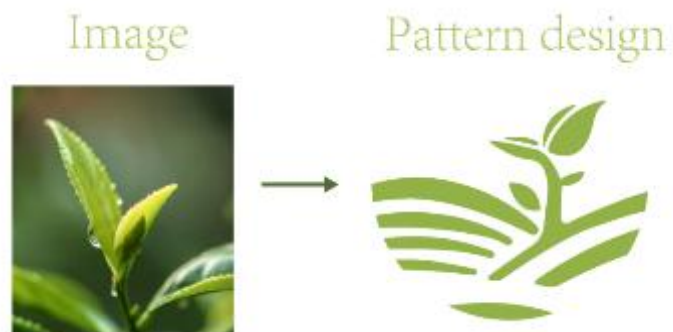


Figure 39: Tea's pattern design

Source: Author (2024)



Figure 40: Osmanthus's pattern design

Source: Author (2024)

The researcher designed a set of plant patterns and a set of font patterns using digital drawing, as shown in Figure 41. From left to right, they are osmanthus, green tea, lotus leaves, black tea, and chrysanthemum. As shown in Figure 42-43, in order to further advance the design experiment, the researchers used C4D modeling and OC renderer to produce renderings.



Figure 41: Pattern and font design of scented tablets

Source: Author (2024)

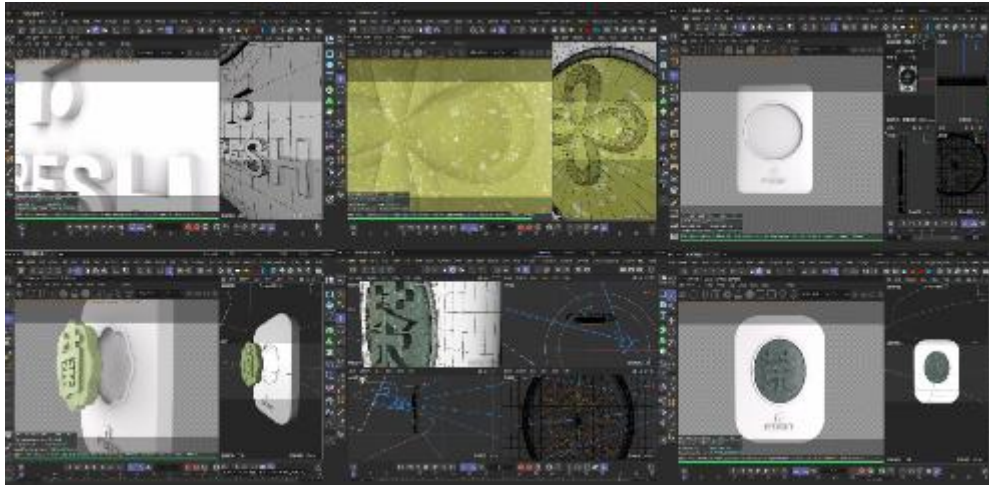


Figure 42: C4D digital modeling design process

Source: Author (2024)



Figure 43: Three-dimensional rendering

Source: Author (2024)

3.5.2 Design experiment with Tea-based clay

In the early stages of the design experiment, in order to explore the shaping ability and visual effects of tea-based clay, the researcher used natural forms as creative elements, focusing on stones and nets, and created the "The Lost Flower in the Net" and "The Lost Flowers in the Stone" series of dried flower decorative vessels. Figure 44 shows the production process of the vessel.



Figure 44: Production process of decorative vessels

Source: Author (2024)

Figure 45 illustrates the researcher's creation of several floral vessels utilizing chrysanthemum, black, green, and jasmine tea leaves. Research indicates that tea-based clay derived from various teas typically reflects the original color of the tea leaves. Moreover, tea-based clay closely resembles stones after it has been shaped and carved. As illustrated in Figure 46-47, the design is based on the concept of "net". The manufacturing process combines tea-based clay with iron wire to investigate the performance of tea-based clay in product structure.



Figure 45: The Lost Flower in the Stone

Source: Author (2024)



Figure 46: Production process of "The Lost Flower in the Net"

Source: Author (2024)





Figure 47: The Lost Flower in the Net

Source: Author (2024)

The researcher summarizes the actual works. Table 7 below shows the design scheme's materials, dimensions, and corresponding pictures.

Table 7: The details of design scheme

| Name | No. | Main ingredient | Dimensions | Flavor | Picture |
|------------------------------|-----|--|---|-------------|---|
| The Lost Flower in the Stone | 1 | Chamomile tea leaves | Length:90mm Width:70mm Height:42mm | Chamomile |  |
| | 2 | Chamomile tea leaves | Length:100mm Width:40mm Height:80mm | Chamomile |  |
| | 3 | Black tea leaves | Length:90mm Width:70mm Height:50mm | Black tea |  |
| | 4 | Green tea leaves | Length:80mm Width:60mm Height:50mm | Green tea |  |
| | 5 | Rose tea leaves | Length:40mm Width:50mm Height:120mm | Rose tea |  |
| | 6 | Black tea leaves | Length:110mm Width:70mm Height:100mm | Black tea |  |
| | 7 | Jasmine Tea leaves | Length:60mm Width:50mm Height:80mm | Jasmine Tea |  |
| | 8 | Jasmine Tea leaves | Length:120mm Width:60mm Height:50mm | Jasmine Tea |  |
| The Lost Flower in the Net | 1 | Chamomile Jasmine and green Tea leaves | Length:140mm Width:130mm Height:300mm | Mix |  |

The design result demonstrates the feasibility, practicality, and shaping capabilities of tea-based clay in design, while presenting its natural, simple and primitive beauty in texture and color. However, this set of works possesses a single form and function, and is devoid of aesthetic appeal as a decorative vessel. In order to enhance the aesthetic value, functional value and spiritual value of the product, the researcher focused on the tree imagery and conducted design experiments. Tree imagery is an important context of Chinese traditional culture, with profound cultural connotations, and highlights the spiritual values of the Chinese nation and the beautiful vision of people's lives. In addition, the natural attributes of trees can convey ecological beauty, and the use of tree images in design can give products a unique aesthetic feeling.

The design experiment utilized tea-based clay as the material and bark as the Xiangsheng objects. This part revealed the viability of tea-based clay in making Xiangsheng bark. Based on the color variation of tea leaves, the researcher collected 15 types of tea leaves (shown in Figure 48), including black tea, green tea, dark tea, chrysanthemum tea, etc. These tea leaves will be utilized to create tea-based clay in various colors. Figure 49 illustrates the bark colors and textures of 10 typical traditional trees. These differences form their unique aesthetic characteristics and organic aesthetics. For example, the emerald green bark of the phoenix tree, which possesses a smooth texture, the gray-white bark of the kapok tree, with irregular cone-shaped coarse thorns, and the gray-brown bark of the mulberry tree, featuring deep longitudinal cracks.



Figure 48: Collection of tea leaves

Source: Author (2024)



Figure 49: 10 types of barks of traditional tree imagery

Source: Author (2024)

In this part, the researcher utilized tea-based clay made from different tea leaves as raw materials to make Xiangsheng barks. Figure 50 displays the experimental process. The researcher utilized pulp to imitate sapwood, imitated bark with tea-based clay, and used carving tools to sculpt the Xiangsheng bark by the textures of various barks. It should be noted that due to the color difference of trees, when making tea-based clay, choosing tea that is closer to the color of the bark will make the elephant bark more realistic. Table 8 presents the Xiangsheng bark along with detailed information on materials. In the imitation of mulberry bark, the researchers utilized black tea as the primary ingredient, whereas for phoenix bark, it is more appropriate to use Zhuyeqing (a variety of green tea). The bark of the soapberry tree is grayish-white, thus selecting Silver needles (a variety of white tea) as the primary raw material aligns more closely with its visual characteristics. Figure 51 shows the outcomes of the bark experiment. Figures 52-57 show the Xiangsheng bark of 6 traditional Chinese trees: Mulberry, Chinese Scholar Tree, Soapberry, Phoenix Tree, Kapok, and Golden Rain Tree, made with tea-based clay.



Figure 50: The process of making Xiangsheng barks

Source: Author (2024)

Table 8: Material details of Xiangsheng barks

Source: Author (2024)

| Objects of Xiangsheng | Selection of materials | | | | | | | |
|-----------------------|------------------------|-----------|-----------|----------|-------------|------------|-------------|---------------|
| | Black tea | White tea | Green tea | Dark tea | Zhuyeqi tea | Paper pulp | Wheat paste | Gypsum powder |
| Mulberry | √ | | | | | √ | √ | √ |
| Chinese scholar tree | | | √ | | | √ | √ | √ |
| Soap berry | | √ | | | | √ | √ | √ |
| Phoenix tree | | | | | √ | √ | √ | √ |
| Kapok | | √ | | √ | | √ | √ | √ |
| Golden rain tree | | √ | | | | √ | √ | √ |



Figure 51: The Xiangsheng barks
Source: Author (2024)



Figure 52: The Xiangsheng bark of Mulberry tree
Source: Author (2024)



Figure 53: The Xiangsheng bark of Chinese scholar tree
Source: Author (2024)



Figure 54: The Xiangsheng bark of Soap berry
Source: Author (2024)



Figure 55: The Xiangsheng bark of Chinese phoenix tree
Source: Author (2024)



Figure 56: The Xiangsheng bark of Kapok
Source: Author (2024)



Figure 57: The Xiangsheng bark of Golden rain tree

Source: Author (2024)

The researcher utilized tea-based clay to develop a set of decorative containers inspired by the concept of Xiangsheng bark. Figure 58 illustrates that this set of works employs trees as Xiangsheng objects, emphasizing the simple texture and organic tonality of plants, so enhancing the natural atmosphere of the living space. This collection has multiple purposes, functioning as both flower vases and containers for sundries.



Figure 58: The Xiangsheng decorative containers

Source: Author (2024)

To further validate the viability of tea-based clay in the application of large size home decor, the researcher utilized a mulberry tree as the Xiangsheng object and produced a mulberry stool with a size of 40cm x 56cm x 50cm. The inner structure of the construction consists of 4mm diameter steel wire, welded under pressure. Throughout the experiment, the pulp will be applied to completely cover the iron frame. Subsequently, once the pulp has dried, the tea-based clay is properly placed on the surface of the piece, and the texture is carved with tools. Finally, the work is placed in a well-ventilated area to dry. Figures 59-60 illustrate the production process and outcomes of the mulberry stool.



Figure 59: The process of making mulberry stool

Source: Author (2024)



Figure 60: Mulberry stool

Source: Author (2024)

3.6 In-depth interview

In order to optimize the design plan and clarify the key design elements, the feedback of stakeholders on the phased design results is particularly important. Therefore, the researcher conducted in-depth interviews with 14 stakeholders, including 3 academic experts, 5 designers, and 6 users. The interviews were mainly conducted face-to-face communication. Due to geographical restrictions, one of the academic experts participated in the form of an online interview. Figure 61 shows the interview process. The interview time was set to 30 minutes. Before the in-depth interview, the interviewee was informed of the research topic and the purpose of the interview.

Table 9: Informed consent form

| Informed consent |
|--|
| <p>This study is part of a doctoral research project at <u>Silpakorn University</u>. This academic research focuses on "<u>The application of tea-based materials in Xiangsheng home decoration</u>," aiming to investigate the uniqueness and innovation of these materials, as well as the design elements and directions for their application in this context. The duration of this interview will be approximately <u>30 minutes</u>. Your involvement as a participant will significantly enhance the outcomes and validity of this study. Your valued thoughts will be utilized just for academic purposes; the data you provide will not be released independently or used for commercial purposes. I would like to convey my deepest gratitude.</p> |



Figure 61: Interview process with stakeholders

Source: Author (2024)

Although the topics of the in-depth interviews all focus on the phased design results of the research, the content of the interviews with the three types of stakeholders will be slightly different. In the interviews with designers, the researcher explored the limitations and optimization directions of the current design from the perspective of design professionalism; the interviews with academic experts focus on exploring the academic value and practical methods of the research; the interviews with users focus on understanding the target users' needs for home decoration and feedback on design solutions. After the interviews, the researchers sorted out the interview content of the 14 stakeholders. Tables 10-14 show the research data of designers, academic experts, and users respectively.

Table 10: The personal data of the designers

| Respondent | Name | Background | Position | Affiliation |
|------------|-----------|----------------|----------------|---------------------|
| Designer 1 | Ms. Huang | Brand design | Design Manager | A DAY Design Studio |
| Designer 2 | Ms. Fan | Visual design | Chief Designer | UGO Design |
| Designer 3 | Mr. Yang | Product design | Designer | RITO Design |
| Designer 4 | Ms. Liu | Product design | Designer | LKK Design |
| Designer 5 | Ms. Wei | Visual design | Chief Designer | DISSONA |

Table 11: The interview result of the designers

| Question | Designer 1 | Designer 2 | Designer 3 | Designer 4 | Designer 5 |
|----------------|------------------------|--------------------|-------------------|--------------------------|----------------------|
| 1. What unique | The visual and tactile | From a sustainable | First of all, the | In the home environment, | From the perspective |

| | | | | | |
|---|---|---|--|---|---|
| <p>experiences can tea-based materials bring to home decoration?</p> | <p>experience is the most intuitive ,different from traditional materials, the visual texture will be very natural. Besides, the taste might be the innovation point.</p> | <p>perspective, tea-based materials can make home decoration more environment ally friendly and promote the recycling of agricultural waste. In terms of visuals, the fiber and ecological sense of the material can enrich the visual form of the product.</p> | <p>texture is different from common products, which gives people a sense of freshness. In addition, the smell of the material can give people a fresh and comfortable feeling.</p> | <p>smell can create artistic conception and affect the mood of the residents. The smell of tea-based materials may bring unique experiences, which cannot be displayed by conventional materials.</p> | <p>of the five senses, the taste, color, texture, and touch of tea can provide a unique experience. Especially the smell of tea, can give people a sense of tranquility and nature.</p> |
| <p>2. Can incorporating plant imagery into home decor enhance the public's understanding of</p> | <p>Usually it is possible, because most Chinese people have a basic understanding of plant imagery. However,</p> | <p>It depends on the design. Good design can both utilize traditional culture and spread it.</p> | <p>Probably yes. Most people have basic knowledge of plant imagery. The public can feel</p> | <p>It can help improve the recognition of plant imagery, but the deeper meaning needs to be explained</p> | <p>Design can guide the audience to pay attention to the meaning behind the design elements, so the</p> |

| | | | | | |
|--|---|--|---|--|---|
| <p>traditional plant imagery?</p> | <p>design is still the key point, which determines how much the public can feel the plant imagery.</p> | | <p>the plant elements through the product's shape, pattern, texture, color and other elements, but the deeper cultural connotation may require extended design.</p> | | <p>combination of culture and design is conducive to the realization of cultural communication, but the final effect depends on the results of the design.</p> |
| <p>3. From the perspective of design, what are the strengths and weaknesses of the work?</p> | <p>The material is an advantage, it is relatively herbal and ecological, and the unique taste of tea is also one of the highlights. But from a design perspective, the visual effect of</p> | <p>The product is functional and decorative, and the texture and taste of the material are advantages, and also the difference between similar products. However, as</p> | <p>New materials are an advantage, and the scented tablets have rich flavors, and the design of the utensils is full of Zen,</p> | <p>This type of product may be particularly popular with environmentalists or the younger generation. The concept of new materials and the uniqueness of tea-based materials are</p> | <p>The concept of recycling agricultural waste is an innovative point, and Xiangsheng products convey a unique aesthetic experience. However, it is difficult to find the</p> |

| | | | | | |
|---|---|---|---|--|--|
| | <p>scented tablets can be more eye-catching and the pattern design can be more refined.</p> | <p>a product, its material performance may need more in-depth testing and evaluation.</p> | <p>which can create an artistic conception. However, the design of scented tablets is more common, and it can be made more novel.</p> | <p>interesting. The combination of plant images gives the product a deep meaning, making this type of product suitable as a gift for friends. Perhaps it would be better to have more categories and styles.</p> | <p>difference between scented slices and similar products without introducing the special characteristics of its materials. It is recommended to make the visual design more eye-catching.</p> |
| <p>4. Can you feel the plant imagery in the design?</p> | <p>I can feel it, but it is not enough, because I have a basic understanding of plant imagery, but it is not thorough and comprehensive enough.</p> | <p>I can feel the plant imagery, especially the scented tablets with plant patterns</p> | <p>Plant imagery can be felt to a great extent.</p> | <p>Absolutely, plant patterns are the most intuitive form of expression.</p> | <p>I can feel the plant elements. When I see the patterns, I can associate them with the meaning behind them. The beautiful plant images are like symbols to the Chinese.</p> |

| | | | | | |
|--|---|--|---|--|--|
| | | | | | I can feel the meaning when I see the pictures. |
| 5. On the basis of the present design, how to convey plant culture comprehensively through design? | Although the public has a basic understanding of plant images, they still need to be educated about the deeper connotations of plant images. Plant images can be incorporated into product packaging design in the form of text or patterns to express plant images in more detail. | Based on the existing design, adding textual descriptions to popularize the cultural connotations of the image may be more conducive to dissemination. It can be added to product cards and packaging. | Maybe I will add some additional knowledge about plant imagery from the design of product packaging, because packaging information can play an auxiliary role, and packaging is also the "outer coat" of the product. | In addition to design, relevant guidance is also needed. People have different levels of understanding of graphics and may need text assistance. | Colors, patterns, and words can all convey images. For example, red symbolizes good luck in China, and yellow symbolizes wealth. Colors can give people intuitive emotional feelings. In addition, textual descriptions can help the public understand plant culture in more detail. |
| 6. What problems | The application of new materials | As for the existing design, | Product performance is a | How to make materials trusted by the | Although tea-based materials are |

| | | | | | |
|---|---|---|---|--|--|
| <p>may be encountered when applying tea-based materials to large home decorations? How to solve them?</p> | <p>in large furniture may have higher requirements on the performance of the materials, such as load-bearing capacity. It is possible to consider combining them with traditional materials to overcome the limitations of new materials.</p> | <p>although the mulberry stool has a stable structure and unique decorative aspects, it is not skin-friendly as a product and the tactile experience of the material will be a challenge. It can be considered to apply its material to other products, such as coffee tables and decorative lamps.</p> | <p>challenge, such as whether the design of tables and chairs is ergonomic.</p> | <p>public is a challenge. Perhaps starting with small-sized products and gradually building trust with users will help the entire product system enter the market.</p> | <p>unique in taste, color, and texture, they may not give a good user experience when applied to large home furnishings, such as chairs. Due to the limitations of the material, it may be more appropriate to apply it to products such as tables, cabinets, and lamps, or combine it with other materials.</p> |
|---|---|---|---|--|--|

Table 12: The personal data of the academic experts

| Respondent | Name | Ages | Work | Income range |
|------------|-----------|----------------|-------------------|--|
| Expert 1 | Ms. Hu | Product design | Master Supervisor | Nanchang Institute of Technology |
| Expert 2 | Ms. Xu | Sculpture | Lecturer | Sichuan Conservatory of Music |
| Expert 3 | Ms. Xiong | Art and Design | Master Supervisor | Jiangxi Science & Technology Normal University |

Table 13: The interview result of the academic experts

| Question | Expert 1 | Expert 2 | Expert 3 |
|---|---|---|---|
| 1. From an academic perspective, what value can be created by applying tea-based materials to art design? | The combination of materials and design has interdisciplinary significance, and the design results produced in the practice process also provide a realistic basis for the application of new materials in the design field. There may be innovations in the methodology during the research process. | Aesthetics, research, and output can all generate value, and in terms of materials, it enriches the diversity of materials. | I have not yet learned about the theory of artistic design using tea-based materials, but this may fill the theoretical gap. In addition, its value can be explored from the perspectives of sustainability, art design, home decor, cultural communication, etc. |
| 2. Can | Yes, it is possible, | Symbolic reminders | Chinese people |

| | | | |
|---|--|--|---|
| <p>incorporating plant imagery into home decor enhance the public's understanding of traditional plant imagery?</p> | <p>but the final effect depends on how much plant imagery the design conveys and how much the user feels it.</p> | <p>can deepen its dissemination, people can easily feel the plant image through symbols or patterns.</p> | <p>generally have a basic understanding of plant images. Incorporating plant images into designs can help them make associations and thus deepen their understanding.</p> |
| <p>3. What are the strengths and weaknesses of the work?</p> | <p>Apart from material innovation, the existing design does not have any other added value. Is it possible to add other functions to the product, such as allowing the vase to hold water? Perhaps combining it with other materials could overcome the limitations of the new material.</p> | <p>Currently, there is no brand targeting plant-based products in the Chinese market. Both materials and Xiangsheng products are good starting points, and it is recommended to develop a complete product system.</p> | <p>The novelty, sustainability and uniqueness of the product can be felt. The Xiangsheng utensils have a primitive beauty, and the scented tablets give people a brand temperament of health and wellness. Combined with the plant imagery, the product is endowed with cultural value and has the attribute of gift giving. However, the current products are not systematic, and it is recommended to make more series of</p> |

| | | | |
|--|---|--|--|
| | | | products. |
| 4. Can you feel the plant imagery in the design? | I can feel it. Especially the plant imagery with patterns | It can definitely be felt, but since people have different perceptions of plant imagery, perhaps each person feels it to a different degree. | The image of plants can be intuitively felt through graphics and taste. For example, the imagery of chrysanthemum can be felt to be healthy from the taste, graphics and color, but the deeper meaning may need to be popularized. |
| 5. How traditional plant images contribute their value in home decoration? | From a styling perspective, plant shapes can create natural beauty and vitality, while the cultural connotations of plants also give the product cultural value, which symbolizes the sentiment of life and a beautiful vision. | The most intuitive thing that can be given to a product is aesthetic value, such as the decorativeness of the shape; then, the concept makes people think about the meaning behind it, such as the cultural concept of the elements. | Chinese people generally have a certain cognitive basis for plant images. Therefore, when plant images are presented, they convey both aesthetic and cultural values. |

The researcher chose 6 individuals who regularly buy home decor as interview participants. This group comprises possible target users with extensive purchasing experiences and pressing purchase needs, their suggestions will provide useful insights for design outcomes.

Table 14: The interview result of the users

| Question | User 1 | User 2 | User 3 |
|---|--|---|---|
| 1. What emotions do you feel that ecological and organic elements in the home environment will evoke? | Organic elements make me feel comfortable and close to nature. | Chinese people, especially those engaged in art and design, pay attention to the artistic conception in life, and ecological organic elements can convey a unique artistic conception. In addition, ecological elements can relieve stress. | It makes me feel relaxed. |
| 2. What was the last plant-related home decor item you purchased? What elements of it attract you? | It is a plant-shaped scented candle. I was attracted by its decorativeness. Secondly, the smell made me feel comfortable and relaxed. I also bought a coaster made of waste wood residue. It is simple and has a natural wood texture. | The paper-carved plant humidifier is innovative in form and can meet functional requirements. It also has plant imagery. | The previous piece is a glass vase ornament, the shape is plant elements, there is a sense of organic and natural beauty. |
| 3. What kind of home decorations do | I prefer to try and buy small products, like scented tablets, | I might choose medium size items like lamps instead of | For my first purchase, I would choose medium-sized |

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|---|--|--|--|
| <p>you want to buy using tea as a material?</p> | <p>because I am concerned about the performance of large items, such as load-bearing capacity. If the experience is good, i might consider buying a larger item.</p> | <p>large items because I am not sure about their durability and I will worry about the performance of the materials.</p> | <p>ornaments, such as decorative flower vases and ecological lamps. If the quality is strong enough and trust is established, I would consider buying large items.</p> |
| <p>4. As shown in the design, are you willing to buy the Xiangsheng utensils and fresh decorations? What is the reason?</p> | <p>I would be willing to buy Xiangsheng utensils, as they feel very suitable for storing tea leaves or tea sets. I feel a sence of wabi-sabi. As for scented tablets, I think it's a good choice to buy it as a gift, but the scented tablets design does not feel refined enough.</p> | <p>If it is a flower vase, I hope it is waterproof, but if it is just for storage, I will consider buying it. In addition, I prefer to buy the first one for the design of scented tablets, because there are two kinds of materials, the touch and appearance will be richer.</p> | <p>I have never seen this kind of decorative vessel on the market. It feels very novel and I am willing to buy it. Regarding the design of the fresh product, scented tablets is more traditional and closer to existing products. It may be easier for most people to accept. And i think it's a good gift choice. As for fresh product for shoes, i don't think people need it, cause there are many deodorants on the market.</p> |
| <p>5. Can you feel the plant imagery in the design?</p> | <p>Absolutely.</p> | <p>Absolutely yes.</p> | <p>Absolutely.</p> |

| | | | |
|---|--|---|---|
| <p>6. Under the same price and function, if the home decoration has cultural connotations, such as symbolizing auspiciousness, beauty, luck, and wealth, would you be more willing to buy it?</p> | <p>If the design is good, I will be happy to buy it. Good meaning will put me in a positive mood. I think I am not the only one who thinks this way. Most Chinese people believe in things that can bring good wishes.</p> | <p>Yes, I am willing to buy products that symbolize good things, especially those that symbolize wealth.</p> | <p>Yes, Chinese people believe in symbolic things.</p> |
| <p>7. What kind of home decorations with meanings have you purchased? And why?</p> | <p>I have bought small ornaments that symbolize peace as gifts for friends. I feel that such products with cultural connotations are very suitable for gifts.</p> | <p>I have purchased ornaments that symbolize wealth.</p> | <p>During every festival, I would buy small decorations like window decorations and couplets.</p> |
| <p>8. Which plant images with meanings would you prefer among home decoration products?</p> | <p>I would prefer plant imagery that symbolize peace, wealth and good fortune.</p> | <p>I would like to choose plant imagery that symbolize peace, promotion, wealth, longevity, and prosperity.</p> | <p>I would choose imagery of peace, wisdom, wealth, and longevity.</p> |

| Question | User 4 | User 5 | User 6 |
|--|--|--|---|
| <p>1. What emotions do you feel that ecological and organic elements in the home environment will evoke?</p> | <p>It creates a relaxing, pleasant and quiet space.</p> | <p>In busy urban life, organic elements can bring a sense of relaxation to the home space and calm people's minds.</p> | <p>Ecological organic elements give me a sense of tranquility.</p> |
| <p>2. What was the last plant-related home decor item you purchased? What elements of it attract you?</p> | <p>Last time I bought a glass vase with plant-shaped elements because it met my basic needs and the style was decorative, giving it added value and ornamental function.</p> | <p>I bought a plant ornament and a plant-shaped lamp, which can create a natural and relaxing living scene.</p> | <p>I bought a vase with plant patterns on it. I think it looks pretty.</p> |
| <p>3. What kind of home decorations do you want to buy using tea as a material?</p> | <p>I tend to buy medium-sized products, such as vases, lamps, low tables and stools.</p> | <p>I might choose small or medium size items.</p> | <p>The first thing that comes to my mind when thinking of tea is its smell. I might buy small decorative items, such as scented tablets or ornaments. If the experience is good, I will try to buy lamps and tables. Since current industrial</p> |

| | | | |
|--|--|--|--|
| | | | products contain formaldehyde, I feel that your material is environmentally friendly. |
| 4. As shown in the design, are you willing to buy the Xiangsheng utensils and scented tablets? What is the reason? | I might buy it. For the scent design, I would buy the scented tablets. The function of volatilizing scent is diverse, I can experience multiple flavors, and it feels like the product has both the function of diffuser and aromatherapy. I think the material is an advantage, it is more herbal and ecological. But I feel that the white plaster part is a bit monotonous. | If the price is right, I am willing to buy scented tablets, I feel the shapes are diverse, they are functional and decorative, and the material gives me a herbal, ecological, and healthy feeling. In addition, I think your products are very suitable as gifts for friends. | I feel that Xiangsheng utensils are very suitable for Zen spaces. I will buy them. I think this product is suitable for use as a storage container on a tea table. It would be better if the tea-based silicone can be seen on both the front and back of this scented sheet design. I suggest a slight modification. In addition, it might look better if the plaster part is not so white. |
| 5. Can you feel the plant imagery in the design? | I can feel it. | It make sense. | Absolutely. |
| 6. Under the same price and function, if the home | I would buy it, especially as a gift. Chinese people love to listen to stories. In | The economic environment in China is not optimistic recently. I tend to buy | For my own use, I may not emphasize the symbolic meaning of the product, but as |

| | | | |
|--|---|---|---|
| decoration has cultural connotations, such as symbolizing auspiciousness, beauty, luck, and wealth, would you be more willing to buy it? | other words, there needs to be cultural connotations behind the product. | products that symbolize wealth and promotion. | a gift, I will choose a product with symbolic attributes. |
| 7. What kind of home decorations with meanings have you purchased? And why? | During the Chinese New Year, I always buy decorations that symbolize good luck. | I bought a carpet that symbolizes wealth. Because i want to get good luck. | I bought the lucky bamboo which symbolizes wealth. |
| 8. Which plant images with meanings would you prefer among home decoration products? | Safety, good luck, harmony and reunion, wisdom. | I would like to choose plant imagery that symbolize rich, promotion, wealth, and longevity. | I would prefer plant images that symbolize peace, health, and wealth. |

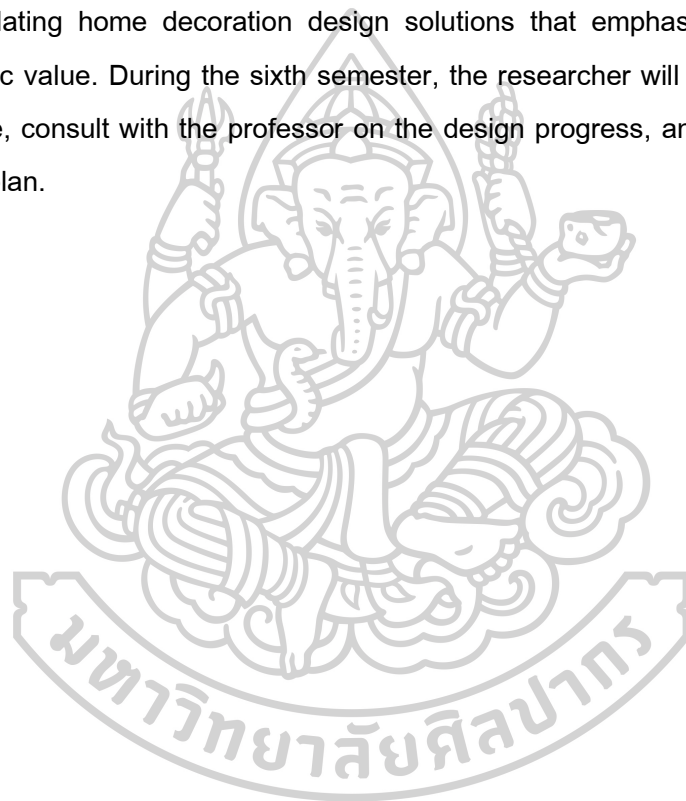
The survey results indicate that most of the respondents referenced "gift" upon viewing the design plan. They believe that home decor using positive symbols is a good choice of gift, indicating that integrating plant imagery and design may provide objects with symbolic significance and raise users' passion and appreciation for them. When asked

about home decor with tea-based materials, the majority of participants liked small to medium-sized items, including flower vases and lamps. This is likely because new materials have not yet garnered the same level of trust from users as traditional industrial materials. Consequently, if tea-based materials are to be utilized in home design and commercialized, it may be better to start with small or medium-sized products to promote gradual public trust development. The respondents' need for home decoration must fulfill fundamental functions and aesthetic appeal. The design of Xiangsheng decorations may reflect ecological and natural aesthetics through their texture and form. Several respondents referenced the styles of "Zen" and "Wabi-sabi," indicating that the simplicity of these items aligns with the creative essence of "Zen," thereby defining the product's usage contexts and style. In addition, despite the unique materials and varied forms of scented tablets, the design requires optimization to enhance its visual appeal. Moreover, the majority of responders notice the organic and plant imagery from the design. Organic and ecological components may foster tranquility and relaxation in individuals. The aesthetic symbolism of plant imagery can impact consumers' purchase decisions. The majority of respondents selected plant images that represent peace, wealth, longevity, and prosperity.

3.7 Summary

During the second semester, the researcher adopted a questionnaire survey to assess public awareness of plant-based materials, traditional Xiangsheng, and plant imagery, along with their acceptance and purchasing intentions about plant-based products. In addition, the researcher concentrated on material testing to transform tea waste into tea-based materials, aiming to find approaches for converting tea waste into new materials. The research demonstrated the methods and processes for tea-based silicone, tea-based leather, and tea-based clay. During the third semester, the researcher employed the findings from material testing to conduct design experiments, with the goal of further investigating the performance and aesthetic potential of tea-based materials in the field of home decor. The researcher utilized tea-based silicone to design scented decorative items, like scented tablets. Besides, the researcher utilized tea-based clay to create a collection of dried flower vases named "The Lost Flower in the Stone" and "The Lost Flower in the Net". In the fourth semester, the researcher focused on 10 traditional tree imagery and 6 scented tea imagery,

investigated their biological properties, analyzed the visual elements, and utilized tea-based clay to create 10 types of Xiangsheng barks, a collection of Xiangsheng vessels, and a mulberry stool. The design experiment requires evaluation and feedback from stakeholders for further research. Consequently, the researcher conducted interviews with academic experts, designers, and users. Their feedback will offer significant insights and guidance for further design. Throughout the fifth semester, the research emphasizes the flavor and texture of tea-based materials, specifically designing three product types: tea-scented tablets, Xiangsheng vessels, and Xiangsheng tree lamps, while formulating home decoration design solutions that emphasize both functionality and aesthetic value. During the sixth semester, the researcher will systematically review the literature, consult with the professor on the design progress, and continue improving the design plan.



Chapter 4

Design Development

4.1 Introduction

In order to optimize the design results and better apply tea-based materials in the field of home decoration, this chapter focuses on three types of home decoration designs, namely small-sized scented pieces, medium-sized decorative flower vases, and large-sized decorative lamps. The researchers focused the design elements on 4 types of scented tea images and 5 types of tree images, with the aim of organically combining tea-based materials and plant images and integrating them into the home environment, thereby creating a comfortable and relaxing atmosphere.

4.2 Design of “Fresh” series

The purpose of the scented tablets design is to use the fragrance diffusion function of tea-based silicone and gypsum to create a fresh and unique smell for the home environment, so the researcher named this set of scented sheet designs "Fresh". According to the data of in-depth interviews, the design of scented sheets is highly liked. Most respondents believe that the materials of tea-based scented sheets are novel and the smell is unique, and the pattern design combined with plant imagery gives the product a positive meaning, making the product have a "gift" attribute. However, some people think that the gypsum part has a single color and the pattern design is not exquisite enough. In order to further promote the design plan, the researchers optimized the design from the aspects of color, texture, pattern, etc. In addition, it should be emphasized that in order to enhance the decorative performance and artistry of the product, the researchers incorporated the lacquer craft into the production of scented sheets. The lacquer craft is a traditional craft production project and an intangible cultural heritage of China. Incorporating the lacquer craft into home decoration can not only enhance the artistic value of the product, but also inherit China's traditional craftsmanship.

4.2.1 The meaning of plant imagery and pattern evolution



4.2.1.1 The meaning of plant imagery



The design of scented tablets focuses on 4 kinds of scented tea images, namely

osmanthus, chrysanthemum, tea leaves and lotus leaves. The reason for choosing these four images is that they not only have profound cultural connotations, but also have a long history of consumption. According to *Classic of Mountains and Seas: Southern Classic*, an ancient book of Chinese mythology, "There is a mountain called Zhaoyao that contains many precious treasures, and the mountain is covered with osmanthus.", and during the ancient China Warring States Period, the poet Qu Yuan wrote in "Nine Songs" that "a car made of magnolia wood is hung with a flag made with osmanthus branches". It can be seen that the ancient Chinese regarded osmanthus as a symbol of prosperity and auspiciousness. In addition, because the Chinese pronunciation of "osmanthus" is the same as "wealth", people gradually believe that osmanthus represents wealth, and the word "Pick osmanthus" means to pass the imperial examination and win the champion. Therefore, "osmanthus" also symbolizes promotion and rapid development. From the perspective of Bi De, osmanthus represents noble morality and lofty qualities. Chrysanthemum has a cultivation history of more than 3,000 years in China. Its most well-known cultural meaning is longevity and homesickness. It also symbolizes noble character and elegant personality. Tao Yuanming, a poet in the Eastern Jin Dynasty, wrote in *Drinking, the fifth*: "Pick chrysanthemum in the east fence, see the south hills at ease." (Chen, 2018). Therefore, people also believe that chrysanthemum refers to the indifference to fame and fortune and an open-minded attitude towards life. Tea originated in the Han Dynasty, flourished in the Tang Dynasty, and prospered in the Song and Ming Dynasties. It is one of the well-known Chinese cultures. During the Tang Dynasty, tea was extended in many literary works and gradually formed tea culture. Lu Yu, the tea saint, mentioned "practicing the virtue of self-discipline" in "The Classic of Tea", emphasizing that tea culture is centered on "tea virtue" and attaches importance to people's behavior and morality. People's understanding of the beauty of tea has been sublimated from an intuitive external state of aesthetics to an abstract personality spirit, and finally nurtured into an elegant and pure aesthetic image (Zhu, 2008). In addition, in Chinese folk marriage customs, tea is also a symbol of purity, firmness and blessings. Mentioning lotus leaves, most people will think of "Lotus unsullied from mud, wash clean without demon", which comes from the "Lotus Love" by Zhou Dunyi, a Neo-Confucianist in the Northern Song Dynasty. Due to the growth environment and

biological form of lotus leaves, people have regarded them as a symbol of purity, elegance and noble soul since ancient times. In addition, the compact growth of lotus leaves has also been extended to mean perfection and harmony. In addition, in Buddhist culture, lotus flowers and lotus leaves are often used as cushions for Buddha statues, symbolizing spiritual practice and transcendence. Table 15 summarizes the four kinds of scented tea images from the perspectives of religious meaning, cultural connotation and image.

Table 15: Introduction of 4 scented tea imagery

| Name of plants | Religious meaning | Cultural symbolism | | Natural Features | Images |
|----------------|---|---|--|---|---|
| | | Bixing | Bide | | |
| Osmanthus | Purify the soul and drive away evil spirits | Noun: ancient imperial examinations, Ancient official positions, friendship and love. Adjective: auspicious, wealthy | Noble character | Color: Light yellow, Golden yellow Shape: Each flower has 4 petals, and the petals are like four small spoons |  |
| Chrysanthemum | | Adjective: long-lived, auspicious | Noble and pure character and open-minded attitude towards life | Color: White or light yellow petals with golden Shape: stamens. Short and numerous |  |

| | | | | | |
|--------------|--|--|------------------------------------|--|--|
| | | | | petals, and golden stamens. | |
| Tea leaves | Buddhism advocates drinking tea, and there is a saying that "tea is the Zen of tea". A kind of ritual. | Noun: love, engagement Adjective: auspicious, purity, fertility and happiness | Self-discipline and pure character | Color: Emerald green Shape: Lanceolate, elliptical, oval and oblanceolate, etc. |  |
| Lotus leaves | Nirvana and Transcendence. The Buddha's seat cushion symbolizes purity and meditation. | Noun: Family affection, harmony, reunion, Adjective: Happy and hopeful | Elegant sentiments and pure soul | Color: Emerald Green Shape: Semicircular, sector and circular |  |

4.2.1.2 The evolution of pattern

The researcher refined the design elements based on the appearance characteristics of the four plants and presented the plant characteristics concretely, which helps users clearly identify plant information when using the product. As shown in Figure 62, taking osmanthus as an example, each flower is painted with four spoon-shaped petals. Figure 63 shows the evolution of the chrysanthemum pattern, with 9 petals drawn on each flower, because in traditional Chinese culture, chrysanthemums bloom in September, and the number "9" is homophonic with the Chinese character "久", symbolizing longevity and longevity. Figures 64-65 show the pattern designs of tea leaves and lotus leaves.

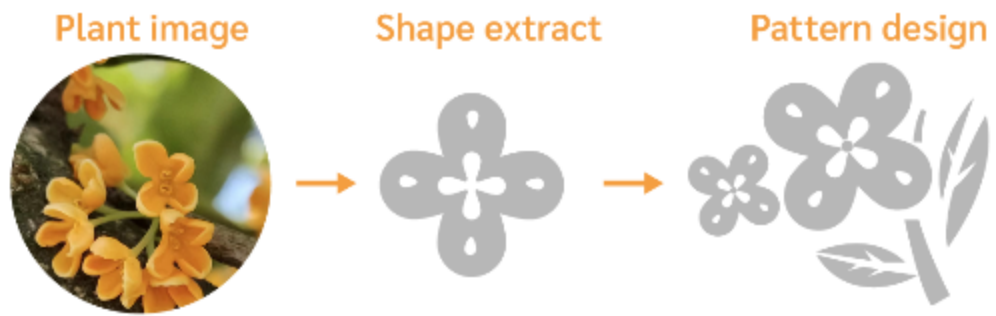


Figure 62: The evolution of osmantus' pattern

Source: Author (2024)

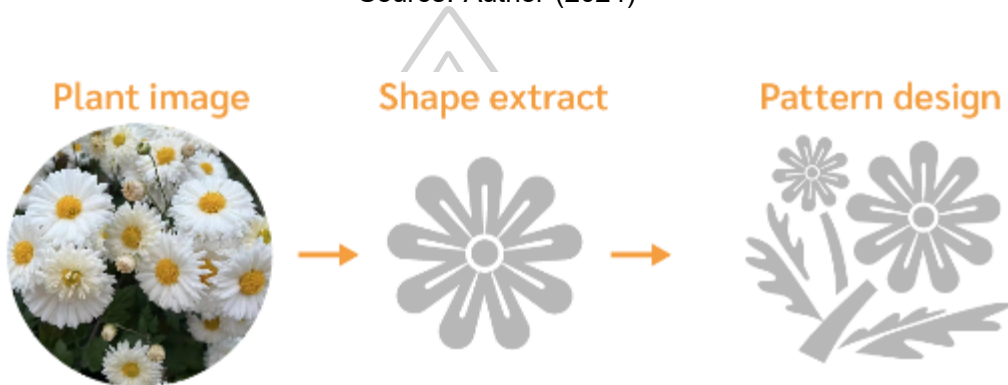


Figure 63: The evolution of chrysanthemum' pattern

Source: Author (2024)



Figure 64: The evolution of tea' pattern

Source: Author (2024)

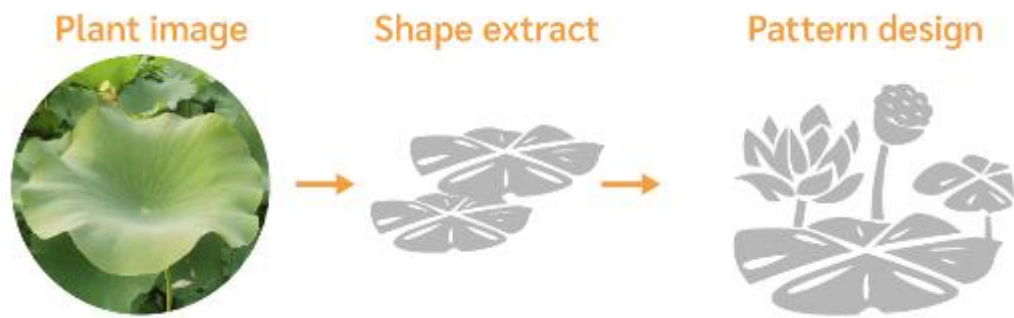


Figure 65: The evolution of lotus leaf pattern

Source: Author (2024)

4.2.2 Color selection and texture design

4.2.2.1 Color selection tea-base silicone

Tea-based silica gel is a mixture of tea waste and food-grade silica gel. Therefore, the color of tea-based silica gel is close to the original color of tea dregs. In order to improve the recognition of plant images, researcher designed plant patterns with their corresponding plant colors. Figure 66 shows the patterns and colors of osmanthus, chrysanthemum, tea and lotus leaves respectively. The osmanthus pattern is golden orange, the chrysanthemum is yellow-green, and the tea leaves are divided into black tea and green tea. The black tea pattern is gray-black, the green tea is gray-green, and the lotus leaf pattern is emerald green.



Figure 66: The pattern and color selection

Source: Author (2024)

4.4.2.2 Color and texture of plaster part

During the in-depth interview stage, some interviewees mentioned that the color of the plaster part was monotonous and the overall visual appeal was unattractive. In order to enhance the visual performance of the design, the researcher tried to incorporate the Chinese intangible cultural heritage lacquer craft into the design process. Lacquer is a natural lacquer whose raw materials are taken from tree lacquer. Lacquer craft can be seen from ancient Chinese handicrafts to modern furniture. The combination of lacquer

and plaster can present a random and dynamic texture, which can not only enrich the artistic expression of the product, but also inherit the traditional craft. The researcher extracted 1-2 representative colors based on the cultural meaning and biological characteristics of plant images. Chinese philosophers have traditionally used the Five Elements Theory (Wu Xing) to explain the principles governing the existence and operation of all things in the world. In the context of the Chinese Five Elements culture, the elements include metal, wood, water, fire, and earth, each associated with specific colors: gold and white represent metal, green and cyan represent wood, black and grey represent water, red and purple represent fire, and yellow and brown represent earth. The ancient Chinese divination text *Zhou Yi* states, "Heaven is dark and the Earth is yellow," symbolizing the chaotic state of the world. In the concept of Five Element, "wood" is represented by the shape and form of trees—branches, leaves, and buds—that grow outward and upward. Taking tea as an example, the researcher uses green to symbolize tea and black to represent water, aiming to evoke an artistic and harmonious blend of tea and water, encapsulating the interplay between green and black. Table 16 shows the color selection of the four plant images.

Table 16: Color selection for plaster part

| Imagery | Primary color | Secondary colors | Reason |
|------------|--|---|--|
| Tea leaf | Black Black means "water" in the Five Element | Green Green means "wood" in the Five Element | Green represents fresh tea leaves and black to represent the water |
| Lotus leaf | Green Green means "wood" in the Five Element | Gold Gold means "metal" in the Five Element | Green represents the lotus leaf, while the gold color refers to the golden body of the Buddha. |
| Osmanthus | Yellow Yellow means "earth" in the Five Element | Gold Gold means "metal" in the Five Element | Gold symbolizes wealth, and yellow symbolizes power and flower' original color. |

| | | | |
|---------------|---|--|---|
| Chrysanthemum | Green Green means “wood” in the Five Element | White White means “metal” in the Five Element | Green symbolizes longevity and white represents a pure soul. |
|---------------|---|--|---|

The researcher used lacquer as dye and paper as the medium for color and texture experiments. Based on different plant images, the researcher conducted and recorded more than 50 color and texture experiments. Figures 67-68 show the experimental process and some experimental results. Figure 69 shows the color textures of tea leaves, lotus leaves, osmanthus, and chrysanthemums.



Figure 67: Experimental process with lacquer

Source: Author (2024)



Figure 68: Experimental results with lacquer

Source: Author (2024)



Figure 69: Colors and textures of 4 imagery

Source: Author (2024)

4.2.3 Realization process

As shown in Figure 70, the researcher obtained the mold through 3D printing, and Figure 71 shows the process from mold turning, pouring plaster to polishing plaster. In early design experiments, the researchers found that due to the dark color of tea dregs, the color saturation of tea-based silicone was low and the color was dull. To meet this challenge, the researcher added color powder during the production process to obtain tea-based silicone with brighter colors. Figure 72 shows tea-based silicone of different colors and raw materials.



Figure 70: 3D printing items

Source: Author (2024)



Figure 71: Model making process

Source: Author (2024)



Figure 72: Different tea-based silicone

Source: Author (2024)

Building upon the earlier phase of research involving the use of paper as a medium for lacquer color and texture practices, the researcher further explored the process of coloring and texturing gypsum for the production of scented tablets. Figure 73 illustrates the process of making tea-scented tablets: First, the gypsum is immersed in a dye bath, and once the dye adheres to the surface of the gypsum, it is quickly removed from the bath to complete the coloring. The dyed gypsum is then left to air dry at room temperature for approximately one day. After drying, tea-based silicone is put into the groove of the incense chip to create a complete tea-scented tablet. It is important to note that gypsum must be thoroughly dried before coming into contact with water, as insufficient drying will prevent effective coloration.



Figure 73: Production process of tea scented tablets

Source: Author (2024)

4.2.4 Summary

Based on the Xiangsheng theory refined in the previous stages, the researcher conducted design activities following the sequence of selecting plant imagery, extracting plant characteristics, and applying them in design practice. The design practice of the tea-scented tablet combined sketching, computer drawing, C4D modeling, and 3D resin printing technologies, utilizing materials such as waste tea, gypsum, food-grade silicone, and lacquer. Through literature research and observation, the researcher outlined the cultural attributes and biological characteristics of the symbolic objects, providing a theoretical foundation and design elements for the project.

During the production of the tea-based silicone for the scented tablets, the researcher discovered that the tea-based silicones made from lotus leaf tea, chrysanthemum, osmanthus, and tea leaves appeared rather dull in color due to the inherent dark tones of the raw materials. This caused the product to lack distinguish ability and visual impact. To address this issue, the researcher added corresponding color pigments to

the tea-based silicones based on different types of tea, such as yellow pigment in the osmanthus-based silicone and cyan pigment in the lotus leaf-based silicone, effectively enhancing the color performance of the product.

The innovation of the tea-scented tablet design lies in the combination of tea-based silicone and gypsum materials. The tea-based silicone emits a faint tea fragrance, while the gypsum has the ability to absorb and diffuse scents. Users can apply essential oils to the surface of the product, which will then release the fragrance. Furthermore, the use of lacquer not only enhances the visual appeal of the product but also introduces an innovative expression of lacquer techniques. This design also validates the feasibility of using tea-based materials in home decoration. By integrating plant culture, plant images, and plant fragrance, the design creates a refreshing and comfortable living atmosphere for users.

4.3 Design of “Bark” series






The researcher named this part of the design "Bark". The design focuses on 5 traditional tree images, with the texture and shape of bark, flowers, leaves, fruits and seeds as design elements, and carried out the design of medium-sized decorative flower vases. The material used in this part is tea-based clay. According to the data of in-depth interviews, in the results of the previous design experiment, most of the respondents believed that the Xiangsheng vessels made of tea-based clay convey a simple and organic temperament, and are suitable for Zen space as storage vessels or decorative utensils. However, as a flower vase, the material has poor waterproof performance and is only suitable for dried flowers. In order to optimize its basic functions and enhance the decorative performance of the Xiangsheng vessels, the researcher used 3D printing technology in the design. The product structure is divided into two parts, the Xiangsheng bark bracket made of tea-based clay and the vase was produced with resin 3D printing. The combination of multiple materials enhances visual diversity.






4.3.1 Shape evolution and meaning

The design of Xiangsheng vessels focuses on 5 traditional tree images, namely soapberry, ginkgo, osmanthus, Chinese scholar tree and golden rain tree. There are two reasons for choosing these five images. First, they are positive cultural symbols, which contain people's beautiful vision; second, they have unique aesthetic value which

provides the product with decorative performance derived from nature. Take soapberry as an example. In the Chinese context, soapberry is pronounced "wuhuan", which means no worries, no disasters, and no misfortunes. Therefore, soapberry is regarded as a symbol of peace and prosperity. In addition, in Buddhist culture, the black and round seeds of soapberry are often used to make Buddhist beads, so soapberry is also called Bodhi seeds. Table 17 shows the cultural connotations, bark characteristics and representative biological characteristics of the five tree images.

Table 17: Information of 5 traditional tree imagery

| Name of plants | Religious meaning | Bixing | Bide | Natural Features | Images |
|----------------------|----------------------|--|--|---|--|
| Chinese Scholar Tree | Sacred Tree | Noun: ancient imperial examinations, Ancient official positions, hometowns Adjective: long-lived, auspicious, wealthy | Spirit of Loyalty and integrity | Color: Taupe Texture: Ridged Fruits: The shape is like a string of green beads. |  Bark  Fruits |
| Ginkgo | Buddhist sacred tree | Noun: friendship, family affection, love Adjective: long-lived, wise | Indomitable character | Color: Taupe Texture: Irregular cracks Leaves: The shape is like a golden fan, with irregular curved edges. |  Bark  Leaves |
| Golden rain tree | Sacred Tree | Nouns: knowledge, wisdom, country Adjectives: eternal, splendid, | Elegant and peaceful personality, free and | Color: Gray-brown Texture: Armor-like |  |

| | | | | | |
|----------------|---|---|-----------------------|--|---|
| | | harmonious | independent character | cracks Flowers: The shape is cone-shaped, like a red lantern. | Bark  Flowers |
| Soap berry | Exorcism | Noun: blessing Adjective: worry-free, safe | | Color: Off-white Texture: Smooth Seeds: Black, round, spherical | Bark  Seeds  |
| Osmanthus tree | Purify the soul and drive away evil spirits | Noun: ancient imperial examinations, Ancient official positions, friendship and love. Adjective: auspicious, wealthy | Noble character | Color: The bark is gray-brown Texture: Shows lenticels. Flower: 4 petals, with light yellow or Golden yellow. | Bark  Flowers  |

The researcher used the most representative elements of 5 tree images as modeling elements for the Xiangsheng vessels, namely, the flowers of the Golden rain tree, the seeds of the Soapberry, the fruits of the Chinese scholar tree, the flowers of the Osmanthus fragrans, and the leaves of the Ginkgo. They are not only recognizable and have unique aesthetic value, but are also well-known plant images. Compared with other plants, they are more likely to evoke associations, allowing viewers to feel the

positive meaning that the work intends to convey. Figures 74-78 show the evolution of the modeling process.

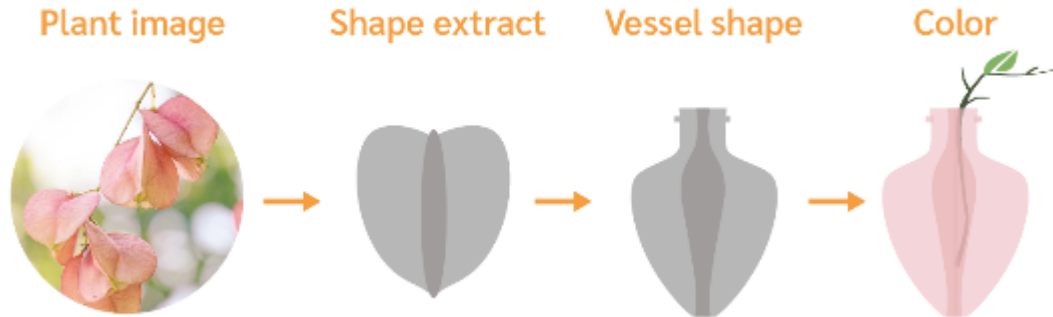


Figure 74: Evolution of Golden rain tree' flower

Source: Author (2024)

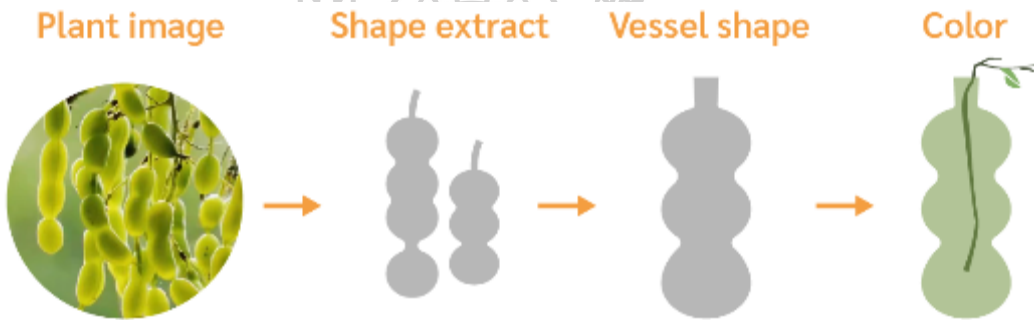


Figure 75: Evolution of Chinese scholar tree' fruits

Source: Author (2024)

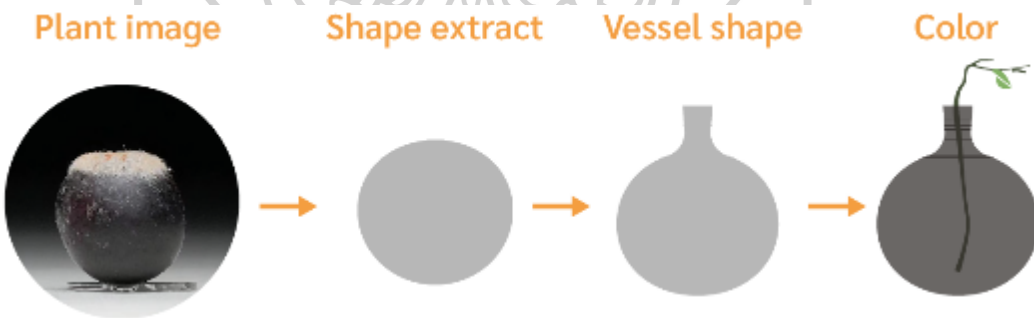


Figure 76: Evolution of Soap berry' seeds

Source: Author (2024)

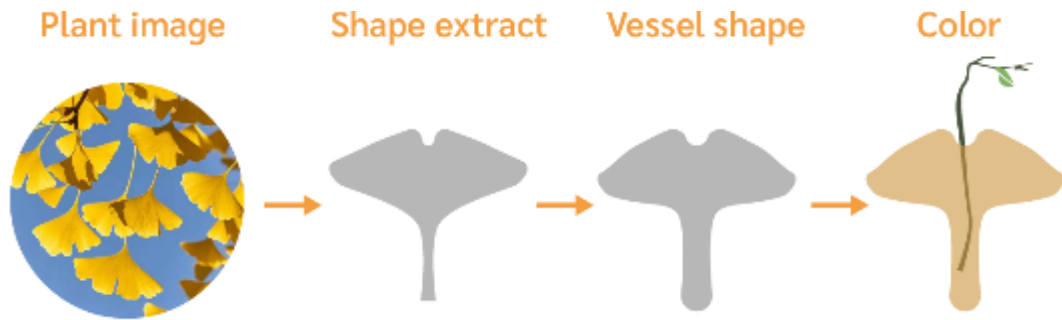


Figure 77: Evolution of Ginkgo' leaves

Source: Author (2024)

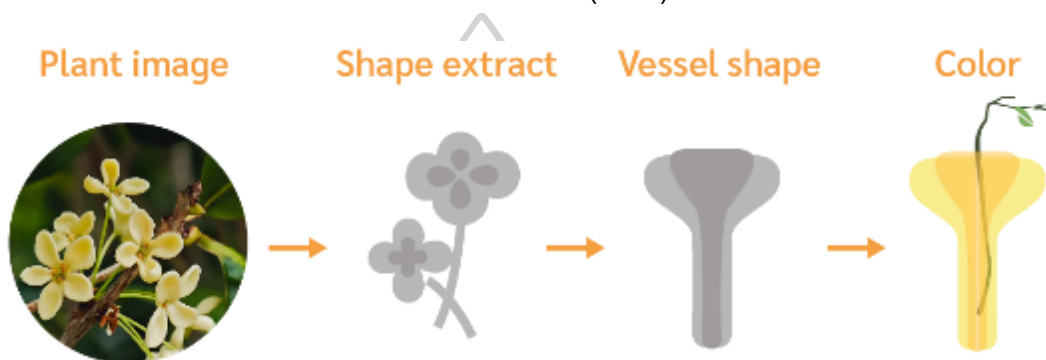


Figure 78: Evolution of Osmanthus tree' flower

Source: Author (2024)

4.3.2 Material, technique and texture

4.3.2.1 Material and technique selection

In order to meet the decorative and basic functions of the flower vase, the researcher combined resin 3D printing technique in the flower vase design stage and used transparent resin spray paint to make the flower vase. 3D printing helps this study to efficiently and completely present the product shape. In addition, transparent resin spray paint can keep the transparency of the product on the basis of color, which will make it easier for users to observe the growth of plants while using the product.

4.3.2.2 Texture of 5 tree imagery

In the previous study on bark characteristics, the researcher summarized the bark color and texture characteristics of 5 kinds of trees. In the design experiment stage, the researcher obtained the method of making Xiangsheng bark with tea-based clay. Therefore, the results of the previous stage will be used in the production of 5 kinds of Xiangsheng bark brackets.

4.3.3 Sketch and digital modeling

As shown in Figure 79, the researcher drew a product sketch with bark and vase. The combination of bark, flowers and fruits highlights the ecological beauty and natural beauty. Subsequently, digital modeling will be used to observe the visual performance of the design plan and will also be used in the 3D printing link of the design implementation process. Figure 80 shows the digital modeling process of the combination of barks and vases.

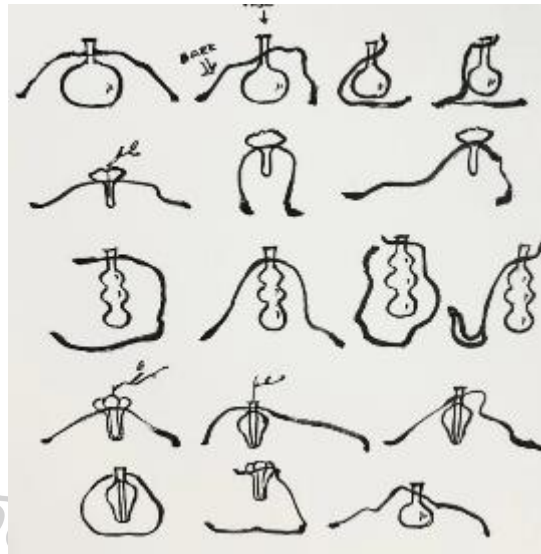
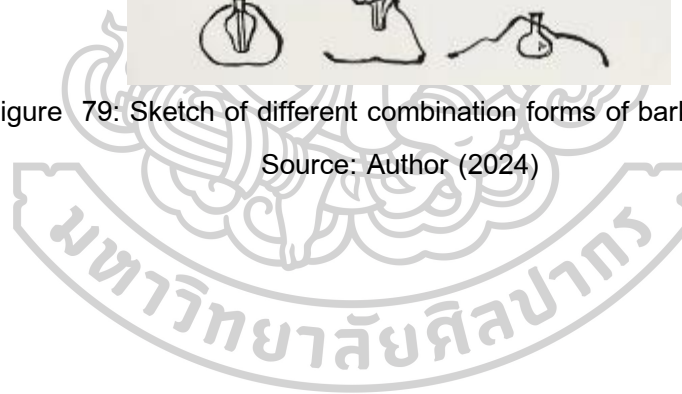


Figure 79: Sketch of different combination forms of bark and vase

Source: Author (2024)



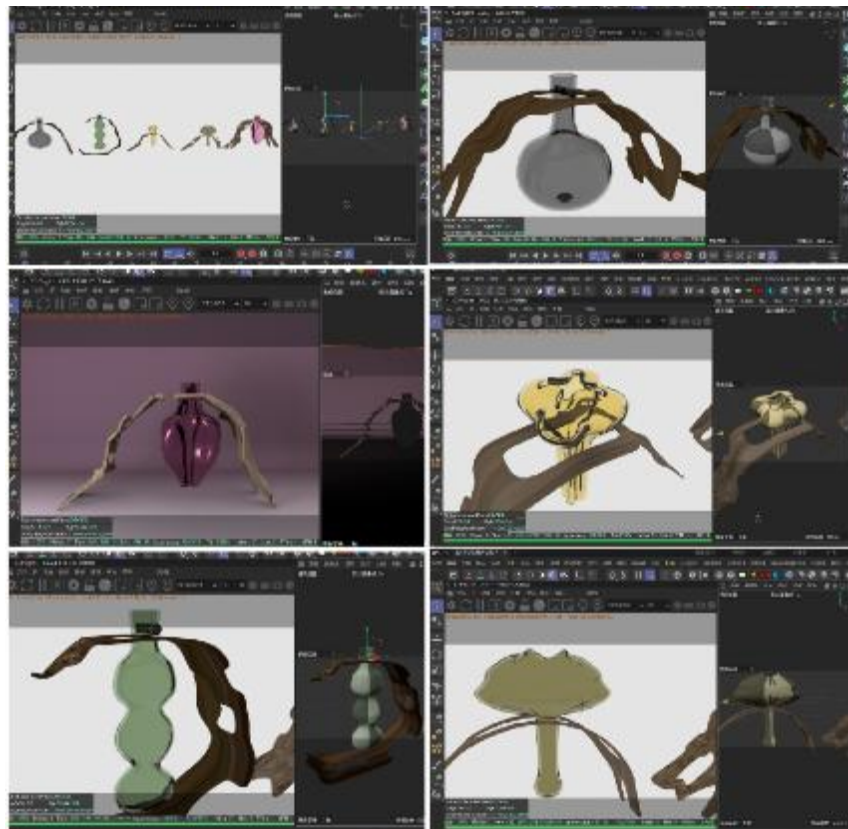


Figure 80: Digital model making process with C4D

Source: Author (2024)

4.3.4 Realization process

The resin 3D printing result of the vase is shown in Figures 81-86. In order to make the product present the plant image more intuitively, the researcher selected colors corresponding to the Xiangsheng objects during the painting process, such as pink for the flower of golden rain tree and green for the fruit of Chinese scholar tree.



Figure 81: Resin 3D print item of Soapberry' seed
Source: Author (2024)



Figure 82: Resin 3D print item of Golden rain tree' flower
Source: Author (2024)



Figure 83: Resin 3D print item of Chinese scholar tree' fruit
Source: Author (2024)



Figure 84: Resin 3D print item of Ginkgo' leaf
Source: Author (2024)



Figure 85: Resin 3D print item of Osmanthus tree' flower

Source: Author (2024)



Figure 86: Resin 3D print item of the 5 plant images

Source: Author (2024)

Figure 87 shows the 3D print items of barks. Tea-based clay will be attached to the surface of the 3D printed structure to achieve the visual effect of Xiangsheng bark. As shown in Figure 88, researcher mixed different tea waste with gypsum powder and Chinese paste to obtain tea-based clay, which was then applied to the surface of the 3D print and carved according to the bark texture.



Figure 87: Resin 3D print item of the barks

Source: Author (2024)



Figure 88: Tea-based clay used in the bark

Source: Author (2024)

4.3.5 Summary

Similar to the previous stage of design practice, the design of Xiangsheng decorative vessels is also based on the framework of Xiangsheng theory. Through literature research and observation, the researcher analyzed the cultural attributes and biological characteristics of symbolic objects, providing theoretical foundations and design elements for the project. The design combines sketching, computer drawing, and C4D modeling techniques. The production of the plastic vessels utilizes 3D resin printing technology, while the creation of the "bark" is based on materials such as waste tea, paper pulp, paste, and gypsum powder, combined with carving techniques.

During the production of the "bark," the researcher found that the surface of the tea-based clay was rough and uncomfortable to the touch. To address this issue, the researcher sanded the surface after completing the bark to reduce its roughness and improve the tactile experience. The innovation of the "bark" series design lies in the multi-sensory experience provided by the materials. The product is presented in a combined form, consisting of two parts: the stand (bark) and the vessel (flower, fruit, leaf). The bark part is made from tea-based clay, realistically mimicking natural tree bark, giving the product a vivid and organic quality. The vessel part, on the other hand, is 3D printed, conveying a modern and industrial feel. The use of 3D printing not only enriches traditional symbolic techniques but also expands the representation of plant

imagery. The two parts can be used together or separately, with the bark stand serving as a holder for dried flowers and other decorative items.

4.4 Design of “Tree” series

In the context of sustainability, the application of tea-based materials in large-scale home decoration may benefit for reducing energy consumption and promoting the recycling of agricultural waste. The design of the tree lamp is to verify the feasibility of using tea-based materials in large-scale home decoration. During the in-depth interviews, some participants showed interest in the application of tea-based materials in lamps, which means that such products have certain market potential. In addition, when asked which of the many positive symbols they would like to be given to home decoration, most of the respondents chose peace and prosperity as their first choice. Therefore, the design of this stage will focus on the image of "soapberry" and develop the tree lamp design. The researcher set the usage scenario of this product as the bedroom, and the functions of the tree lamp will be reflected in the following four points:

1. From the visual dimension, the design of the tree lamp incorporates the image of trees, which can convey the visual experience of natural ecology and help users release stress;
2. From the cultural meaning, the Xiangsheng tree lamp combines the bark characteristics of the soapberry, giving the product a beautiful meaning of worry-free, peace and prosperity;
3. From the material dimension, the tea-based clay will release a light tea fragrance, which has the effect of soothing emotions and can improve the user's sleep quality;
4. From the product function point of view, the product can provide users with lighting and storage functions. In addition, in the previous stage of the design experiment, some respondents questioned the design of the mulberry stool, and some people thought that the texture of tea-based clay was not skin-friendly and was applied to chairs or stools. In order to further explore the feasibility of tea-based clay in large-size home decor, the researcher will focus on the imagery of mulberry to make a decorative low table.

4.4.1 Sketch of design

The researcher drew different tree lamp shapes and low tables, which were inspired by natural forms such as tree trunks and tree holes. As shown in Figure 89, the top surface of the tree lamp can be used to place mugs, books and other items, and the low table can be placed in the living room or balcony to enhance the natural atmosphere of the home space.



Figure 89: Sketch of tree lamps and tree table

Source: Author (2024)

4.4.2 Digital modeling

The researcher made the structure and shape of the product using digital modeling. Figure 90 shows the C4D modeling process. The researcher made a 1:1 digital model, which will be used for 3D printing.

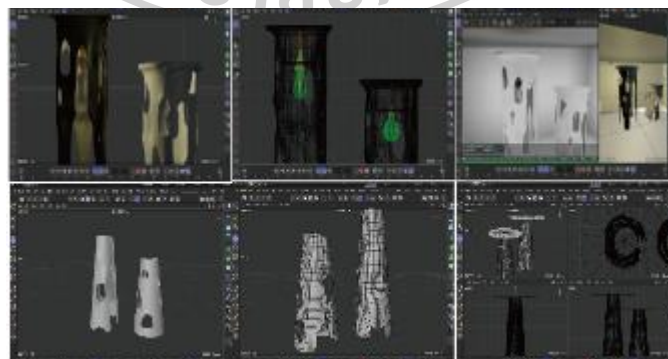


Figure 90: Digital model making with C4D

Source: Author (2024)

4.4.3 Realization process

As shown in Figures 91-92, the researcher created the base model of the tree lamp and low table using 3D printing at a 1:1 scale. Subsequently, the researcher mixed white tea leaves, gypsum powder, and paste to create a tea-based clay. White tea was chosen as the material of tree lamps, because its gray-white color closely resembles the bark of the soapberry tree. The mulberry tree low table will be made from black tea, as the color of the black tea plant itself can more realistically present the color of mulberry bark. Figure 93 illustrates the production process of the tree lamp, where the researcher applied the tea-based clay onto the surface of the base model and used carving tools to replicate the texture of tree bark. After the initial shaping, the surface was smoothed with sandpaper. Figure 94 shows the production process of the low table.



Figure 91: Base model of 3D print tree lamps

Source: Author (2024)



Figure 92: Base model of 3D print tree table
Source: Author (2024)



Figure 93: Production process of the tree lamp
Source: Author (2024)



Figure 94: Production process of the tree table
Source: Author (2025)

4.4.4 Summary

The design of the “Tree” series aims to explore the feasibility of using tea-based materials in large-scale home decor. In this phase, the researcher combined sketching and C4D modeling, and employed 3D printing technology to create the basic model of the product.



By utilizing tea-based materials, the tree lamp design expands the functionality of the product. From the perspective of functional innovation, the design addresses four key functions: lighting (as a lamp), cultural dissemination (as a cultural product), storage (as a bedside table), and sleep enhancement (through the release of tea fragrance). The product can be placed next to the bed, emitting a subtle tea scent that helps alleviate anxiety and promote better sleep. Additionally, the lamp's form and texture contribute to creating a natural, rustic, and organic atmosphere in the living space, allowing individuals to escape from the industrial environment imposed by concrete and steel, thereby fostering a more comfortable and soothing living environment. From the perspective of cultural communication, plant imagery is widely present in the fields of literature, painting, and garden design. The combination of plant imagery and home decoration expands the dissemination path of traditional culture and helps to popularize traditional culture to the public.

4.5 Design presentation

4.5.1 Design of “Fresh” series

Table 18 presents the specific sizes, meanings and images of the 10 tea-scented tablets. Figures 95-104 show the images of the "Fresh" series works.

Table 18: Detailed information of “Fresh” series design

| Materials | Culture meanings of plant imagery | Sizes of works | Images of works (Design 1) | Images of works (Design 2) |
|---------------------------------|--|--|--|---|
| Green tea Silicone Gypsum | Noun: love, engagement Adjective: auspicious, | Design 1 Gypsum size 68mm×5mm×100mm Tea-based silicone 52mm×2.5mm×52mm |  |  |

| | | | | |
|--|--|---|--|---|
| | <p>purity, fertility and happiness</p> | <p>m Design 2 Gypsum size 70mm×10mm×100m m Tea-based silicone 46mm×3mm×50mm</p> | | |
| <p>Osmanthus Silicone Gypsum</p> | <p>Noun: ancient imperial examination s, Ancient official positions, friendship and love. Adjective: auspicious, wealthy</p> | <p>Design 1 Gypsum size 68mm×5mm×100mm Tea-based silicone 52mm×2.5mm×52m m Design 2 Gypsum size 70mm×10mm×100m m Tea-based silicone 46mm×3mm×46mm</p> |  |  |
| <p>Black tea Silicone Gypsum</p> | <p>Noun: love, engagemen t Adjective: auspicious, purity, fertility and happiness</p> | <p>Design 1 Gypsum size 68mm×5mm×100mm Tea-based silicone 52mm×2.5mm×52m m Design 2 Gypsum size 70mm×10mm×100m m Tea-based silicone 46mm×3mm×50mm</p> |  |  |

| | | | | |
|--|---|---|---|--|
| <p>Lotus leaves Silicone Gypsum</p> | <p>Noun: Family affection, harmony, reunion, Adjective: Happy and hopeful</p> | <p>Design 1 Gypsum size 68mm×5mm×100mm Tea-based silicone 52mm×2.5mm×52mm Design 2 Gypsum size 70mm×10mm×100mm Tea-based silicone 50mm×3mm×50mm</p> |  |  |
| <p>Chrysanthemum Silicone Gypsum</p> | <p>Adjective: long-lived, auspicious</p> | <p>Design 1 Gypsum size 68mm×5mm×100mm Tea-based silicone 52mm×2.5mm×52mm Design 2 Gypsum size 70mm×10mm×100mm Tea-based silicone 50mm×3mm×50mm</p> |  |  |



Figure 95: Green tea-scented tablet
Source: Author (2024)



Figure 96: Osmanthus-scented tablet
Source: Author (2024)



Figure 97: Black tea-scented tablet

Source: Author (2024)



Figure 98: Lotus leaf-scented tablet

Source: Author (2024)



Figure 99: Chrysanthemum-scented tablet

Source: Author (2024)



Figure 100: Green tea-scented tablet (2)

Source: Author (2024)



Figure 101: Osmanthus-scented tablet (2)

Source: Author (2024)



Figure 102: Black tea-scented tablet (2)

Source: Author (2024)



Figure 103: Lotus leaves-scented tablet (2)

Source: Author (2024)






Figure 104: Chrysanthemum-scented tablet (2)



Source: Author (2024)

4.5.2 Design of “Bark” series

Table 19 presents the specific dimensions, materials and corresponding plant imagery of the five Xiangsheng decorative vessels. Figures 105-110 show the photographs of the "Bark" series works.

Table 19: Detailed information of “Bark” series design

| Plant imagery | Culture meanings | Main materials | Dimensions | Images of works |
|--------------------------------------|---|-----------------------|------------------|---|
| Soapberry tree (barks and seeds) | Noun: blessing Adjective: worry-free, safe | White tea | 300mm×90mm×90mm |  |
| Osmanthus tree (barks and flowers) | Noun: ancient imperial examinations, Ancient official positions, friendship and love. Adjective: auspicious, wealthy | White tea & black tea | 224mm×64mm×60mm |  |
| Golden rain tree (barks and flowers) | Nouns: knowledge, wisdom, country Adjectives: eternal, splendid, harmonious | Dark tea | 300mm×94mm×110mm |  |

| | | | | |
|--|--|------------------|-------------------------|--|
| <p>Chinese scholar tree (barks and fruits)</p> | <p>Noun: ancient imperial examinations, Ancient official positions, hometowns Adjective: long-lived, auspicious, wealthy</p> | <p>Green tea</p> | <p>300mm×80mm×110mm</p> |  |
| <p>Ginkgo tree (barks and leaves)</p> | <p>Noun: friendship, family affection, love Adjective: long-lived, wise</p> | <p>White tea</p> | <p>240mm×80mm×64mm</p> |  |

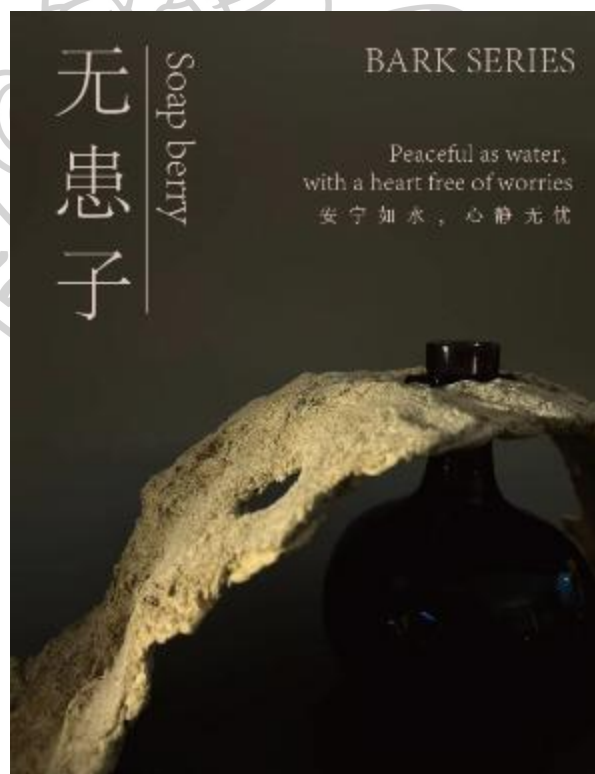


Figure 105: Main visual of Bark (soap berry)

Source: Author (2024)



Figure 106: Main visual of Bark (osmanthus)

Source: Author (2024)



Figure 107: Main visual of Bark (golden rain tree)

Source: Author (2024)



Figure 108: Main visual of Bark (Chinese scholar tree)

Source: Author (2024)



Figure 109: Main visual of Bark (ginkgo tree)

Source: Author (2024)



Figure 110: Bark series design

Source: Author (2024)

4.5.3 Design of “Tree” series

As shown in Figure111, the Tree Lamp series includes two different sizes of tree-shaped lamps, with the product details outlined as follows:



Figure 111: Tree lamp series design

Source: Author (2024)

1. The small tree lamp, Figure 112 shows the product poster of small tree lamp.

Dimension of the work: 26cm × 24cm × 40cm

Materials: Tea-based clay, paper pulp

Technology: Clay craft, 3D print, sculpting, sanding



Figure 112: Tree lamp design (small)

Source: Author (2025)

2. The large tree lamp, Figure 113 shows the product poster of large tree lamp, and figure 110 illustrates the main visual poster.

Dimension of the work: 28cm × 24cm × 58cm

Materials: Tea-based clay, paper pulp

Technology: Clay craft, 3D print, sculpting, sanding

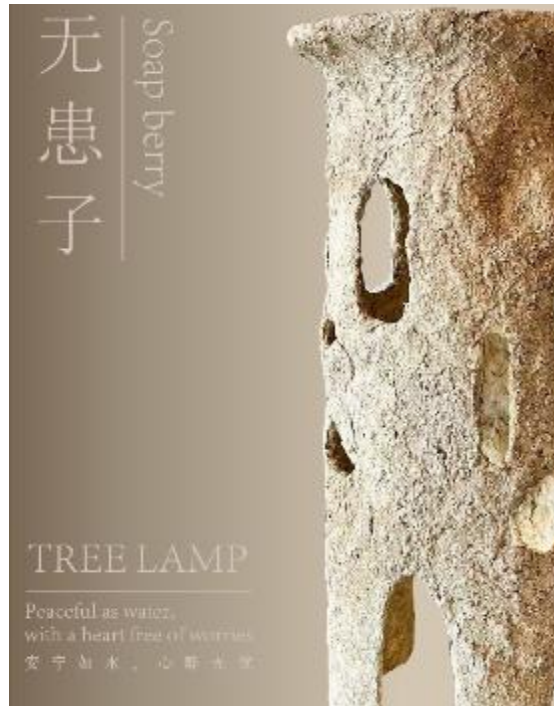


Figure 113: Tree lamp design (large)

Source: Author (2025)

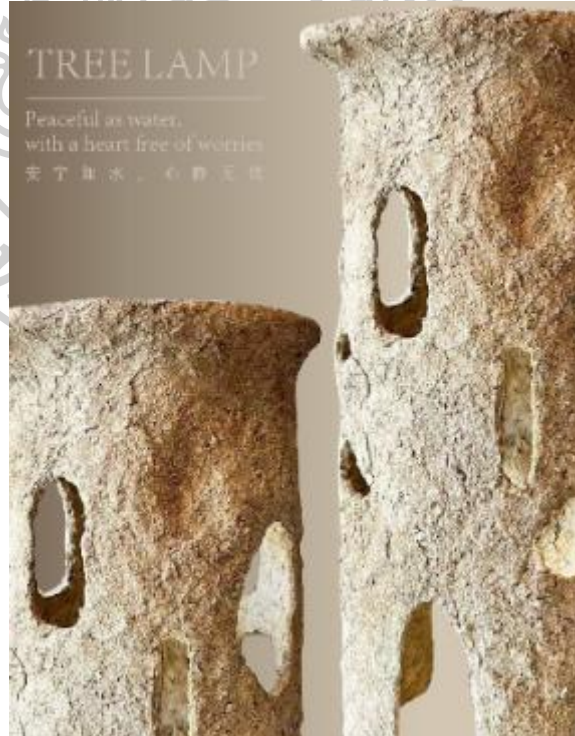


Figure 114: Main visual of tree lamp series

Source: Author (2025)

The low tree table, Figure 115 shows the product poster of the low tree table. Figure 116 shows the main visual of the product.

Dimension of the work: 45cm × 44cm × 45cm

Materials: Tea-based clay, paper pulp

Technology: Clay craft, 3D print, sculpting, sanding

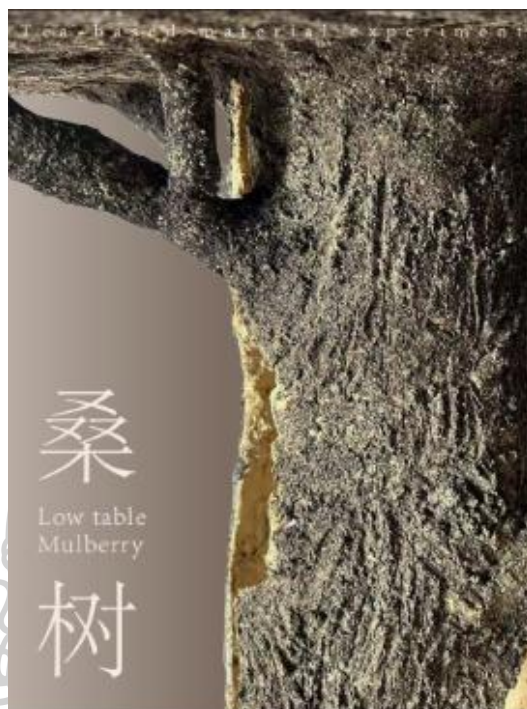


Figure 115: Product poster of the low table

Source: Author (2025)



Figure 116: Main visual of the low table

Source: Author (2025)

Chapter 5

Conclusion

5.1 Introduction

This study focuses on three main issues: the lost of traditional Xiangsheng from a cultural perspective, the ambiguity of plant imagery, and the reuse of agricultural waste in the context of sustainability. Based on these issues, the study sets three research objectives: 1. To trace the historical context of Xiangsheng and clarify its significance in design practice; 2. To establish a theoretical framework for Xiangsheng based on plant imagery; 3. To explore and define methods for transforming tea waste into tea-based materials and apply these materials in Xiangsheng home decor design. This chapter provides a summary and overview of the research in three parts. The first part discusses the study's conclusions and findings; the second part highlights the research's contributions; and the final part explores recommendations for future research. The study demonstrates that, within the context of sustainable development, using tea as a material in Xiangsheng home design offers new insights into modern Chinese design. Additionally, the researcher provides several valuable recommendations to guide future studies in this field.

5.2 Conclusion

This research adopts plant Xiangsheng as a creative approach and explores the reuse of agricultural waste, offering a new insight for modern Chinese home decor. The research reviews the relevant knowledge of traditional Xiangsheng, clarifies the similarities and differences between Xiangsheng and bionics, identifies the unique value of plant imagery in Xiangsheng practice, and establishes a Xiangsheng theoretical system based on plant imagery. Additionally, guided by the principles of plant Xiangsheng, the research conducts material and design experiments, demonstrating three methods for converting waste tea into tea-based materials and applying these materials to Xiangsheng practice in the field of Home Decor.

5.2.1 Material perspective

One of the primary objectives of this study is to transform waste tea into tea-based materials. Through material experiments, the researcher successfully developed tea-based silicone, tea-based leather, and tea-based clay, validating the feasibility of

converting waste tea into usable materials. The study found that tea-based silicone retains some of the tea's aroma while exhibiting water resistance and elasticity. The limitation of tea-based silicone is its shaping ability. Besides, although tea-based leather has good flexibility, it is prone to mold growth in humid and enclosed environments due to the biological properties of the experimental materials. Among the three material tests, the experimental tools and steps of tea-based clay are the simplest and easiest to operate. Tea-based clay demonstrates strong shaping capabilities when wet and retains the texture and some of the aroma of the tea once dried and cured. All three tea-based materials are processed through composite material techniques. In the design practice of this study, tea-based clay showcased unique shaping abilities and visual effects in the tree Xiangsheng practice, conveying the natural and rustic qualities of the material through multiple sensory dimensions, including texture, smell, and touch. The material research outcomes affirm the aesthetic and practical value of agricultural waste, offering new insights into the reuse of waste tea.

5.2.2 Design perspective

From a design practice perspective, this study's design approach is based on the theory of plant Xiangsheng, which validates the feasibility of this theory in the field of design. The design process followed the steps of refining plant imagery, observing plant characteristics, and conducting design experiments. The study employed tea-based materials in multiple design experiments and focused on three design concepts for home decor: the "Fresh" series tea-scented discs, the "Bark" series decorative vessels, and the "Tree" series. The "Fresh" tea-scented discs have versatile application scenarios, such as in wardrobes, bathrooms, bedrooms, and cars. The combination of tea-based silicone and plant imagery enhances the user's sensory experience from both visual and olfactory dimensions. The beautiful plant imagery enriches the cultural connotation of the product, expressing a longing and expectation for a better life. The "Bark" decorative vessels differ from modern flower containers by using the unique visual characteristics of tea-based clay to create vivid, realistic tree bark forms, combining both functionality and decoration. This design integrates the natural, rustic qualities of tea-based clay with the modernity of 3D printing technology, using trees as a theme and incorporating elements like tree bark, flowers, and leaves to present a rich and distinctive visual effect. The "Tree lamp" is an experimental design that combines scent, light, and form. Unlike other lighting fixtures, this design utilizes the refreshing tea

aroma of tea-based clay to create a relaxing and soothing living environment. Additionally, light radiates outward through a tree hollow shape, and the interplay of light and shadow creates a warm atmosphere. This study explores the unique value of tea's aroma, color, and texture in the design field through innovative material approaches.

5.2.3 Philosophical and aesthetic perspectives

From the essence of Xiangsheng practice, it reflects the process through which humans observe and mimic nature. Tang (2005) pointed out that as a philosophical concept passed down through generations, the idea of "Harmony between nature and man" expresses the inseparable organic connection between "human" and "nature." In the context of agricultural waste reuse, this study aligns with the trend of sustainable development, and the research on tea-based materials contributes to the promotion of resource recycling. Additionally, products made from tea-based materials not only help popularize ecological education but also raise public awareness of environmental protection. Zeng (2006) argued that the concept of "Harmony between nature and man" serves as an important theoretical foundation for contemporary China's ecological cultural development. From the perspective of traditional Chinese culture, the philosophical idea of "Harmony between nature and man" emphasizes the integration of humans and nature, striving for a perfect balance and establishing a positive, cyclical relationship between them. Xu (2013) noted that, from a design perspective, this idea advocates placing nature at the forefront of design, seeking a sustainable design approach that adapts to time, place, and circumstance. The principle of "Dao follows nature" asserts that humans should align with the laws of nature, eliminate internal desires, and pursue a simple lifestyle and a transcendent state of being. This ethical principle offers significant inspiration for modern design (Chen & Wu, 2023).

5.3 Contribution

5.3.1 Theory perspective

This study clarifies the differences between Xiangsheng and bionic design, and proposes a theoretical framework for Xiangsheng based on plant imagery, filling the gap in the existing Xiangsheng theory regarding the integration of traditional Xiangsheng with design practice. By introducing an interdisciplinary ecological philosophical perspective into the field of Xiangsheng, this study provides new theoretical approaches

for the design field, particularly by incorporating the philosophical concept of “Harmony between nature and man” to explore the application of the harmonious relationship between humans and nature in design. Through the study of tea-based materials, this research summarizes three methods for converting waste tea into tea-based materials, enriching the theoretical foundation for transforming agricultural waste into sustainable design materials, while also advancing the development of sustainable design theory. Furthermore, the study verifies the feasibility and uniqueness of tea-based materials in the field of home decoration through design practice, providing theoretical support for innovation in home decoration and materials.

5.3.2 Design and practice

Firstly, through multiple design experiments, this study validates the feasibility of tea-based materials in home decoration and demonstrates the aesthetic and functional value of tea-based materials. This research proposes a design method based on plant Xiangsheng, promoting the integration of sustainability and ecological aesthetics in design by combining plant imagery with agricultural waste. Additionally, through the design practice of three types of home products, this study demonstrates how agricultural waste can be transformed into design materials with ecological value, advancing green design practices. This study challenges the traditional design concept of “functionality first” and introduces a design philosophy centered on “sensory experience,” emphasizing the integration of multiple sensory experiences for users, particularly in terms of smell, touch, and visual elements. From an interdisciplinary perspective, this research involves knowledge from multiple fields, including materials science, botany, literature, and design, thus promoting cross-disciplinary design practice.

5.3.3 Culture and education

From the perspective of ecological education, applying tea-based materials to home decoration helps popularize ecological concepts and enhances the public’s cultural awareness and recognition of ecological design and sustainable development. From the perspective of cultural transmission, plant imagery is commonly found in literature and art. This study incorporates plant imagery into the field of home decoration, expanding the channels for cultural communication and enriching the forms of cultural expression, which will contribute to the inheritance and dissemination of traditional culture.

5.4 Recommendations

This study explored the application of tea-based materials in home decoration design, proposed the theory of plant Xiangsheng, and validated its feasibility in design practice. However, certain limitations remain. The properties and performance of tea-based materials, particularly the long-term durability of products, require further verification and research. Future studies should focus on investigating the physical and chemical properties of tea-based materials, especially their stability, durability, and biodegradability under varying environmental conditions. Additionally, the researcher could explore the transformation of other types of agricultural waste into innovative materials for design, further diversifying the material options available for green design. Building on the findings of this study, designers should place greater emphasis on incorporating ecological materials into product design. Future home design practices could promote sustainable design by integrating plant-based materials. Governments should encourage companies to adopt sustainable design principles in product development by offering incentives such as fiscal subsidies and tax breaks, thereby facilitating the recycling of agricultural waste and the development and application of sustainable materials. This study provides a new theoretical framework and design approach for green design in the field of home decoration. Future research and practice should continue to advance the application and evolution of sustainable design. Through ongoing exploration and innovation, designers, researchers, and policymakers can work collaboratively to make meaningful contributions to the promotion of social sustainability.

REFERENCES

- Ashby, M. F., & Johnson, K. (2013). *Materials and design: the art and science of material selection in product design*. Butterworth-Heinemann.
- Benyus, J. M. (1997). *Biomimicry: Innovation inspired by nature*. HarperPerennial.
- Braungart, M., & McDonough, W. (1998). The next industrial revolution. *The atlantic monthly*, 282(2), 82-92.
- Bumgardner, M. S., & Nicholls, D. L. (2020). Sustainable practices in furniture design: A literature study on customization, biomimicry, competitiveness, and product communication. *Forests*, 11(12), 1277. <https://doi.org/10.3390/f11121277>.
- Cao, X. O. (2018). *Chinese modern design thought: Life, enlightenment, and change*. China Architecture & Building Press.
- Cao, X. O. (2020). The "situation" of modern design in China. *Art Studies*.
- Chele, E. S., Ricardo, M. C., Ana, P. M., & Teresa, M. R. (2012). Bamboo, from traditional crafts to contemporary design and architecture. *Procedia-Social and Behavioral Sciences*, 51, 777-781.
- Chen, M. Q., & Wu, W. H. (2023). Dao follows nature: The inspiration of Daoist aesthetic philosophy for modern design. *Jingu Wen Chuang*, 03, 90-92. <https://doi.org/10.20024/j.cnki.CN42-1911/I.2023.03.029>.
- Chen, P. (2004). A brief discussion on the image of "mulberry tree" in the Book of Songs. *Journal of Zhaowuda Mongol Teachers College (Chinese Philosophy and Social Sciences Edition)* (02), 19-20.
- Chen, P., & Lu, L. (2022). Research on the contemporary revitalization of Taohuawu woodblock New Year paintings under cross-disciplinary design thinking. *Design*, 09, 147-149.
- Chew, M. M. (2010). Delineating the emergent global cultural dynamic of 'globalization': The case of pass-off menswear in China. *Continuum: Journal of Media & Cultural Studies*, 24(4), 559-571.
- Dai, L. N. (2017). Beyond "user-centered design": Reflecting on contemporary design issues from an Eastern cultural perspective. In *Eastern Design Studies*:

- Proceedings of the Third Eastern Design Forum and the 2017 Belt and Road Initiative and Eastern Design International Academic Conference (pp. 148-155). Media and Design Studies, Shanghai Jiao Tong University.
- Dong, Y. (2003). On the phenomenon of empathy in aesthetics. *Journal of Fuling Normal University*, 19(6), 36-38.
- Du, J. (2009). An analysis of the plant images in "Flowers". *People's Music* (08), 57-59.
- Dumée, L. F. (2022). Circular materials and circular design—review on challenges towards sustainable manufacturing and recycling. *Circular economy and sustainability*, 2(1), 9-23.
- Dykes, T. H., Rodgers, P. A., & Smyth, M. (2009). Towards a new disciplinary framework for contemporary creative design practice. *CoDesign*, 5(2), 99-116.
- Feng, W. (2023). Global localization and local globalization: A new trend in the transformation of national image into cultural communication. *Journal of Shanxi University (Philosophy and Social Sciences Edition)*, 03, 76-81.
[https://doi.org/10.13451/j.cnki.shanxi.univ\(phil.soc.\)2023.03.010](https://doi.org/10.13451/j.cnki.shanxi.univ(phil.soc.)2023.03.010).
- Gu, H., & Gu, J. X. (2019). "The presence" of "life" restoration: A new historical perspective on Chinese Modern Design Thought—Life, Enlightenment, and Change. *Journal of Shandong University of Arts and Crafts*, 06, 107-110.
- Han, C. (2018). Returning to the scene of history: A different dimension of Xiangsheng: A Field Study of Ancient Chinese Art. *Zhuangshi*, 05, 74-75.
<https://doi.org/10.16272/j.cnki.cn11-1392/j.2018.05.014>.
- Hang, J. (2002). Indigenous knowledge systems and traditional studies. *Southeast Culture*, 8, 45-52.
- Hang, J. (2011). The democratic spirit of design. In *The kindness of design* (p. 20). Guangxi Normal University Press.
- Hong, J. L., & Cui, W. H. (2020). Viewing the origins of Chinese art from the history of design: Reading Li Lixin's Xiangsheng: A Field Study of Ancient Chinese Art. *Art Education Research*, 06, 44-45.
- Huang, M. (2017). Research on the development and innovative design of museum cultural and creative products. *Art and Technology*, 30(09), 49.

- Huang, M., Vongphantuset, J., & Sirivesmas, V. (2024). Exploring the approach of Xiangsheng art with tea-based material: Transforming waste tea leaves into "tree". *Arts Educa*, 41, 1-10.
- Huang, X. (2024). From "the naturalness of the Dao" to "the Dao reveres nature": The inheritance and development of the Daoist view of "Dao follows nature" in Han Dynasty Daoism. *Religious Studies*, 01, 54-60.
- Jia, J. (2011). A study on plant imagery (Doctoral dissertation, Northeast Forestry University).
- Jiang, H., & Zhou, W. Z. (2013). The power of design in the context of globalization. *Art Studies*, 01, 204-206.
- Jiang, X. J. (2023). A study on the application of contemporary design aesthetics in interior design. *Shanghai Packaging*, 04, 86-88.
<https://doi.org/10.19446/j.cnki.1005-9423.2023.04.026>.
- Jin, Y. P. (2013). Global localization, local globalization, and interculturality. *International Cultural Management*, 11, 11-16.
- Keoleian, G. A., & Menerey, D. (1994). Sustainable Development by Design: Review of Life Cycle Design and Related Approaches. *Air & Waste*, 44(5), 645-668.
<https://doi.org/10.1080/1073161X.1994.10467269>.
- Li, G. J. (2007). The aesthetic value of "imagery." *Appreciation of Masterpieces*, (8), 126-130.
- Li, L. (2017). *Xiangsheng: Field Research on Ancient Chinese Art*. Peking University Press.
- Li, W. W. (2014). A study on biomimetic design of children's furniture (Master's thesis, Jilin University). Master's thesis.
- Li, W., Zhai, C. F., Xu, D. W., Liu, J. W., Zhang, J. L., Wu, Y., & Zhang, M. (2021). The embodiment of plant cultural connotation in Chinese classical gardens. *Modern Horticulture*, 24, 132-134. <https://doi.org/10.14051/j.cnki.xdyy.2021.24.046>.
- Li, Z. (2023). Exploring Taoist philosophy in Tao Yuanming's works from the perspectives of the Daoist view of nature and life. *Jingu Wen Chuang*, 15, 60-62.
<https://doi.org/10.20024/j.cnki.CN42-1911/I.2023.15.019>.
- Liang, L. (2002). A Study on the History of Ginkgo Cultivation Technology in China. *Agricultural Archaeology*, (1), 259-261.

- Lin, S., Ren, Q., & Jin, A (2023). A brief analysis of the "plant-like creatures" in traditional Chinese ceramic vessels. *Ceramic Research* (03), 108-110.
<http://doi:10.16649/j.cnki.36-1136/tq.2023.03.039>.
- Liu, F. B. (2017). *Appreciation of plant culture* (pp. 14-18). Hebei University Press.
- Liu, N. (2021). *Research on the development strategy and path of China's industrial design facing the era of intelligent interconnection* (Unpublished doctoral dissertation). Nanjing University of the Arts, Nanjing.
- Liu, X. (2023) *Research on plant cultural elements in Chinese traditional culture*. *Tiangong*, (19), 16-18.
- Liu, X. M. (2023). *A study of plant cultural elements in Chinese traditional culture*. *Tiangong*, 2023(19), 16-18.
- Liu, Y. T. (2011). *A study on contemporary design criticism in China* (Doctoral dissertation, Wuhan University of Technology). Doctoral dissertation.
- Lv, J. (2021). *The cultural connotation of plants in Chinese gardens*. *Cultural Relics Appraisal and Appreciation*, 2021(05), 98-100.
- Naik, T. R., & Moriconi, G. (2005, October). *Environmental-friendly durable concrete made with recycled materials for sustainable concrete construction*. In *International Symposium on Sustainable Development of Cement, Concrete and Concrete Structures*, Toronto, Ontario, October (Vol. 5, No. 7).
- Papanek, V. (1971). *Design for the real world: Human ecology and social change*. Pantheon Books.
- Qin, Y. (2008). *A study on the library of Chinese plant-shaped elements in biomimetic design* (Master's thesis, Jiangnan University). Master's thesis.
- Reichert, C. L., Bugnicourt, E., Coltelli, M. B., Cinelli, P., Lazzeri, A., Canesi, I., ... & Schmid, M. (2020). *Bio-based packaging: Materials, modifications, industrial applications and sustainability*. *Polymers*, 12(7), 1558.
- Ruan, J. (2023). *Analysis of contemporary design and future trends*. *Design*, 8(4), December 2023.
- Shi, X. D. (2021). *The "original Dao spirit" of design art: A review of Xiangsheng: A Field Study of Ancient Chinese Art*. *China Educational Journal*, 01, 109.
- Tang, Y. (2017). *Research on the "original motivation" of design* (Unpublished doctoral

- dissertation). Nanjing Art Institute, Nanjing.
- Tang, Y. J. (2005). On "the unity of heaven and man." *History of Chinese Philosophy*, (2), 5-10.
- Tong, Y. J. (2012). *Research on characteristics of domestic modern art design* (Unpublished doctoral dissertation). Wuhan University of Technology, Wuhan.
- Wang, C. H. (2024). A comparative study of the thinking of Mencius and Plato. *Chinese Ethnic Expo*, 02, 24-26.
- Wang, Y. F., & Chu, M. (2024). A study on biomimetic design of children's furniture. *Toy World*, 03, 155-157.
- Wang, Y. K. (2024). The application of local materials in environmental design and cultural heritage. *Design*, 9, 1156.
- Wei, J. Y., & Xi, G. Q. (2021). Promoting interdisciplinary integration to support the construction of a science and technology powerhouse. *China Social Sciences Today*, 2264, 10-13.
- Wen, C. (2010). The influence of primitive mythological images on literary creation: starting from the image of "mulberry tree". *Journal of Shandong Trade Union Management Cadres College* (06), 155-156.
- Wilson, E. O. (1984). *Biophilia*. Harvard University Press.
- World Commission on Environment and Development. (1987). *Our common future: Report of the World Commission on Environment and Development*. Oxford University Press.
- Wu, Y. (2018). The relationship between contemporary art and design in the information age. *Design*, 14, 111-113.
- Xie, W. Y. (2023). Freedom and goodness: An analysis based on relevant texts of Plato. *Journal of Peking University (Philosophy and Social Sciences Edition)*, 04, 15-26.
- Xu, G. (2013). The concept of sustainable design in Chinese traditional philosophical thought. *Art and Technology*, 04, 257.
- Xu, P. (2005). The necessity of industrial design industry development policies. In *Qingshan Jian Wo* (pp. 120-122). Chongqing University Press.
- Xu, T. (2020). Art and science meet at the pinnacle: the application of new materials and interdisciplinary trends in contemporary art in China and abroad. *Journal of*

- Fine Arts (05), 11-17.
- Yan, G. C. (2008). On Mencius' four-factor personality structure of "benevolence, righteousness, propriety, and wisdom." *Psychology and Behavioral Studies*, 01, 61-64.
- Yang, X., Xu, T. (2019). A study on the pine and cypress images in the titles of traditional Chinese private gardens. *Landscape Architecture* (12), 109-114. <http://doi:10.14085/j.fjyl.2019.12.0109.06>.
- Yang, X., Yang, M. (2016). The Generative Observation and Metaphorical Cognition of the "Chinese scholar tree" Image. *Journal of Fudan University (Social Sciences Edition)* (06), 119-128.
- Ye, L. (2010). *Beauty in Imagery*, Peking University Press.
- Ye, S., & Li, K. (2019). A study on the differences between contemporary art and contemporary design. *Art and Design (Theory)*, 05, 29-31. <http://doi:10.16824/j.cnki.issn10082832.2019.05.003>.
- Young, C., Jirousek, C., & Ashdown, S. (2004). Undesigned: A study in sustainable design of apparel using post-consumer recycled clothing. *Clothing and Textiles Research Journal*, 22(1-2), 61-68.
- Yu, F. (2013). The concept and trends of biomimetic design. *Zhuangshi*, 04, 25-27. <http://doi.org/10.16272/j.cnki.cn11-1392/j.2013.04.001>.
- Yuan, X. P. (1998). *A study of Chinese poetic art* (p. 53). Peking University Press.
- Zeng, F. R. (2006). The ancient Chinese philosophy of "the unity of heaven and man" and contemporary ecological culture construction. *D Wen Shi Zhe*, (4), 5-11.
- Zhang, L. (2023). The contemporary design culture of the new materialism turn. *Zhuangshi*, 10, 20-25. <http://doi:10.16272/j.cnki.cn11-1392/j.2023.10.001>.
- Zhang, M., & Jia, L. S. (2023). "Cultural design" from the perspective of "design culture": Analysis and exploration of the modern translation of traditional Chinese making methods. *Zhuangshi*, 10, 12-19. <https://doi.org/10.16272/j.cnki.cn11-1392/j.2023.10.023>.
- Zhang, Q. (2023). An analysis of the imagery beauty of garden plants in the cultural context of Yuan Ye. *Design Art Research*, 05, 124-128.
- Zhang, X. Y. (2008). On the emotional psychological mechanism of aesthetic empathy.

Journal of Qiqihar University (Philosophy and Social Sciences Edition), (1), 171-173.

Zhao, D. D. (2019). A study on the application of sustainable design in rural residential space environment design based on beautiful countryside construction. *Art Appreciation*, 2019(12), 223-224.

Zheng, X. (2016). From "the naturalness of the Dao" to "the Dao governs the nature of all things": The changes in the definition of the relationship between Dao and nature in Han and Jin Daoism. *Philosophical Research*, 6, 52.



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