



VISUAL ANALYSIS AND EXPLORING OF CHINESE WINDOW LATTICE PATTERNS
FOR CONTEMPORARY CERAMIC DECORATION DESIGN



A Thesis Submitted in Partial Fulfillment of the Requirements
for Doctor of Philosophy DESIGN ARTS (INTERNATIONAL PROGRAM)

Silpakorn University

Academic Year 2023

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Keyword : Chinese window lattice, Visual Analysis, Ceramic decoration,
Contemporary art

Mr. Anjing ZHUO : VISUAL ANALYSIS AND EXPLORING OF CHINESE WINDOW
LATTICE PATTERNS FOR CONTEMPORARY CERAMIC DECORATION DESIGN Thesis
advisor : Assistant Professor Dr. Veerawat Sirivesmas

The window lattice is a component of a window, which is formed by the combination of intersecting lattice and frames in the window. It is a bridge that connects two spaces. You can see different landscapes from the outside through the window lattice, like a dynamic painting hanging on the wall. After a long historical development, the window lattice pattern in the design has required a deep cultural connotation and characteristics of the times, both of practical and artistic value. However, the development of window lattice patterns is still in the stage of arts and craft and lacks of knowledge and theoretical basis for exploration. Factors such as the backwardness of theoretical foundations and the limitation of expression methods have hindered the development of window lattice patterns. More exploration is needed to enhance the sustainability of window lattice patterns by using new materials and new technologies.

This thesis takes the visual analysis of window lattice patterns as a starting point to explore methods for their application in contemporary ceramic decoration design. Research objective: 1. Exploring window lattice patterns development and their potential in contemporary ceramic decoration design. 2. Explore how window lattice patterns can be combined with contemporary ceramic decoration. 3. Research

and develop new visual languages and aesthetic values to create ceramic decorative works.

The research method of the thesis: First is literature review and fieldwork in Beijing and Suzhou are conducted to summarize the rules for the development of window lattice. Then, based on experimental methods, a detailed analysis of ceramic glazing, shaping, and firing techniques will be carried out. This will support creative practices to explore different ways in which window lattice patterns can be represented in ceramics. By gradually moving away from traditional approaches while incorporating them into the essence of the designs, these patterns will be applied to new design developments. The researchers focus on exploring the developmental forms of window lattice patterns and their hidden philosophical meanings expands different expressive possibilities in ceramic decoration and creates a new visual language.

Through the study and exploration of window lattice patterns, I hope to deepen understanding and development of traditional Chinese culture, inspire designers engaged in ceramic art, and provide certain theoretical references.

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Always choosing to believe and not rejecting enthusiasm is what keeps me motivated to keep my desire to explore the world. Grateful for all the people who support and help me and fill me with courage.

Anjing ZHUO

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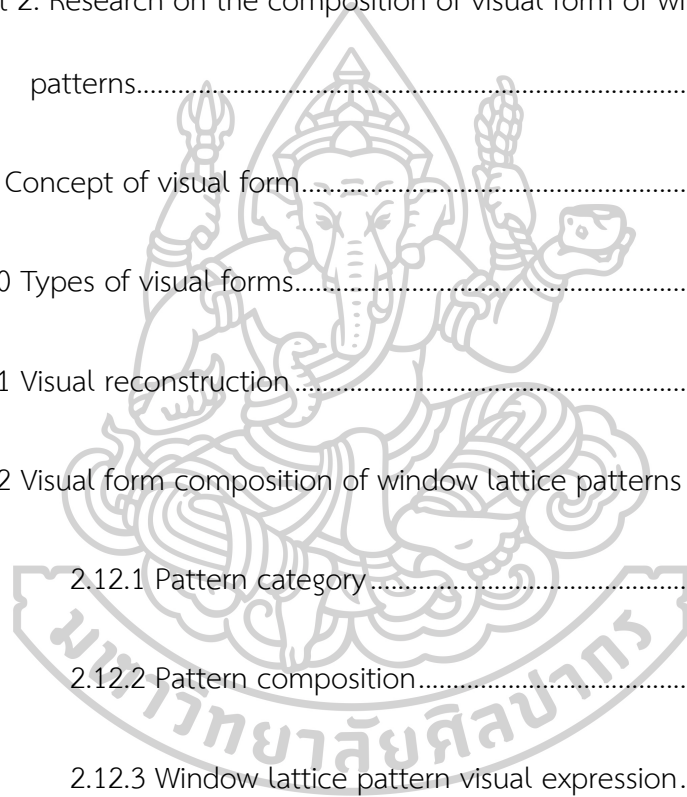
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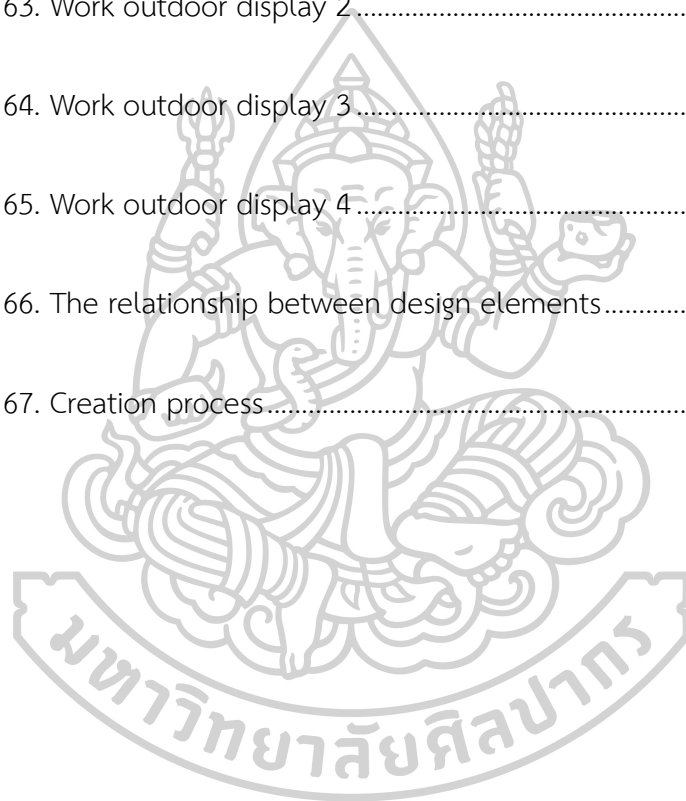
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CHAPTER 1

INTRODUCTION

1.1 Background and statement of the problem

1.1.1 Background

Window lattice patterns are part of the traditional Chinese visual elements. As an indispensable architectural component in traditional residential buildings, they contain rich artistic forms and have significant research value in the field of art. With the development of society, window lattice patterns integrate social hierarchy, religious ideas, and folk culture, becoming a pattern with rich national connotations and strong decorative aesthetics. Unfortunately, few researchers have studied the application of window lattice patterns in contemporary art. Mostly, they are simply copied or directly applied in two-dimensional design or architectural decoration, with a lack of research and innovative development of window lattice patterns.

In the field of design, traditional Chinese patterns with their shapes, colors and rich connotations have charm and are used in many areas of social life. The use of traditional cultural elements is an inevitable trend in modern design. It is necessary to take traditional culture as the basis and widely adopt design concepts from the world art field to create works with traditional Chinese charm and cultural connotations.

Ceramics is an ancient art form, and an important decorative technique. In recent years, contemporary design concepts have strongly influenced the overall shape and details of ceramics. Contemporary ceramic decoration usually focuses on innovation and modernity, expressing the connotation where artists express old or historic themes using new visual languages.

The window lattice is a folk cultural expression that expresses the spirit of traditional Chinese culture. Through contemporary ceramic decoration design, it provides a wide design space and diverse expression methods for the development

and innovation of window lattice patterns, enriching the contemporary expression of traditional Chinese culture.

The thesis explores and develops different expression by researching the characteristics of window lattice patterns in combination with contemporary ceramic decoration design to integrate traditional Chinese patterns with contemporary art, create new visual languages and provide designers with new creative ideas. This research has both theoretical value and practical significance.

1.1.2 Problem statements

The research on window lattice patterns mainly focuses on graphic design, or the application of wood or stone as creative materials in the building. Most existing designs only involve simple replication or direct application of window lattice patterns, with less involvement in contemporary ceramic decoration design. Through the collection and organization of data, researcher have found that window lattice patterns have the following problems in ceramic decoration design:

1. In the collection and analysis of window lattice patterns in China, few scholars have paid attention to their application in contemporary art, and there is a lack of comprehensive analysis and organization of literature or papers.
2. Window lattice patter lack innovative design, and most of them are simply copied or directly applied in two-dimensional, lacking three-dimensional display.
3. The design research of window lattice patterns focuses on graphic design, or wood or stone as the materials appear in the building, with little involvement in ceramic decoration design. There is a lack exploration new materials and technologies for the design of window lattice patterns.

1.2 Research objectives

There are three main research objectives in relation to the application of traditional Chinese window lattice patterns in the contemporary ceramic decoration:

1. To investigate the origin, historical development and cultural connotations of window lattice, establish a theoretical basis for exploring window lattice patterns and their potential in contemporary ceramic decoration design.

2. Explore how window lattice patterns can be combined with contemporary ceramic decoration.

3. Explore the combination of ceramic materials and decorative techniques in window lattice patterns, research and develop new visual languages and aesthetic values to create ceramic decorative works that combine tradition and modernity.

1.3 Scope of the research

This study aims to explore traditional Chinese window lattice patterns, focusing on the examples from the Forbidden City in Beijing and the Suzhou Gardens. The focus is on the pattern structures of the window lattices; their production process and materials are not the subject of the research. The selection focuses on structures with linear shapes, simple geometric and complex geometric patterns. This study focuses on traditional aspects and applies them to contemporary ceramic decoration design, expanding the expression forms of window lattice patterns.

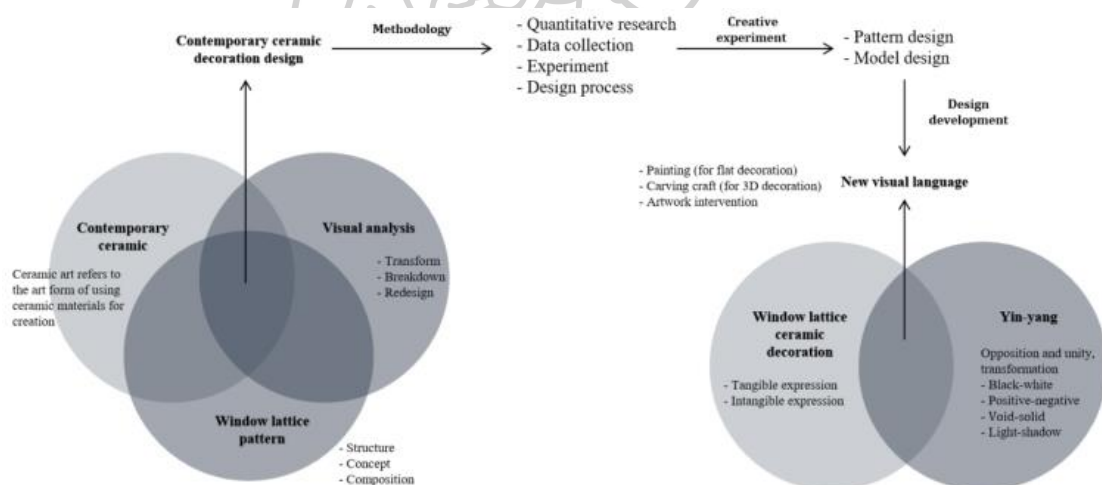


Figure 1. Conceptual research

Source: Researcher's diagram. October, 2023

1.4 Keywords and definition

Chinese window lattice: The window lattice is a component of a window formed by the combination of intersecting lattices and frames in the window. It is a

bridge that connects two rooms and increases the decorative and aesthetic value of the window, while providing privacy and light control. Through the window lattice, different landscapes can be seen from the outside, like a dynamic painting hanging on a wall.

Visual analysis: Visual analysis refers to the observation and understanding of the structure, shape, color, and other features in a window lattice pattern by the human visual system in order to derive and explain the information contained in the patterns.

Contemporary design: Contemporary design embraces new artistic elements with an open-minded approach that is not limited by traditional forms, rules or constraints. It explores various new ideas, concepts, materials, and technologies, and often presents them in innovative ways. By breaking away from traditional artistic concepts and forms, it revitalizes artistic expressions and gives them new life.

Ceramic decoration: Ceramic decoration refers to the use of ceramic materials for decorative purposes, creating works with visual appeal and aesthetic significance. By integrating contemporary design with ceramic craftsmanship and decoration, ceramic works are given a new design language.

1.5 Research methodology

The research on the application of Chinese window lattice patterns in contemporary ceramic art comprises several steps, which will be implemented in the following order: Firstly, observation and data collection are carried out by reviewing literature from various fields related to the research objectives. Then, fieldwork will be conducted in which the researchers will survey the window lattice patterns in both the northern and southern regions of China. Due to the vast territory of China, there are differences in history, culture, lifestyle and climate between the north and the south, which leads to regional differences in the design of window lattices and recording them can provide a more comprehensive understanding of their structural characteristics. The collected data will then analyzed and materials will be selected as a basis for discussion and experimentation to determine key aspects for conceptual designs. Finally, new designs and developments are proposed based on

the outcomes of the design experimentation phase, leading to conclusions and recommendations.

Literature review

During the research phase of this thesis, the researcher consulted extensive books and materials on window lattice forms, ancient garden art and ceramic art. These consultations served as a theoretical basis for discussing the application of window lattice models in contemporary ceramic design.

Interview and fieldwork

The researcher has attended many lectures on the relationship between traditional culture and contemporary art and personally experienced the current situation of historical and cultural cities represented by Beijing and Suzhou during the field research period, and collected a large number of photos and materials.

Case study and practical research

Analyzing excellent examples of the application of window lattice elements in contemporary design, drawing on the innovative points and the artists design concepts from these cases, examining the way window lattice elements are combined with contemporary ceramic art, provides important ideas and methods for design. A detailed analysis of ceramic glazing, shaping and firing techniques in practical research provides a basis for exploring different ways of presenting window lattice patterns in ceramic decoration.

1.6 Outcomes

In creating ceramic works thematizing traditional Chinese elements, the researchers focused on the post-evolutionary forms of window lattice patterns and the hidden philosophical meanings, they apply in contemporary ceramic decoration. The final outcomes are as follows:

New knowledge 1: Summarized the different expressions and artistic characteristics of Chinese window lattice, discovering how to apply them in contemporary ceramic decoration

New Knowledge 2: Based on the evolution rules of the window lattice pattern design can not only increase innovation, but also retain its characteristics, broaden the variety of ceramic decorative design, to meet the contemporary aesthetic needs.

New Knowledge 3: In researching window lattice patterns, integrate the Yin-Yang philosophy, explore and develop new visual languages to expand the forms of expression in contemporary ceramic decoration.

These are some of the conclusions drawn by the researcher in exploring the performance of traditional window lattice patterns in contemporary ceramic decoration, hoping to provide reference and help for related learners.

1.7 The relationship between research objective (RO), research questions (RQ), research methodology (RM), research outcomes (ROC)

| PROBLEM STATEMENTS (PS) | RESEARCH OBJECTIVES (RO) | RESEARCH QUESTIONS (RQ) | RESEARCH METHODOLOGY (RM) | RESEARCH OUTCOMES (ROC) |
|--|---|---|---|--|
| Few scholars have paid attention to window lattice pattern application in contemporary art, lack of comprehensive analysis and organization of literature or papers. | Exploring window lattice pattern potential in contemporary ceramic decoration design. | What are the characteristics of window lattice patterns? | Observation, field-works, Literature review, Case study | Summarized the different forms of expression and artistic characteristics of Chinese window lattice, and discover how to use them in contemporary ceramic decoration. |
| Window lattice patten lack innovative design, and most of them are simply copied or directly applied in two-dimensional, lacking three-dimensional display. | Explore how window lattice patterns can be combined with contemporary ceramic decoration. | How to explore the expression of window lattice patterns in contemporary ceramics? | Questionnaire, Experiment and design | Based on the evolution rules of the window lattice pattern design can not only increase innovation, but also retain its characteristics, broaden the variety of ceramic decorative design, to meet the contemporary aesthetic needs. |
| Lack exploration new materials and technologies for the design of window lattice patterns. | Research and develop new visual languages and aesthetic values to create ceramic decorative works that combine tradition and modernity. | How to create contemporary ceramic decoration design based on the window lattice pattern? | Practice research | In the exploration of window lattice patterns,integrate understanding of Yin-Yang philosophy, researching and developing new visual languages to expand the expressive forms in contemporary ceramic decoration |

Table 1. The relationship between RO, RQ, RM and ROC

Source: Researcher's table. October, 2021

1.8 The thesis overview

The overall thesis consists of five chapters.

The first chapter mainly presents the research background, the problem, the research objectives, the key words, the scope of the research, the methodology and the outcomes.

The second chapter focuses on the origin and development of traditional Chinese window lattice, analyzes the visual composition of patterns and ceramic decoration methods. Explore the potential of window lattice patterns in contemporary ceramic decoration design.

The third chapter introduces the research methodology. This includes a questionnaire survey to recognize window lattice patterns, data analysis, and creative experiments related to ceramic decoration design. The aim is to explore and develop different forms of expression for window lattice patterns.

The fourth chapter conclude the design development based on creative experiments. The aim is to create ceramic decorative works with a new visual language that combines tradition and modernity.

The fifth chapter is the conclusion and recommendation of the research.

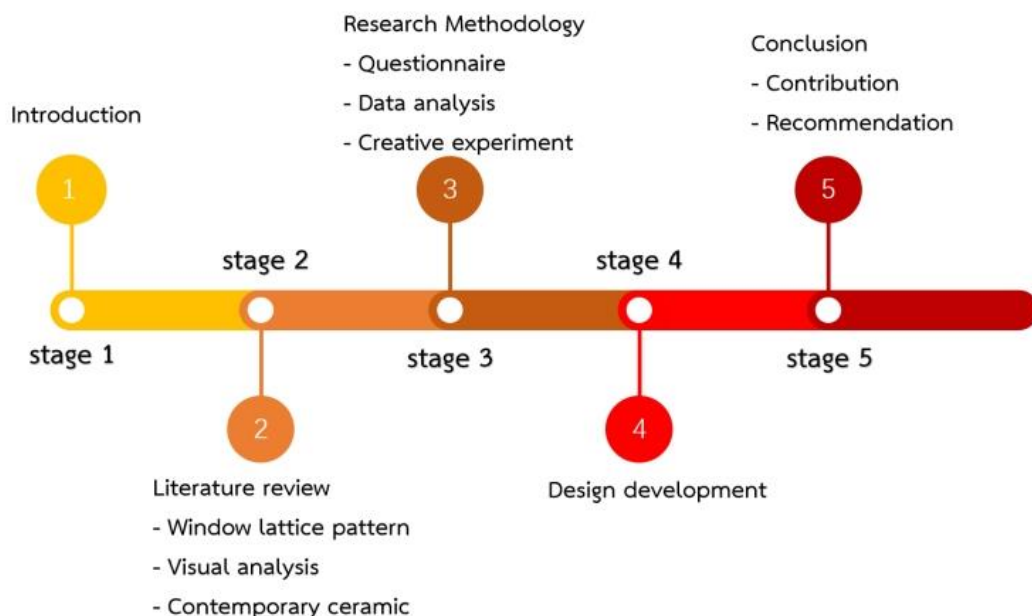


Figure 2. Conceptual research

Source: Researcher's diagram. October, 2021

Chapter 2

Literature Review

2.1 Introduction

The traditional window lattice designs in different regions of China are influenced by regional cultures, ethnic traditions, geographical landscapes, and climates. Therefore, they exhibit great diversity in terms of functionality, style, and form. Over time, as traditional architecture has evolved, ornamentation has become richer and window lattice designs have developed accordingly. These designs consistently carry the cultural essence of ancient architecture and culminate in distinctive forms. They are revered for their artistic value and the incorporation of these patterns into contemporary ceramic art can enhance the expressive forms of traditional Chinese patterns.

This study aims to explore the structural aspects of traditional Chinese window lattice patterns through visual analysis and to investigate their application in contemporary ceramic decorative design. The relevant literature and research are divided into three main parts.

The first part introduce the historical background, structure and development of the Chinese window lattice pattern.

The second part analyzes the visual composition of window lattice patterns.

The third part discusses the development history of ceramic decorative art, its artistic characteristics and the application of window lattice patterns in contemporary design.

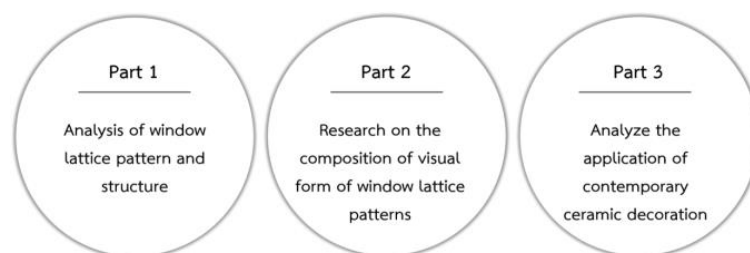


Figure 3. Literature review flow chart

Source: Researcher's diagram. May, 2022

Part 1: Analysis of the window lattice pattern and its structure

This chapter is based on the historical development of traditional Chinese window lattice patterns and introduces the artistic characteristics of different historical periods.

2.2 Definition and historical background of the window lattice

2.2.1 Definition

The window lattice is a component of a window, which is formed by the combination of intersecting lattices and frames in the window. It is a bridge connecting two rooms and on which various auspicious and beautiful patterns are engraved. From inside, you can see the landscape outside through the window lattice, like a dynamic painting hanging on the wall. It has functions such as controlling space, lighting and internal and external air circulation in architecture and gardens.

2.2.2 The historical background of the window lattice

In the "Book of Rites (The Rites of the Season)" it's recorded: "In ancient times, the kings did not yet have palaces. In winter, they lived in earthen caves, and in summer, they lived in nests made of branches." This describes the early living conditions of humans. "Earthen caves" refer to dwellings dug into the ground, while "nests made of branches" indicate structures resembling bird nests made from tree branches. According to archaeological discoveries, the primitive humans of Zhoukoudian in Beijing, located 550000 years ago, relied on the entrance of the stone cave where they lived for lighting and ventilation. The excavation and investigation of the primitive clan social settlement site in Banpo Village, Xi'an, Shaanxi, which dates back 6000 years, showed that there were already openings on the top of the houses at that time. The "Book of Rites (Monthly Ordinances)" records: "In ancient times, pottery kilns and caves were all opened on top to let light shine in." Throughout the lengthy period of early human society, to ensure lighting, ventilation, and the expulsion of smoke generated by fires inside dwellings, opening holes in the roof became a necessary choice and can be considered a precursor to

windows. Although holes in the roof addressed the issues of lighting, ventilation, and smoke, they were unable to protect against rain and snow. Therefore, this gradually evolved into openings on the sides of buildings. This marks the development process from "chimneys" to what we now recognize as "windows."

The window is a key component of architecture. Its most basic function is ventilation and lighting. Before the popularization of glass, most windows in Chinese architecture used hemp paper and yarn as lighting materials. In order to facilitate installation, dense lattice strips were placed inside the window frames, which turned into various patterns.

With the development of architecture, windows took taken on important decorative functions. More than 2000 years ago, Laozi described in his work "The Tao Te Ching": "Design the doors and windows to create a space; it is the emptiness in it that makes it useful" It is currently unknown when the first windows appeared in China. According to archaeological research, the earliest known architectural relic is the Yangshao Cultural Primitive Settlement Site, as shown in Figure 4, which archaeologists have reconstructed and depicted in a fanciful image, showing the embryonic form of the window lattice.

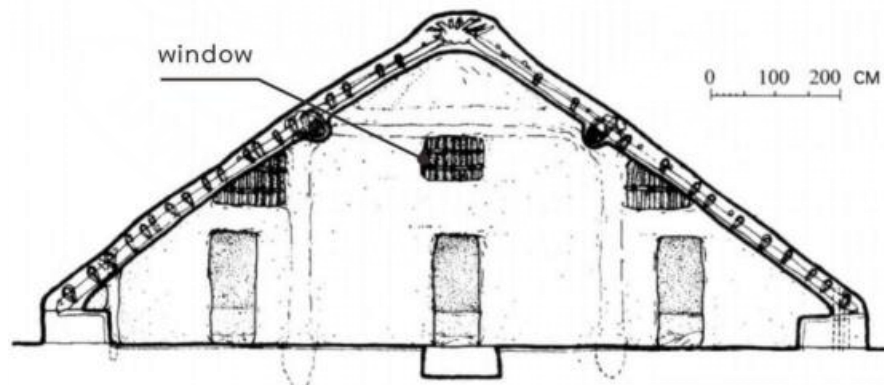


Figure 4. Yangshao Culture building recovery

Source: <https://www.awhouse.art>

The development of the window lattice is influenced by factors such as economy, culture and technology, with the reform of construction technology having the most profound influence. Huang Hanmin pointed out in his book "The Art of Doors and Windows" that only bronzewares from the Zhou Dynasty and wooden

coffins from the Warring States period had cross shaped and diagonal square shaped window lattice (Huang, 2010). From this, it can be deduced that the earliest physical information about windows can be found on bronzewares from the Western Zhou Dynasty, as shown in Figure 5. It is a bronzewares from the Jiyue Copper House excavated during the Spring and Autumn period, with floor-standing long lattice windows on both sides and cross-shaped lattice windows on the back, with an ancient and simple design.



Figure 5. Spring and Autumn period (770 B.C.-221 B.C.), Bronzeware

Source: https://m.sohu.com/a/253571777_210889

During the Qin Dynasty, the style and design of window lattice were simple, and served basic functional purposes. It was not until the Han Dynasty that structured, straight lattice windows appeared. In the Sui and Tang dynasties, people's thoughts were liberated in an unprecedented way through the exchange of economy, politics and culture, and architectural culture was further developed. The lattice decoration of window became more and more complex, and the straight lattice windows with their simple and atmospheric shapes were the most representative pattern of the Tang Dynasty. Before the Song Dynasty, window lattices were mainly used for lighting and ventilation. During the Song Dynasty, various aspects of society developed rapidly and the artistic value of window lattice design gradually improved.

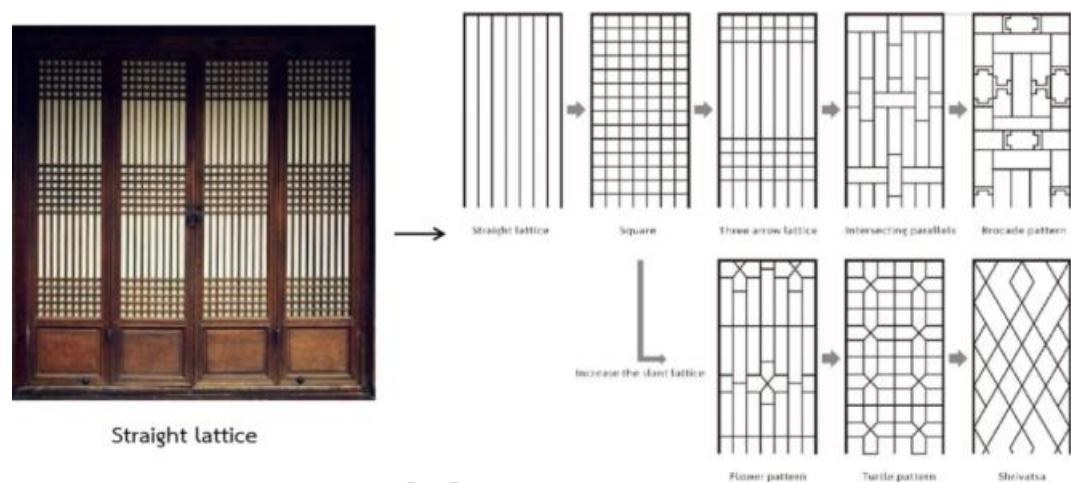


Figure 6. Straight lattice window

Source: Researcher's design. May, 2022

During the Ming and Qing Dynasties, the design of window lattices underwent a great development. Different styles developed, which contained both decorative and practical elements. Geometric forms became the main decoration for window lattice in the Ming Dynasty. The craftsmanship was meticulous and offered a dignified and substantial appearance, with an even greater variety of styles. There were abstract geometric patterns, including ice crack patterns, lozenge motifs, as well as various depictions of plants, flowers, stories of people, landscapes and themes expressing people's wishes for happiness and longevity. In this era, calligraphy, painting, embroidery and other crafts were integrated into the decoration of the window lattice decoration (Sun, 2019). Over the millennia, traditional Chinese window decorations has evolved and refined, giving rise to various styles that bring unprecedented artistic color to window lattice decoration. Unlike the earlier simple designs, more emphasis is now placed on decoration to achieve a blend of functionality and artistry. During the Ming and Qing Dynasties, the development of window decorations in garden landscapes, such as the one in Suzhou also progressed rapidly. Window lattices were often integrated into garden corridors or attached to walls and served to embellish walls, connect spaces, and borrow scenery.

During the Qing Dynasty, the patterns of the window lattices continued the characteristics of the Ming Dynasty but appeared even richer and fuller. They were characterized by elaborate and intricate decorative motifs and reached the pinnacle of window lattice art in the Ming and Qing periods. In terms of the balance between artistry and functionality, the Qing Dynasty moved from the artistic peak of the Ming Dynasty to the extreme of craftsmanship (Tian, 1985).

The evolution of window lattice patterns reflects the development and progress of society, economy, and culture in different dynasties. It embodies the love and longing of ancient working people for a better life and carries wishes and auspicious meanings. It holds a cultural and spiritual significance (Li, 2007).



Figure 7. Window lattice patterns of gardens in the Ming and Qing dynasties

Source: <https://new.qq.com/omn/20210120/20210120A05VJK00.html>

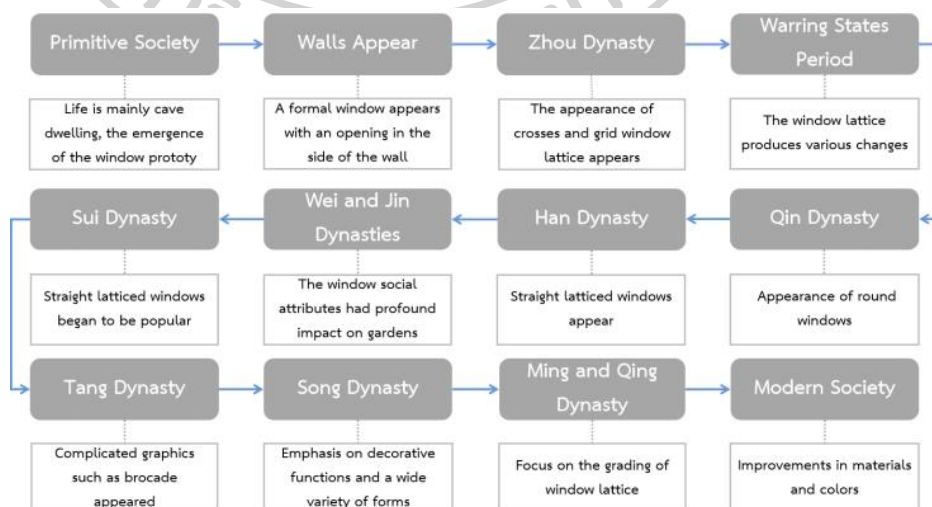


Figure 8. The development of Chinese window lattice in different periods

Source: Researcher’s diagram. May, 2022

2.3 Type of window lattice

As a significant component of Chinese architecture, window lattice represent the most diverse aspect of traditional architectural decoration. They have historical and cultural value as well as practical and artistic significance. According to the classification in the book "Chinese Traditional Door and Window Woodcarving", the common window lattice can be divided into four types: long windows, Sill window, removable windows, and scenic windows (Xu, 2010).

Long windows

The long window is an architectural feature commonly found in traditional temples, gardens, and residential buildings in China. It serves as both a window and a door and is usually located at the front of a hall. Its size can vary depending on the height, size and needs of the building, but it usually has six panels. However, depending on the space requirements, it can also consist of four or eight panels, and its shape can be diverse. In the Suzhou region of China, the long window is more frequently used than in the northern regions, likely due to the warmer climate in the south. The long window is easy to open and close, allowing for good ventilation and lighting.



Figure 9. Long window pictures

Source: https://www.sohu.com/a/447488019_617491

The most practical thing in gardens is the long window. When opened, people can go in and out freely, and the ventilation function can be used. When it is closed, it also has the function of insulation and lighting, so that people can view the

landscape outside from inside. The upper part of the long window has a lattice structure for easy lighting, while the lower part is a rectangular wooden panel decorated with patterns such as poetry and flowers.



Figure 10. Long window structure

Source: Researcher's design. May, 2022

Sill windows

The sill window is often used in interior side rooms and is common in gardens, temples and residential buildings. It is essentially a long window without a windowsill, where the remaining lower part of the wall is made into a wall above which the window is fitted and can be opened. As it is a transparent window, it allows light and ventilation even when it is not open. The color, pattern, and design will match those of the long windows, making the exterior of the building look more harmonious and unified. In Song Dynasty paintings, the sill window shape can often be seen in waterfront halls, where you can sit on the railing and enjoy the scenery after opening the window. This elegant window decoration can still be seen in old houses in southern China today.

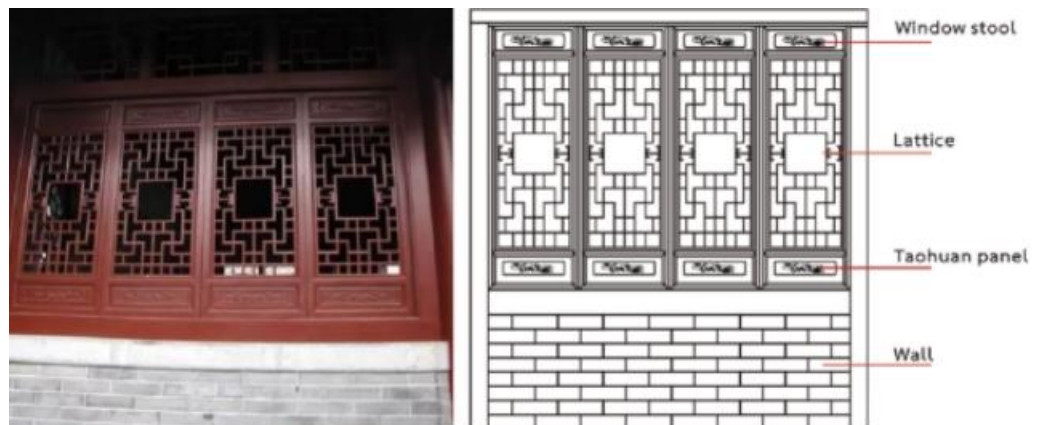


Figure 11. Sill window structure

Source: https://www.sohu.com/a/295154600_99943194

Removable windows

The removable window is a type of window construction known for its exquisite and artistic design. It is typically divided into two sections: the upper part can be pushed out and supported, while the lower part can be lifted and removed, which is how it got its name. In winter, the largest part of the window is tightly closed, while in summer, the lower part can be removed to provide ventilation and cooling. This feature of the removable window is the biggest difference to the other types of windows. Removable windows are commonly used in buildings such as gazebos, boats, and towers, and their structures can vary depending on the region. The patterns of the removable windows in the Forbidden City in Beijing often use patterns such as "stepped brocade" and "turtle back brocade," while in southern China, they often have geometric shapes such as rectangles, hexagons and octagons. Additionally, the windows are often decorated with various carved patterns to make them even more exquisite.

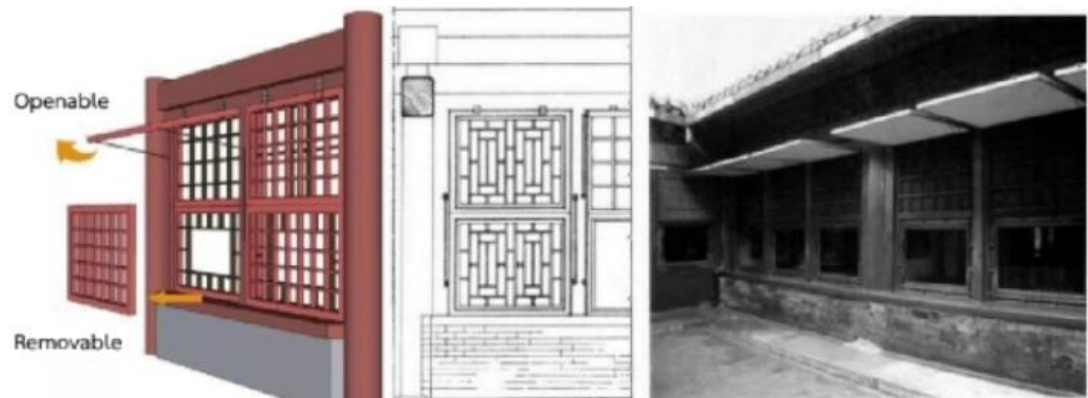


Figure 12. Removable window structure

Source: https://www.sohu.com/a/293557720_99943194

Scenic window

Scenic windows are often placed on garden walls and serve to embellish the environment, convey space and borrow from the landscape. They come in a variety of shapes and are often placed continuously on the wall, at a height that corresponds to a person's line of sight. Borrowing landscapes "introduces" distant mountains, rivers or other beautiful scenery into the window, expanding the space in the garden and making it easy for people to enjoy the landscape through the window lattice.

The shape of the scenic window can be square, octagonal, hexagonal, rectangular. The decorative patterns on the window lattice are complex and are usually matched to the assorted styles and landscapes inside and outside the window. Common window lattice patterns include the Swastika, ice crackle, and Hui pattern. Some have simple or hollow patterns in the center and intricate patterns on the edges, which facilitate the view of the scenery in the courtyard and enhance the sense of hierarchy and space. Others have intricate patterns in the center of the window lattice and simple patterns at the edges.

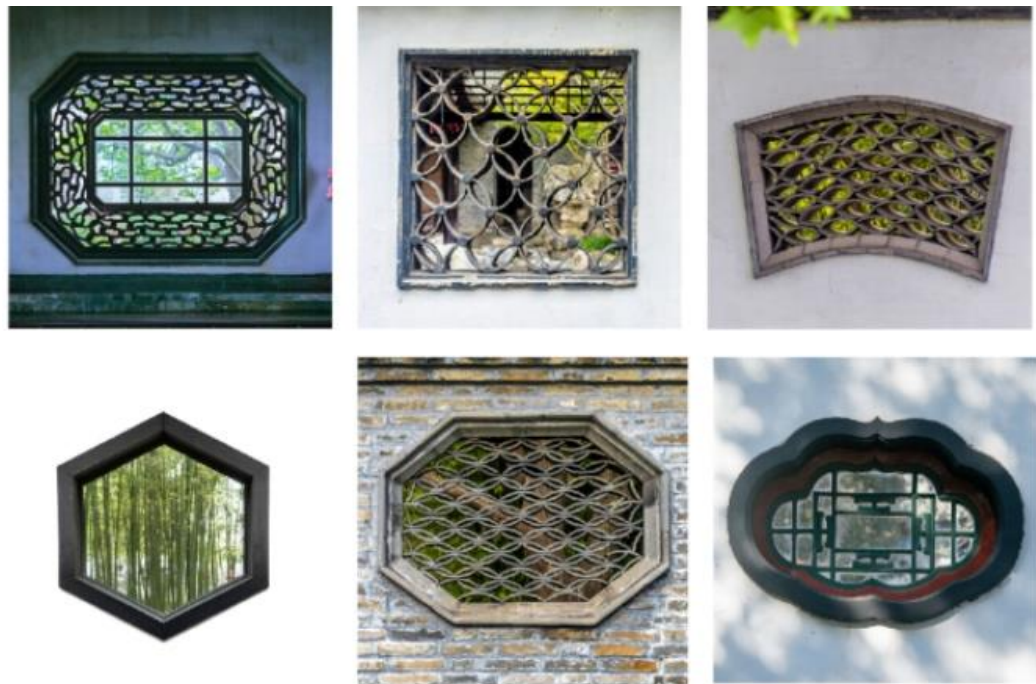


Figure 13. Scenic window structure

Source: Researcher's photos. May, 2022

Scenic windows are usually installed on low external walls. As they are not protected by eaves, the window lattice materials are often made of stone and bricks. The size of scenic windows is small, with a width of around 60-90 centimeters. They should not be neither too wide nor too large, and the height above the ground is usually around 120 centimeters to facilitate the view of the landscape outside the window.

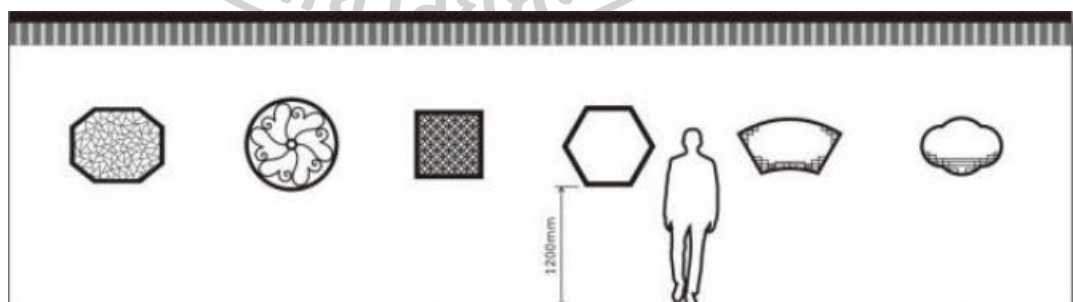


Figure 14. The relationship between the scenic window with people's view

Source: Researcher's photos. May, 2022

2.4 Research object

Due to the vast territory of China, there are differences in history, culture, living habits, and local climate between the northern and southern regions, which lead to regional differences in the design of window lattice. In this research, the window lattice of the Forbidden City in Beijing is studied as a representative of the north and the private gardens in Suzhou, Jiangsu Province, as the representative of the south for research. This is the most significant region for the differences in window lattice between the north and south of China. By analyzing the window lattice in different regions, their structural characteristics can be discovered more comprehensively.

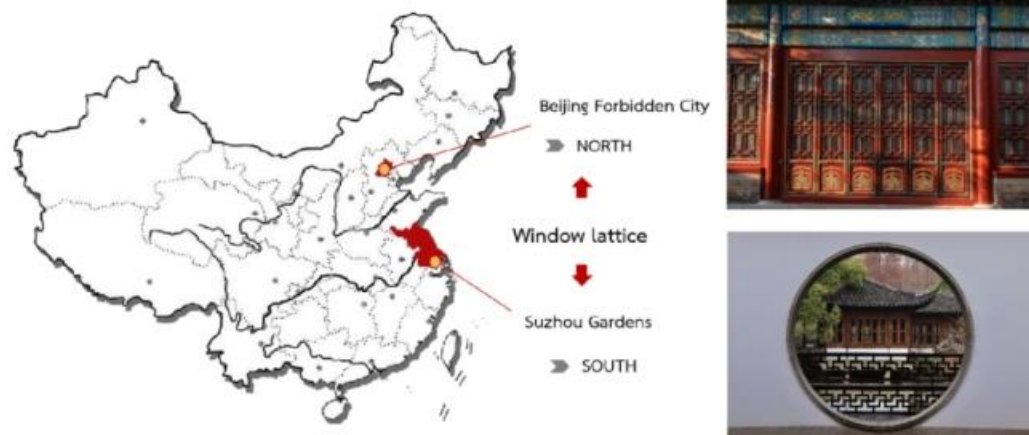


Figure 15. North south distribution of window lattice

Source: Researcher's photos. May, 2022

2.5 Summarize the structure, characteristics and evolution process of window lattice

2.5.1 Window Lattices Visual Form of the Forbidden City

The Forbidden City in Beijing was built in 1420 and served as an imperial palace for the Ming and Qing Dynasties. It is the largest and most complete surviving ancient wooden building complex in the world and represents the highest achievement of architectural art during the Ming and Qing Dynasties. The Forbidden City is listed as a World Cultural Heritage Site. Its overall layout, the individual buildings and the detailed decorations are of great importance for research. The

artistic connotations and aesthetic implications reflected in it profoundly embody traditional Chinese culture.

The architecture of the Forbidden City is grand and majestic, influenced by royal regulations, traditional cultural ideas, and the northern geographical environment. The architecture also reflects a clear hierarchy, with variations in the size, style, specifications and detailed decorations of the windows due to the different levels of hierarchy. This is also a unique feature of the palace windows as a representative of royal architecture in the Forbidden City (Wang, 2017)

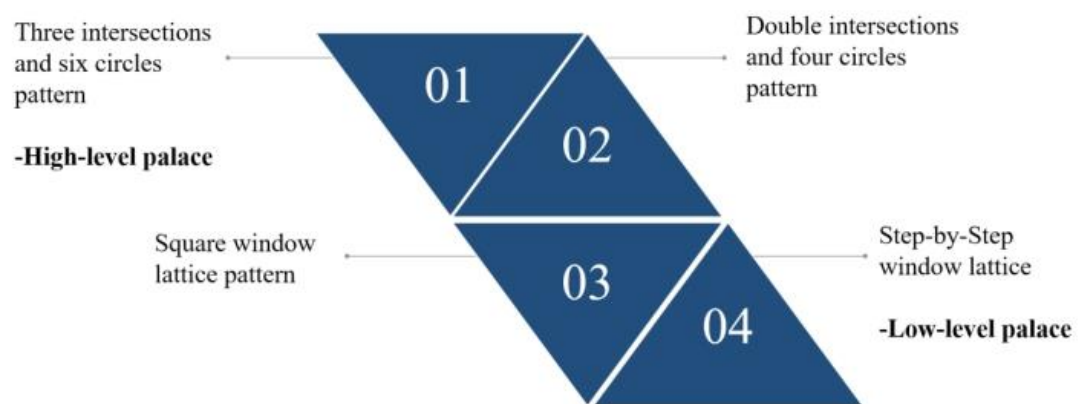


Figure 16. Strict level of window lattice structure

Source: Researcher's diagram. May, 2022

The most important buildings in the Forbidden City are the "Three Halls and Three Palaces" on the central axis, and the "Three Great Halls" are the highest buildings in terms of form. They are the Hall of Supreme Harmony, the Hall of Central Harmony and the Hall of Preserving Harmony, so the windows of these buildings are of the highest level in terms of structure and decoration. According to the structure of the windows, they are arranged from top to bottom: long windows, sill windows and straight lattice window. The levels of the window lattice decoration is arranged in the following order: three intersections and six circles, double intersections and four circles, square window and stepped brocade decorated pattern (Lou, 2011). As for the color, gold is preferred. This rare and precious metal has a color that is close to yellow with luster. Combined with the red doors,

windows and pillars around them, they appear bright and prominent, displaying the dignity of the royal architecture.

Three intersections and six circles pattern

The pattern of three intersections and six circles is a symbol of national political power and represents all things in the world. It is the highest level of window lattice decoration. This pattern consists of three intersecting lattices, forming a diamond-shaped flower with six petals at each intersection point. A small metal nail is used to fix the three lattices in the center of each diamond-shaped flower. The pattern is created by intersecting straight and diagonal lattices to form numerous equilateral triangles. This pattern is used on the lattice doors of the "Three Halls and Three Palaces" of the Forbidden City. The different distance between the lattice strips or the addition of other decorations on the lattice strips, create different styles of window lattice.

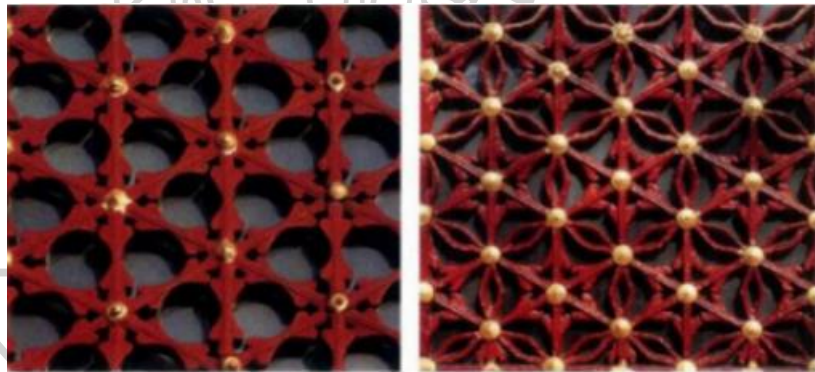


Figure 17. Three intersections and six circles pattern

Source:http://www.360doc.com/content/22/0405/23/32730899_1025020155.shtml

The three intersections and six circles pattern consist of six petals. To draw it, start with a circle and divide its circumference into six equal points. Then, draw six circles, each centered in one of these six points and of the same size. The petals are formed by the intersections between the original central circle and the six circles drawn. This results in six petals that form the pattern.

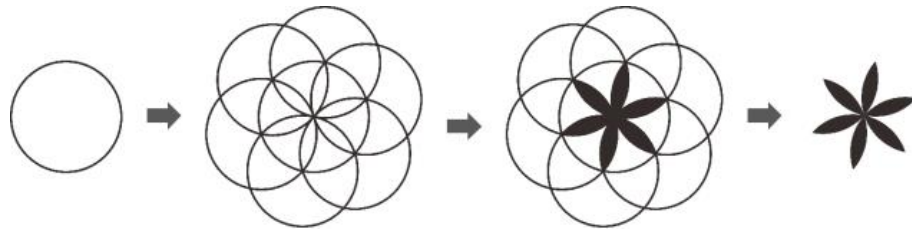


Figure 18. The process of pattern evolution

Source: Researcher's design. May, 2022

Double intersections and four circles pattern

The pattern of double intersections and four circles refers to a basic window lattice design with four petals, where each petal is formed by the intersection of two circles. The pattern use four identical circles with each pair of circles intersecting to form a petal. However, as the circle method is complicated to construct, squares were used for the pattern instead of circles. The resulting design is arranged at an angle of 45 degrees and can be used both horizontally and vertically. The decorative effect of this pattern is not as magnificent as that of the window lattice pattern with three intersections and six circles.

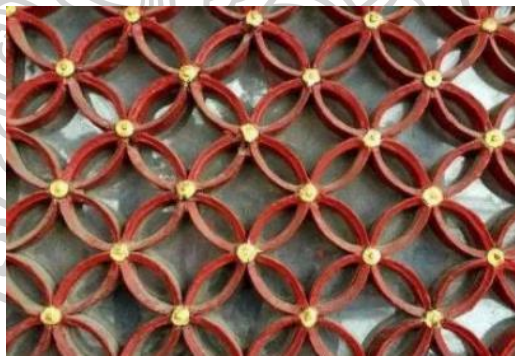


Figure 19. Double intersections and four circles pattern

Source: <https://www.sgss8.net/tpdq/14031966/>

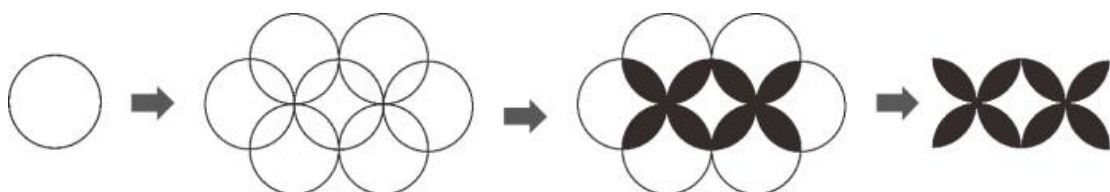


Figure 20. The process of pattern evolution

Source: Researcher's design. May, 2022

Square window lattice

The square window lattice consists of intersecting vertical strips that form a square lattice. It can be used at a 45-degree angled as well as in a vertical or horizontal form. This lattice design is based on a grid pattern and creates a simple and regular visual impression.



Figure 21. Square window lattice pattern

Source: Researcher's photos. May, 2022

Stepped brocade window lattice

The stepped brocade pattern is created by using lattices form a frame. This pattern symbolizes the idea a step towards a prosperous future. It is a beautiful and regular pattern commonly found in the gardens of the Forbidden City.



Figure 22. Stepped brocade window lattice

Source: Researcher's photos. May, 2022

From the above buildings where several window lattice patterns are located, it is obvious to see a hierarchical phenomenon, and the pattern of the window lattice has become a means of expressing the hierarchy of the building. Patterns are versatile, the designer who wants to make good use of the pattern must understand

how it is composed and how to redesign the window lattice, it is necessary to start from the basic pattern, analyze it, look for the rule, and then adjust it.

2.5.2 Window lattices visual form of the Suzhou Gardens

Le Feng wrote in the "Biography of Chen Congzhou" that "The Jiangnan gardens are the best in the world, and Suzhou gardens are the best in Jiangnan (Le, 2009)." Suzhou Gardens, which are considered the model for the classical private gardens in the Jiangnan region of China, are renowned for their unique architectural features, such as the window lattice, which are elegant in style, varied in number, and diverse in pattern forms. In the Suzhou area, there are numerous traditional gardens, apartment blocks, and residential buildings from the Ming and Qing dynasties, representing the highest level of window lattice decoration in traditional Chinese architecture.

Window lattice the basic elements of traditional Chinese decoration in terms of shape, color, pattern, and construction technology. The exquisite and simple characteristics are a highly summarized artistic style of the window lattice in Suzhou Gardens (Zhuang, 2009).

Window frame pattern

Window frames can be divided into two types. One type consists of simple geometric shapes, such as squares, circles, diamonds, and more. Another type consists of various natural plant features, such as the shape of sunflower, a begonia and gourd. The window frames of this type of theme to a certain extent represent the history, culture, customs, and traditions of the Jiangnan region and express people's beautiful wishes for life (Ye, 2014).



Figure 23. The window different forms

Source: Researcher's photos. May, 2022

Characters window lattice pattern

Chinese characters have their origins in pictograms, and in the process of historical development, people have endowed them with rich emotional colors. Therefore, window lattice patterns are often decorated with the imagery and polysemy of characters. There are two ways of expression: one is to set the characters in the outline of a square or circle as the center of the whole window frame, and the other is to cover the whole picture with characters and express it in a patterned form. Usually, characters with beautiful meanings are selected.



Figure 24. Character window lattice pattern

Source: Researcher's photos. May, 2022

The Chinese character "回", the "回" pattern for example, was originally derived from the pattern on pottery and bronze. It is mainly composed of regular horizontal and vertical short lines, which has a good meaning of "return" in Chinese culture, symbolizing the reunion of the whole family and the longevity of blessings, and because of the richness of its pattern, it has been widely used in window decorations.

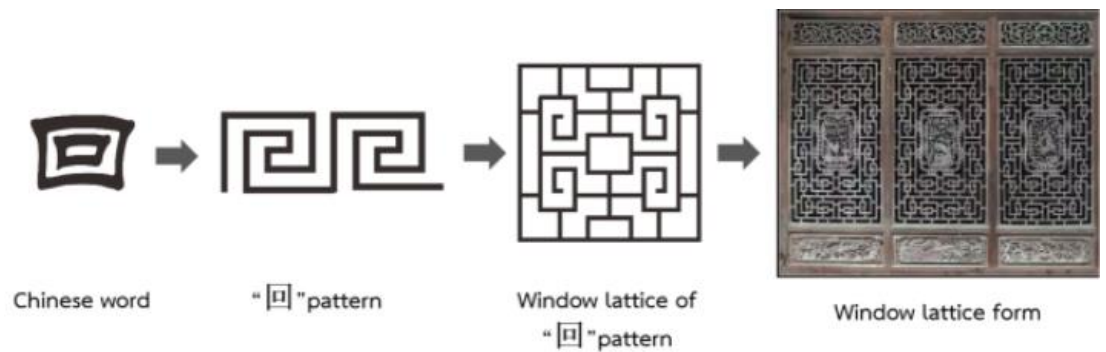


Figure 25. Application of "回" pattern window lattice design

Source: Researcher's photos. May, 2022

The "工" pattern (gong) is quite common in traditional window lattice. The shape of the Chinese character "工" is both horizontal and vertical, the ancients believed that it symbolizes the principle of following rules and behaving with integrity. Therefore this pattern is often used in official mansion.

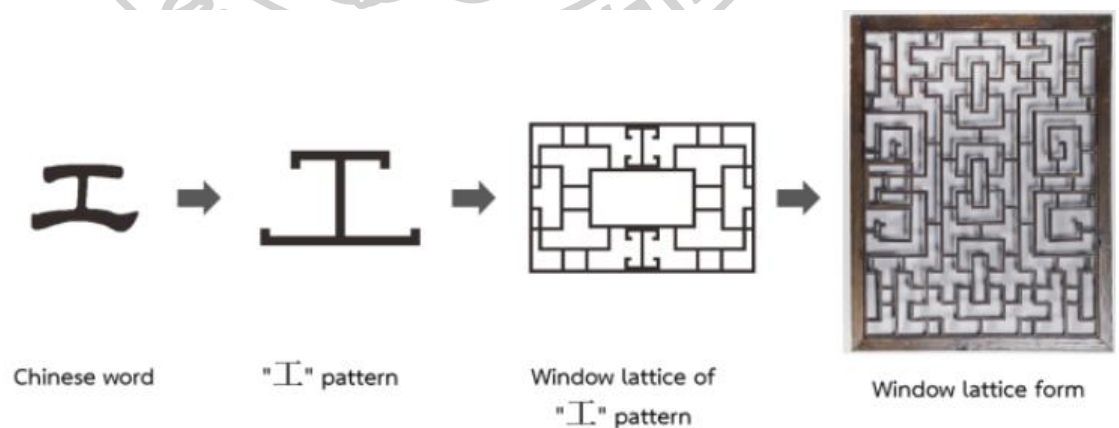


Figure 26. Application of "工" pattern window lattice design

Source: Researcher's photos. May, 2022

Geometric window lattice pattern

The patterns used in early window lattice decorations were mostly square and round, but as time continued to develop, the basic geometric patterns were too homogeneous, so a series of richer complex geometric patterns for window lattice were produced, such as chevron, ice crack and hexagonal patterns and other different kinds of patterns. These patterns generally use the basic horizontal, straight, diagonal and curved lines, and transform into rhythmic patterns various compositional techniques.



Figure 27. Geometric patterns of window lattice

Source: Researcher's photos, May, 2022

Plant window lattice pattern

Simple geometric shape patterns no longer satisfied the aesthetic demands of the ancients for window lattice, and began to pay attention to plants and flowers in nature. Common plant patterns include orchids, pines, plums, chrysanthemums, and bamboos. As shown in Figure 28, the plum blossom pattern is a very typical pattern, presented as a regular and eye-catching five-petaled plum blossom. The pattern can be used as the main component of the content in the window lattice, but also as a tool to embellish the details.

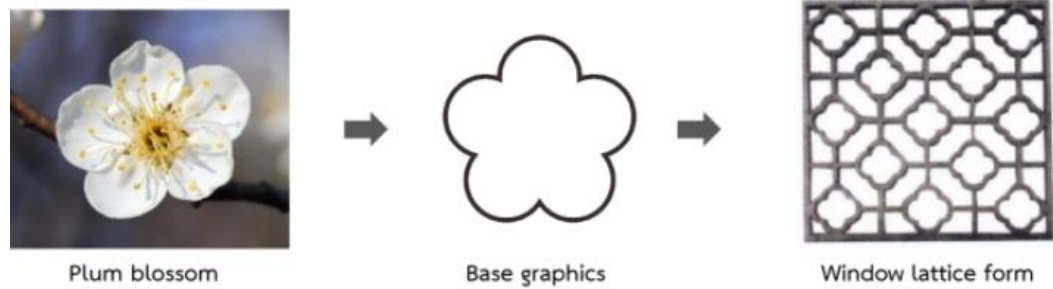


Figure 28. Application of plum blossom pattern

Source: Researcher's photos. May, 2022

Animal window lattice pattern

Many common animals have become the theme of creation, such as magpies, bats, turtles etc. Have become the subject of creation and are auspicious and festive meanings by people. The turtle stands for health and longevity, the magpie for luck, the mandarin duck for love and happiness, and the carp for career development.

For example, the turtle back pattern is one of the most common decorative animal patterns in traditional window lattice. Its model is the back shell of turtles that grow in the water, abstracted as a hieroglyphic pattern that signifies health and longevity.

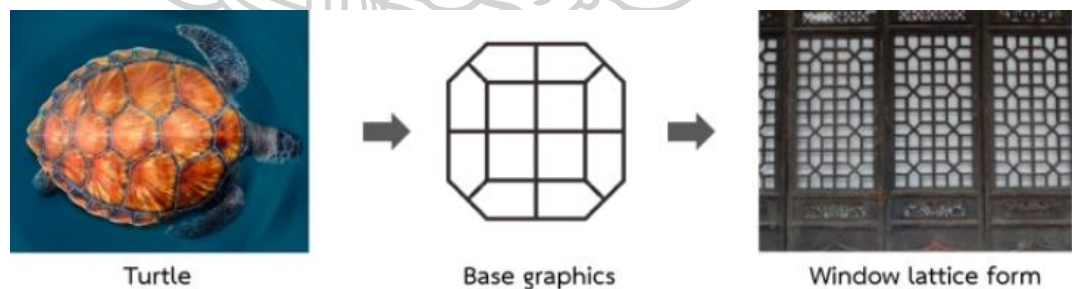


Figure 29. Application of turtle-back pattern

Source: Researcher's photos. May, 2022

Window lattice combination pattern

A new decorative pattern is formed by combining two or more different graphic elements, mostly composed of geometric shapes.



Figure 30. Window lattice combination pattern

Source: Researcher's photos. May, 2022

Result: The Yangtze River roughly bounds the northern and southern regions of China. Due to historical, cultural, and other factors, differences in the window lattice have developed between the two regions. There are many differences in the patterns, forms, colors, and other aspects of window lattice in the northern and southern regions. The patterns of the northern window lattice are usually more rigorous, orderly, and use a stricter hierarchical system. The patterns of the southern are widespread have complex shapes and a free expression. In terms of colors, gold and red are often used in the Forbidden City to highlight the nobility of the royal; The southern region is represented by black, white, and gray, which are simple and rustic.

2.6 The artistic characteristics of window lattice

2.6.1 Pattern Art

The artistic characteristics of traditional Chinese window lattice patterns lie in the perfect combination of form and meaning. In terms of form, they are characterized by their modeling and decorative patterns, which follow artistic rules such as rhythm, symmetry, echo, balance, contrast, harmony, and proportion. In terms of meaning, they embody the ancient working people's love and longing for a better life, and contain auspicious meanings and wishes. They are rich in cultural and spiritual connotations and have profoundly influenced traditional Chinese culture.

Traditional Chinese window lattice patterns have strong ethnic and regional characteristics, profound symbolism, perfect forms, and diverse artistic expressions.

Traditional Chinese culture has always been good at conveying people's perception of the outside world through graphic symbols that form certain patterns. This can be traced back to the totemic patterns of primitive tribes and the decorative patterns on primitive vessels, such as animal patterns and natural patterns of the sun, moon, and stars.

As an important component and part of traditional architecture, window lattice typical significance for China's aesthetic and creative recognition. They are not only used for decoration but also fulfill important practical and cultural functions. Taking Suzhou Gardens as an example. It can be seen that some window lattice decorations have more complex patterns. In contrast, others are simpler, among which a large number of classical styles have an enormous influence and have been passed down to the present day. They often appear in contemporary classical-style architectural designs and become a decorative style.

2.6.2 Light and shadow aesthetics

Traditional Chinese gardens attach great importance to the creation of mood and atmosphere. Wang Guowei once said, "The environment is not only about the physical scenery, but also about the realm of emotions such as joy, anger, sorrow and happiness in the human heart. Therefore, those who can portray true scenery and genuine emotions are said to possess artistic realm, while those who cannot are considered lacking in such realm (Wang, 1981)." This indicates that the integration of scenes and emotions is key to establishing a mood. Chinese gardens have developed in line with landscape painting and pastoral poetry, both of which have placed great emphasis on spiritual resonance and poetic sensation from the outset. The play of light and shadow aesthetics in window lattices embodies a form of artistic and symbolic beauty. In reality, it is based on structural elements. Different patterns create different light and shadow effects when penetrated by light, resulting in a aesthetic appeal. When the light passes through the window lattice, the floor forms a distinctive pattern that moves over with the passage of time, like a dynamic painting.



Figure 31. Window lattice made of light and shadow

Source: <https://www.vcg.com/creative/1373514537>

2.7 Expression of window lattice patterns in product design

The application of window lattice patterns in modern design should not be limited to their original position and function. They can be used flexibly, either hanging on walls, embedded within wall surfaces, transformed into furniture or decorations. Various decorative techniques should be comprehensively used to recreate the window lattice and highlight the charm of window lattice art (Jiang, 2014).

2.7.1 Furniture design

In the development of window lattice, they have gradually found use in furniture, often in the form of partitions. As shown in Figure 32, window lattice replaces walls to create hollow decorative structures. In this way interior partitions can serve as walls and decorative elements. They not only complete the dividing space, but also reinforce the sense of openness within the space.



Figure 32. Window lattice partition

Source: <http://www.djzr88.com/Products/hgdsjzxdf.html>

2.7.2 Lamp design

Window lattice patterns can be presented in the form of paintings or carvings and used in lamp design. Applying the window lattice pattern to the lampshade, when light passes through it, it will cast shadows with window lattice structures in the surrounding environment. The application of window lattice patterns in lamp design adds more artistic and cultural symbols to the interior.

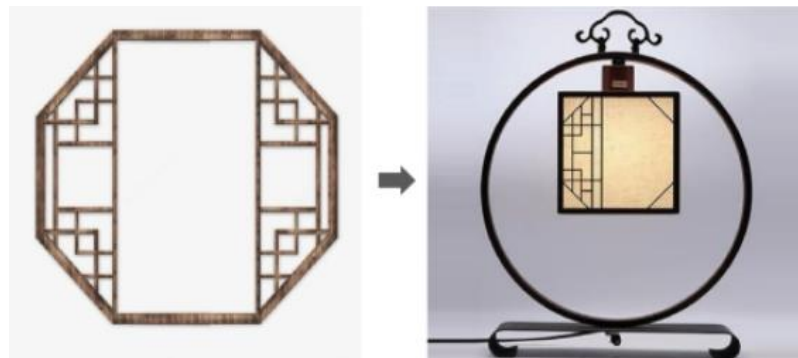


Figure 33. Product design with window lattice pattern

Source: Researcher's photos. May, 2022

2.7.3 Jewelry Design

Jewelry design is one of the most emotionally and artistically expressive categories of product design and highlights a variety of methods for obtaining visual symbols. Many jewelry designers draw inspiration from iconic patterns and incorporate these artistic elements into their jewelry designs. As shown in Figure 34, the jewelry design inspiration is derived from the window lattice patterns in architecture.



Figure 34. Jewelry design with window lattice pattern

Source: Researcher's photos. May, 2022

2.7.4 Cultural and creative product design

Cultural and creative products are inspired by the traditional Chinese window lattice, creating various practical, decorative, or culturally significant items. These designs often blend traditional culture with modern aesthetics, show the heritage and innovation of traditional craftsmanship. As shown in Figure 35, the Palace Museum introduces a stationery set that takes up the theme of window lattice. The pen holder and the notebook's waistband contain geometric elements from of the Forbidden City's window lattice, with colors reminiscent of the palace's red walls and decorated with gold accents. The hollow design of the pen holder not only enhances the look of pen but also reduces its weight making it easier to use.



Figure 35. Cultural and creative products with window lattice

Source: https://m.sohu.com/a/339189266_170561

2.7.5 Book design

The inner pages of the book are carved with various window lattice patterns on cardboard, reminiscent of a bridge connecting two spaces. Through the window lattice, the external scenery is presented, creating the visual effect that borrowed scenery from Chinese gardens, and that the landscape outside the window flows into the interior of the book.



Figure 36. Book design with window lattice

Source: <https://www.pinterest.com/pin/399835273170269872/>

2.8 Summary

Window lattice patterns are a part of traditional Chinese visual elements, containing rich artistic forms, and have significant research value in the field of design. With the development of society, window lattice integrates social hierarchy, religious ideas, and folk culture, becoming a decorative pattern with rich ethnic connotations. It is characterized by its exquisite shape and rich decorations, and is an outstanding representative of country's traditional culture.

The application of window lattice patterns in modern design can not only protect and promote traditional ethnic culture, but also spread innovative ideas in modern design. Emphasizing modern design and the application of traditional decorative elements, and the expression of cultural images is the key to the success of the modern applications of traditional patterns.

Part 2: Research on the composition of visual form of window lattice patterns

2.9 Concept of visual form

Vision is the physiological dimension that leads to the most important sensations in humans and animals, the first level of perception, a psychological phenomenon at the lower level of mental processes. Daniel Bell, a famous American sociologist, once pointed out that contemporary culture is turning into a visual culture, and that visual culture is gradually becoming the main cultural form we are pursuing (Liang, 2019). It is a social and cultural phenomenon of cultural dissemination using audiovisual media to satisfy people's cultural needs. Zong Baihua wrote in "Aesthetic Walk" that "an artwork without the active imagination of the viewer is dead and lifeless (Zong, 2005)." so the innovative development of visual symbols should be based on the exploration of the context of the times, so that the heritage continues to develop and develop ways.

The visual form needs to be optimized and integrated through the reasonable organization of the shape, pattern, color, structure and other related visual information, which can not only highlight the cultural, artistic, functional and valuable attributes, but also realize the user's experience of traditional culture, aesthetics, the emotional needs of the visual guidance and perception of the effect

of the organization of the optimization of the visual form of the ability to make the visual redesign of the traditional culture to more accurately convey the cultural information, practical information, decorative information, so as to create a more powerful attraction.

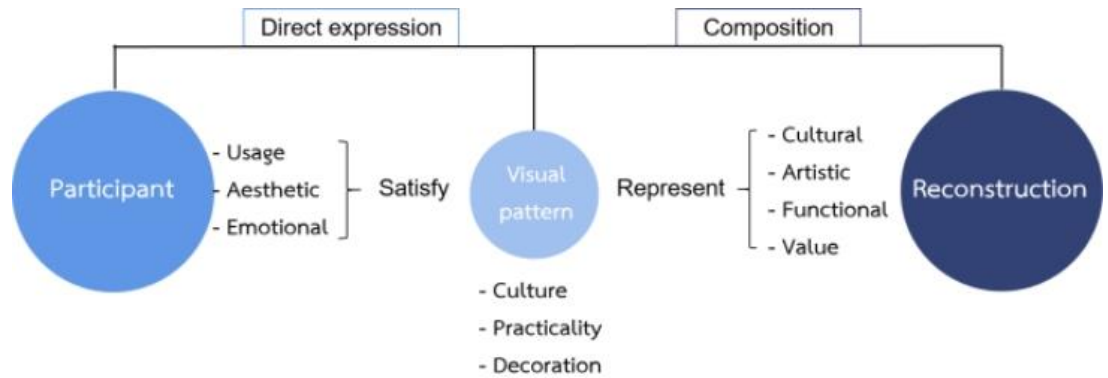


Figure 37. The relationship between visual pattern and participant and reconstruction
 Source: Researcher’s diagram. October, 2022

2.10 Types of visual forms

Forms can be divided into two categories in terms of their characteristics: one for real forms and the other for conceptual forms.

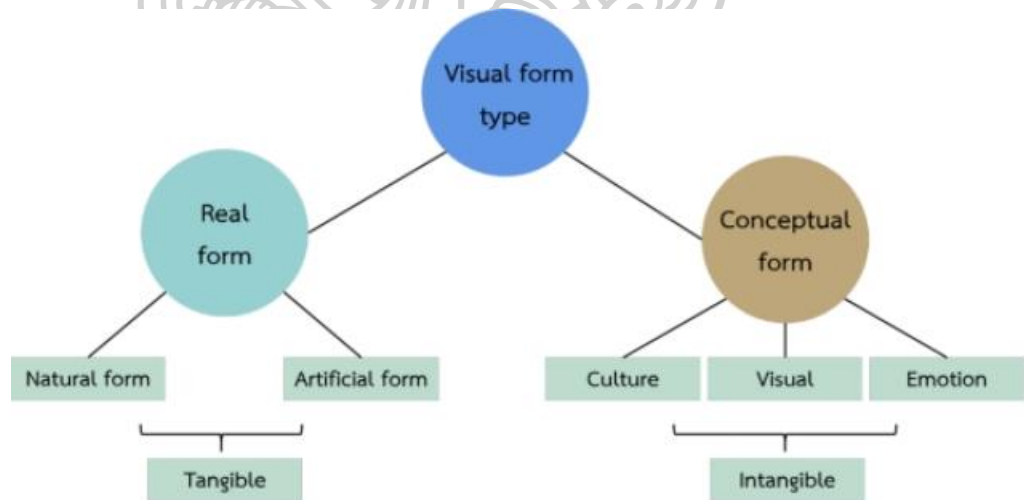


Figure 38. Types of visual forms
 Source: Researcher’s diagram. October, 2022

A real form is an objectively existing form with materialized characteristics, which includes natural forms and artificial forms. The second category is artificial

forms, which are all forms created by human secondary processing by human, such as the product modeling, the building exterior construction. Most artificial forms are derived from natural forms, but at the same time, they are associated with more emotional values.

Conceptual forms are usually material forms that have no objective existence. Although they can be observed, they do not have a figurative graphic configuration pattern, and therefore cannot usually be converted directly into a usable form. Some of the conceptual forms are not graphic, but they are presented in a form that is accessible and has the ability to be graphic which implies the cultural, visual and emotional characteristics behind the object (Wu, 2008).

2.11 Visual reconstruction

Reconstruction refers in particular to the redesign of the theme, structure, color, etc. Of the information conveyed in addition to its values and aesthetics unchanged, which can be briefly summarized as symbolization and abstraction of the visual elements. The mainly purpose is to break up the original visual form, take out the basic elements contained in the design, and combine them with the theme to be embodied in the design, effectively reorganizing these basic elements, and realizing innovate on this basis. Therefore, when redesigning the visual form, it is necessary to fully understand the basic elements of the form content, and then deconstruct and reorganize them with different themes, and finally realize the artistic effect (Brett, 2006).

The lack of innovative design of traditional pattern elements, most of which are simply copied or directly applied, has gradually cause a strong aesthetic fatigue to the audience, thus greatly weakening the attractiveness of the visual content of culture and the spread of connotation. Therefore, based on the formation of traditional culture with the value of visual aesthetics, the pattern is redesigned according to the reconstruction of visual forms, and the abundant visual power of traditional culture is utilized to expand the creative ideas, thus stimulating the attention and inheritance of culture.

2.12 Visual form composition of window lattice patterns

Based on the research on visual form in the previous text, analyze the window lattice from three aspects: pattern category, composition, expressive form, and symbol:

2.12.1 Pattern category

The structure of window lattice patterns has its origins in simple geometric forms, under the influence of economic, cultural, technological, and other factors, various forms have emerged. The window lattice pattern is composed of characters, geometry, plants, animals, and folk stories. These patterns serve as the foundation for the development of numerous contemporary designs.

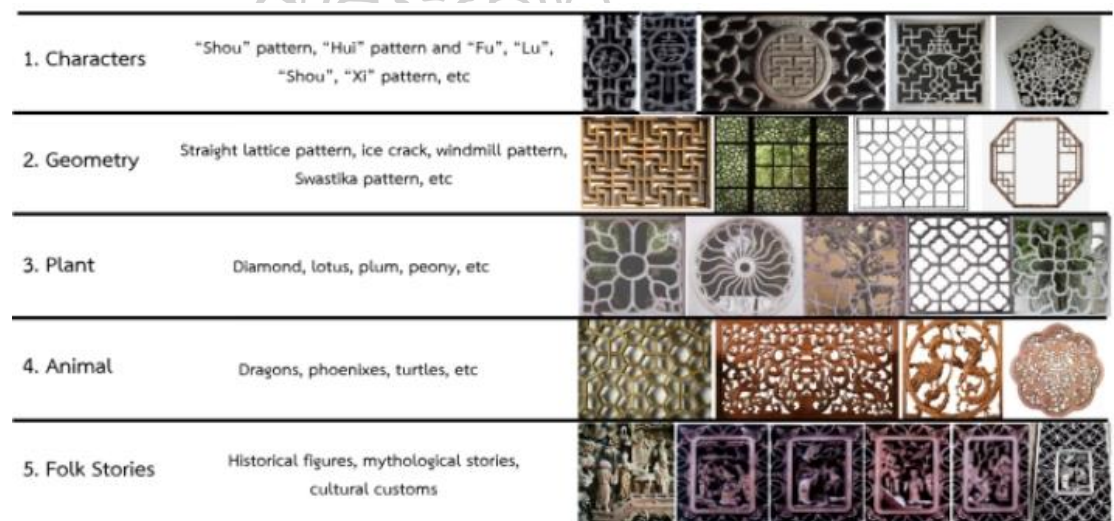


Figure 39. Window lattice pattern decoration

Source: Researcher's diagram. October, 2022

2.12.2 Pattern composition

Repetitive composition

Repetitive composition is an artistic technique in which involves arranging decorative patterns are continuously according to certain rules. Common forms are two-side continuity and four-side continuity. This continuous repetition of visual elements creates rhythm and a sense of harmony in the composition.



Figure 40. Repetitive composition

Source: Researcher's photos. October, 2022

Rotating composition

The rotating composition is based on a central point, around which all elements rotate.



Figure 41. Rotating composition

Source: Researcher's photos. October, 2022

Centripetal composition

The centripetal composition places the main subject in the center of the frame, with elements from different directions gradually converging towards the center, creating a sense of gradual convergence from the outer edges of the frame. This composition effectively attracts the viewer's eye and highlights the main subject.



Figure 42. Centripetal composition

Source: Researcher's photos. October, 2022

Central-emission composition

Central-emission composition is a form of layout in which radiates patterns or elements outwards from the center of the frame. The center point becomes the focus, drawing the viewer's attention and conveying a sense of outward expansion. As shown in Figure 43, the window lattice surrounds the center with various pattern that enhance the richness and vibrancy of the artistic expression.

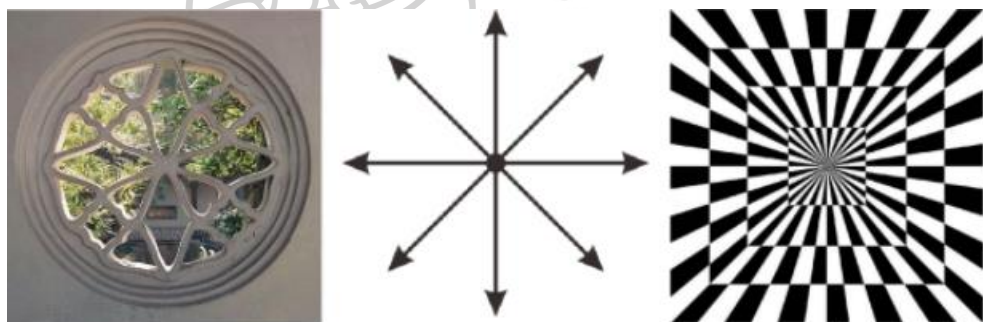


Figure 43. Central-emission composition

Source: Researcher's photos. October, 2022

Scattered composition

Scattered composition refers to the arrangement patterns through the distribution of dot-like elements instead of connecting methods. This composition style is clear and more flexible, not restricted by the outer frame, but determined by the shapes and arrangement of the elements.



Figure 44. Scattered composition

Source: Researcher's photos. October, 2022

2.12.3 Window lattice pattern visual expression

Tangible expression

In pattern design, graphic elements refer to the most basic building blocks of a pattern, often depicted as simple geometric shapes such as lines, dots, planes, and forms. These elements are conceptually the smallest, simplest, and most concentrated units that play a crucial role in the construction of a pattern. These graphic elements can be combined in different colors, shapes, sizes, and directions. By combining and arranging these graphic elements, designers can create various forms and styles of patterns to achieve the desired visual effect. Window lattice patterns are made up of these graphics, and therefore, the different ways in which window lattices are arranged can give people different visual experiences.

Intangible expression

In terms of form, window lattice patterns can break away from their own intricate and complex patterns, and present abstract and concise shapes, making their structural characteristics more modern. The focus is on expressing the texture and grain of the existing materials, using as many simple elements and materials as possible in the design, avoiding too many implied meanings in the shape, and also doing subtracting for innovative thinking and the pursuit of appearance. It is not just about external beauty but also about inner meaning. Rhine Hart once said, "Minimalism does not focus on form, but on a true sense of existence. By using concise, orderly, and holistic logical thinking to connect art with the daily life, and by transforming material interests, the minimalist art concept naturally penetrates into

science, technology, historical context, and human life, thereby showcasing the spiritual significance of the artist."

2.13 Summary

From the above research, it can be concluded that the visual composition of window lattice patterns no fixed rules or limitations. Instead, it can be designed flexibly depending on the designer's creativity, spatial style, functional needs, and aesthetic preferences. The structural rules observed in the visual analysis of window lattice patterns contribute to better preserving the original characteristics of the objects. However, the challenge in the design field is to promote innovation while retaining the traditional pattern features. Therefore, this study will combine visual analysis and explore the evolution of window lattice patterns to enable them to survive in modern society.

Part3: Analyze the application of contemporary ceramic decoration

2.14 The definition of contemporary ceramic art

2.14.1 Definition

Contemporary ceramic art has developed on the basis of traditional ceramics, whose most prominent feature is its practicality. Contemporary ceramic art is an important carrier of modern art, which is not a simple repetition and continuation of tradition, but a liberation from ancient and established process models. It re-examines, explores and develops the essence of ceramics to create a personal artistic expression with a modern spirit. It represents a new visual art form that allows artists to show their creative emotions without constraints and reflect their true selves.

To summarize in contemporary ceramic art involves artists using ceramic materials as the primary medium, away from traditional practical properties, to express the ideals, personality, emotional psychology, consciousness, and aesthetic value of modern individuals. The main focus of this aesthetic value is not on the objective world, but on the inner world of people in contemporary society. Emphasize new methods and forms of expression, visualizing techniques such as

implication, metaphor, symbolism, association, and imagery. These techniques portray the fluidity of human consciousness and the diverse understandings of this world and society (Bai, 1999).

2.14.2 The history and development of contemporary ceramic art

Ceramic art is an artistic concept that refers to products or activities of artistic decoration or creation using ceramics as the main material (Qi, 2010). In the 1940s, a group of Western art experts began to explore the creation of clay and glazes, including Paul Gauguin, Pablo Ruiz Picasso, Auguste Rodin, Henri Matisse, and others. They brought innovative ideas to the field of utility ceramics based on their understanding of painting and sculpture. Paul Gauguin was the first Impressionist expert to enter the field of ceramic art, creating nearly a hundred ceramic works that were consistent with his inherent rough and romantic art style, bringing his rich imagination to full fruition and paving the way for modern ceramics. Another significant figure in the creation of modern ceramics was Pablo Picasso, who drew inspiration from folk pottery and brought forth new artistic design concepts. Since then, ceramics have evolved rapidly around the world, taking on a whole new look and attitude.

Since the 1950s, the modern ceramic art movements in Europe, America, and Japan have had a profound influence. They began to test and practice a completely new way of making ceramics and aesthetics that completely broke with traditional forms, allowing the clay to express itself in an improvised, uninhibited, and free form, resulting in effects such as flaws, cracks, and pores. In Kyoto, Japan, the "Sodei-sha" founded by ceramic artists such as Kazuo Yagi and Osamu Suzuki, advocated that works should completely break away from practicality, emphasizing the artistic and spiritual aspects of creation, and introduced the innovative practices of a new generation of ceramic artists. From then on, ceramic art as an independent art form broke away from the category of practical containers in the fine arts and was linked to new concepts such as modern environmental art. Modern ceramic art began to develop in a diverse and open direction.

Since 2000, with the development of ceramic technology and continuous breakthroughs in molding techniques, ceramic artists have used various mechanical device and tools in the field of ceramic art to improve the level of production technology, explore new clay formulations, try different texture effects, and use computer 3D design, scanning, production, firing methods and other process technologies.

Today, modern ceramics in countries such as China, the United States, Japan, the United Kingdom, and South Korea have developed significantly and formed their own styles and characteristics. Ceramic artists have committed their artistic concepts and thoughts to traditional ceramic production techniques, and have conducted numerous innovative experiments in terms of shaping, materials, decoration, firing, and more. Some artists innovate their work based on tradition, some combine tradition with modernity, and still others abandon tradition and use modern creative concepts to express their work, forming different trends in the development of contemporary ceramics.

2.15 The Intervention of modern design concepts

Modern art refers to a series of art movements and styles that emerged from the late 19th to the mid-20th century, and whose emergence marked the subversion of traditional art concepts and the exploration of new ways of artistic expressions. In contrast to traditional art, modern art places more attention to the exploration of forms, colors, lines and concepts, and artists seek to express their inner world and reflect social reality through innovative methods.

The liberation of artistic concepts not only led to the emergence of new art forms but also blurred the boundaries between traditional arts. Ceramic art and modern art differ in terms of materials, techniques, and modes of expression, but they also influence and overlap. Some modern artists integrate ceramic materials and techniques into their works, merging traditional ceramic art with contemporary art forms, creating new artistic languages and modes of expression, thereby giving rise to a new art form known as contemporary ceramic art (Van, 2006).

Over the past decade, many ceramic artists from around the world have continuously experimented and explored the boundaries of different materials, techniques, and concepts. They have challenged the boundaries of traditional art and even ventured into the realm of avant-garde art. The intervention of modern art, in particular, has had a significantly influenced on the development of contemporary ceramics and the creative work of artists, giving it with new vitality.

In "Ceramic Art Theory" (Qi, 2010), the creative forms entering the contemporary ceramic era are divided into three categories: representation, medium, and free creation. "Representation" refers to artists using ceramic materials and techniques to express personal emotions and intentions through their creations. "Medium" emphasizes the inherent characteristics of ceramic materials themselves and show their aesthetic features as the core content. "Free creation" is a ceramic art form that artists create independently based on their personal ideas and techniques.

In conclusion, contemporary ceramics has developed various ways to express the artists' thoughts, emotions, and creativity under the influence of modern art, and has influenced each other in the historical background.

2.16 Decorative methods of contemporary ceramic

2.16.1 Definition of decorative

The word "decoration" first appeared in China in the 5th to 6th centuries and referred to adornment and dressing up. In the West, it first appeared in the 17th to the 18th centuries and refers to artistic decoration. Decorative art is classified as a form of art that emphasizes aesthetics over functionality. Many artistic creations employ decoration as a means of expressing emotions, conveying culture, or ideas. Ceramic decoration refers to the methods and techniques of artistic treatment of ceramics that can enhance the artistic value of the work.

2.16.2 Ceramic decorative expression

2.16.2.1 Color glaze

The variation in glaze color refers to the natural changes in the color, texture, and material of the glaze on the surface of ceramics caused by temperature

fluctuations during the firing process. As the external material manifestation of modern ceramics, it not only has a decorative function but also serves to protect the surface of the ceramics (Kazuo, 2014). There are many examples of kiln variations in contemporary ceramics, such as Jun porcelain in China, which has the reputation of having "one color in the kiln, ten thousand colors outside the kiln". Its kiln-fired glazes have rich colors and clear glaze layers, and have become an important decorative technique for contemporary artists.



Figure 45. Color glaze

Source: <https://lighthouse-kanata.com/en/artists/yoshiro-kimura/>

2.16.2.2 Clay texture

The texture of clay serves as a ceramic decoration technique that ceramic artists incorporate into their works, presenting them a distinction artistic charm. Traditional decoration methods include techniques such as embossing, carving, and pasting. Artists can use unconscious, random, or naturally occurring textures to express their inner emotions during the creative process (Zeng & Zeng, 2008).



Figure 46. Clay texture

Source: <http://www.ccd2008.com/h-nd-405.html>

2.16.2.3 Special effect of firing

Fire is an inevitable product of human social development, and the firing of ceramics is closely related to fire. Fire is an uncertain factor, so the results it creates are often an abstract and unpredictable form of language (He, 2008). With the development of technology, ceramic artists have become very adept at controlling the temperature and techniques of firing ceramics. Firing methods such as raku firing, salt firing, pit firing, and wood firing can create different firing effects and have become unique decorative techniques for ceramic artists.



Figure 47. Firing effect of different methods

Source: <https://www.alexmandli.com/work/pit-pottery.html>

2.16.2.4 Traditional painting techniques

Decorative techniques such as blue-white, overglaze, and underglaze play an important role in traditional ceramic decoration. In these traditional methods, various painting materials are used to depict and color the surface of ceramic objects, with the process being completed during firing. With the progress and development of the times, artists have combined these techniques with contemporary ceramic art, to break through the limitations of tradition and create innovative artistic forms.



Figure 48. Traditional decorative techniques

Source: <http://www.jdztc.com/llt/ktsh/wzzz/2014/04/12/12093625320.html>

2.16.2.5 Composite materials

When using composite materials, ceramics are combined with other materials to create a new artistic form. Artists use the uniqueness of these mixed materials in their creations, aiming to give their works more innovation and a more accurate expression of the author's feelings and thoughts. In contemporary ceramics, composite materials such as wood, glass, metal, and more. As shown in Figure 49, it is the "Net Series" by Chinese ceramic artist Huang Huanyi. The works are created using metal and ceramic materials as media. They express an understanding of the complex relationship between aesthetic concepts and innovative expression, presenting a unique artistic expression.



Figure 49. The combination of ceramics and metals

Source: <http://www.cjicb.com/hd20220214-ty.html>

2.16.2.6 Open light decoration

The art of "Open light" in ceramics has similarities with the art of "borrowing scenery" in art of classical Chinese gardens and is a technique of traditional ceramic decoration. This technique refers to the use of lines to outline circular, square, and diamond shaped frames in the main decorative areas of objects, to paint and decorate them within these frames.

Opening light originated from window design in ancient architecture, which is a technique that incorporates window shapes into ceramic decoration and becomes a fixed form (Wang, 2000). In open light decoration, a specific shaped decorative space is left in a certain area of the object, and then patterns are drawn in this area to enrich the decoration of the object. This technique enriches the decoration of the

object, highlights certain images, and enhances the decorative effect through strong contrasts and a blend of stillness and motion.



Figure 50. Open light in ceramic painting
Source: Researcher's photos. November, 2022



Figure 51. Open light in ceramic art
Source: Researcher's photos. November, 2022

2.17 Expression carrier of contemporary ceramic decoration

Contemporary ceramic decoration is divided into three types of expression carriers: flat expression, relief expression and three-dimensional expression.

2.17.1 Flat expression carrier

In contemporary ceramic decoration, the most representative form of flat expression is public ceramic murals, which often has decorative or commemorative purposes. Ceramic decoration is expressed through a two-dimensional plane and does not occupy three-dimensional space.

The artwork in Figure 52 is a passageway located in Amsterdam Central Station, designed as an art corridor by the architectural firm, Benthem Crouwel Architects. The tunnel is completely covered with ceramic tiles, and the designers have used colors to create a sense of visual depth. The blue and white tones create a contrast that is reminiscent of the sky and the sea. Additionally, cold lighting is also used to make the entire crowded corridor visually spacious.



Figure 52. Tunnel murals in Amsterdam

Source: <https://www.topscene.com.tw/news/323>

2.17.2 Relief expression carrier

Relief expression in ceramics is a technique of presenting works by carving or forming raised images on the surface of ceramics. This expression gives the ceramic works a three-dimensional impression and enriches the texture effects.

The ceramic work "Box of Life" by Zhu Legeng as shown in Figure 53, consists of tens of thousands of white ceramic pieces. The entire work has a coral like texture and shows a constantly changing light and shadow effect. It has a strong visual impact that evokes a sense of the inner power of life.

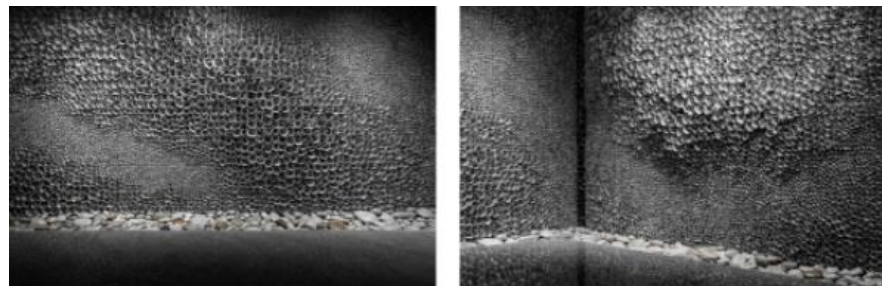


Figure 53. China, Zhu Legeng, *Box of Life*

Source: <https://news.artron.net/20210717/n1098504.html>

2.17.3 Three-dimensional expression carrier

The three-dimensional expressions of ceramics differ significantly from the flat and relief, often presented in sculptural forms. In the book "Ceramic Sculpture", ceramic sculpture is positioned as ceramic or porcelain as a material to shape visible and touchable solid three-dimensional art image, is a reflection of social life, humanism, with independent aesthetic characteristics and aesthetic ideals of a form of art, which carries the spiritual connotation of mankind, expresses the creator's own thoughts and feelings (Zhang et al., 2005).

As shown in Figure 54, the work in question is of "Treasure Connoisseur" by Chinese artist Lv Pinchang. It is a sculpture that combines his personal likeness with broken pieces of antique porcelain. The artwork reflects the artist's knowledge of both traditional and contemporary art who is an expert in antiques. The artist has collected various pieces of old porcelain and created a unique visual space through specific arrangements and combinations. The ceramic artwork that touches the viewer is not the creator behind the work, but the specific space site and humanistic background. If the work is detached from the space it need, then the tension displayed is diminished.



Figure 54. China, Lv Pinchang, *Treasure connoisseur*

Source: <http://www.cjicb.com/Lyu-Pinchang.html>

2.18 Analysis of contemporary ceramic decorative application

2.18.1 Morphological composition

Repetitive composition

As shown in Figure 55, this is a basic form of decoration in which a basic shape is repeated in a regular pattern, with variations in direction and position. This

composition has a strong sense of form and is widely used in contemporary ceramic decoration. The repetitive composition design arranges shapes of the same size in a regular pattern according to a specific direction.

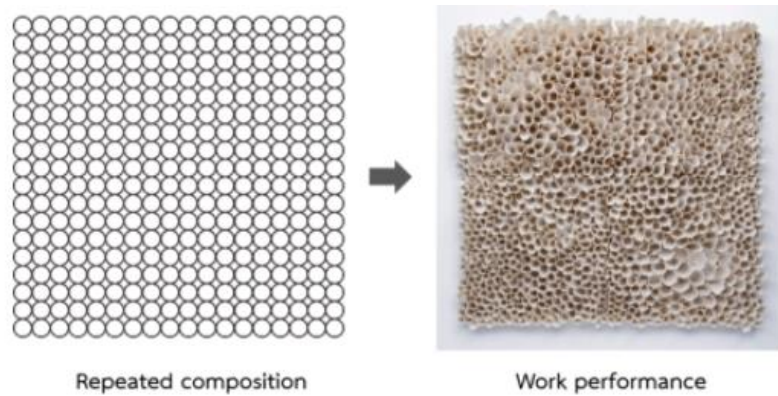


Figure 55. Repetitive composition

Source: Researcher's photos. November, 2022

Color gradation

Gradient composition refers to a gradual and regular sequence of changes in a basic shape in which the colors change in a specific path and direction from dark to light. The ceramic artwork in Figure 56 is an example of gradient composition in which the colors gradually change from light to dark in an ascending and descending pattern, creating a sense of rhythm and harmony in the work.

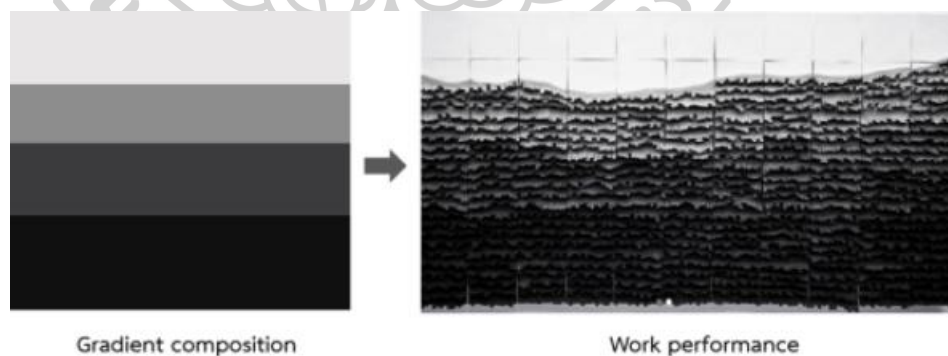


Figure 56. Color gradation composition

Source: Researcher's photos. November, 2022

Specific composition

Specific composition means that the order of the compositional elements in an ordered relationship, is deliberately broken by emphasizing some individual elements to break the regularity and create a sense of surprise in the work, highlighting the beauty of the theme. As shown in Figure 57, the same elements are arranged in a combination, with white as the main color, and the blue highlighted the middle, breaking the rules of the whole composition and creating a striking effect.

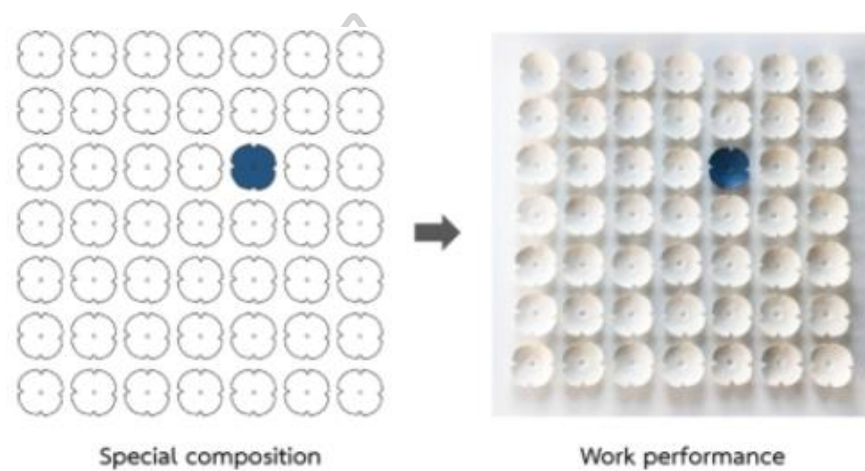


Figure 57. Specific composition

Source: Researcher's photos. November, 2022

Similar composition

Similar composition form refers to the abundant presence of multiple basic shapes in a similar structure, creating a visually consistent yet varied overall impression. This composition allows for variations in color, texture, size, and shape. In Figure 58, each element primarily features a circular form with slight differences that, when combined with color variations, result in a richer and more appealing overall effect.

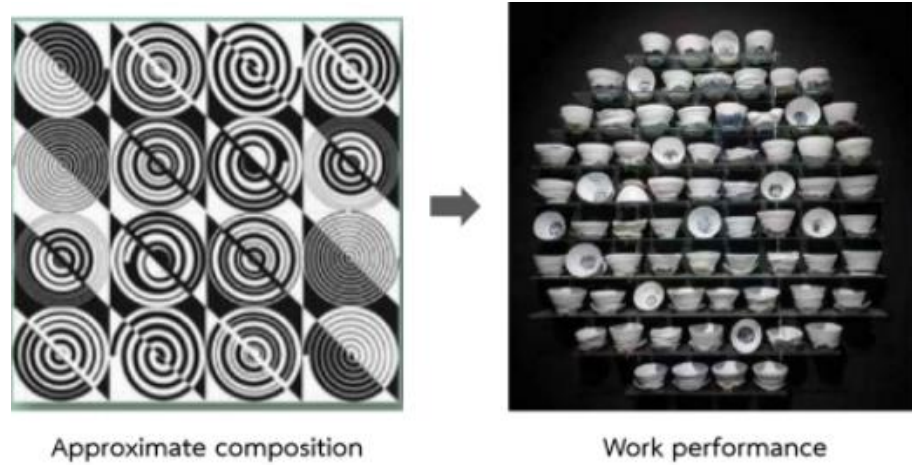


Figure 58. Similar composition

Source: Researcher's photos. November, 2022

2.18.2 Display method

In the late 19th century, the British art critic Clive Bell proposed the theory of "significant form". He believed that "in different works, the composition of lines, colors, and the relationship between forms can stimulate our aesthetic emotions. These aesthetic forms of the relationship and combination of lines and colors I call 'significant form'. It is the common property of all visual arts (Ross, 1984)." His theory aims to reveal that when the forms and elements of a work are arranged in a unique way, the "significant form", it can dominate the work and stimulate the audience's aesthetic emotions.

The artist designs and fires ceramic components, and then combines them various methods such as hanging in space, multiplying in quantity, arranging in order, and stacking to give them a visually significant form. In the display space, the artist shapes the form of the work and creates a space for reflection for the participants.

The intervention of modern art has precisely opened up new creative methods and new ceramic language styles for artists. The display method of free combination of ceramics completely breaks through the boundaries of ceramic materials in the works. The display technique also makes the presentation and expression of contemporary ceramics more intuitive and visually impressive. For example, by extensively duplicating a single image and arranging them in a space, a

spectacular scene is presented, which visually conveys a deep and shocking impression.

Some artists also use methods such as suspension and assembly to create works with complex changes in form and a stronger sense of space. In the process of spatial shaping in ceramic artworks, careful consideration is required for the use of each element and symbol, by various aspects such as form, color need to be carefully designed and combined in order to create a significant work of art (Peterson & Peterson, 2009).

2.19 Application of window lattice patterns in contemporary works

The application of window lattice patterns has enriched and diversified the forms of contemporary art expression. Due to the widespread application of various decorative techniques in window frames, the forms of expression and aesthetic experience are also constantly changing (Gao & Zhao, 2013).

Researchers have collected a large number of works on the theme of window lattice in contemporary art, analyzed the creative ideas, molding techniques, and use of comprehensive materials by different artists. Summarizing the artist's innovative points and design concepts in excellent work examples provides researcher with the necessary ideas and methods to create decorative art using ceramics as carriers.

Case study 1

As shown in Figure 59, this work chooses a window lattice structure as the background, combined with ceramic painting as the central pattern, revealing an elegant and implicit beauty. Visually create the effect of viewing the scenery inside the window. This work has a strong Chinese style, and on the basis of capturing traditional elements, a new thinking is conducted.



Figure 59. Decorative works with hanging paintings

Source: <https://m.tb.cn/h.4LrwMKm?sm=d91bac>

Case study 2

The *Window Series* works are created by the artist Wang Jianzhong with glass material. The works are deeply familiar with the spirit of traditional Chinese culture in the treatment of modeling, skillfully use some patterns or symbols in ancient modeling, and integrate the sense of history with modern artistic expression. The work is not only the construction of a new image, but also contains rich cultural connotations and re-examination of traditional culture.

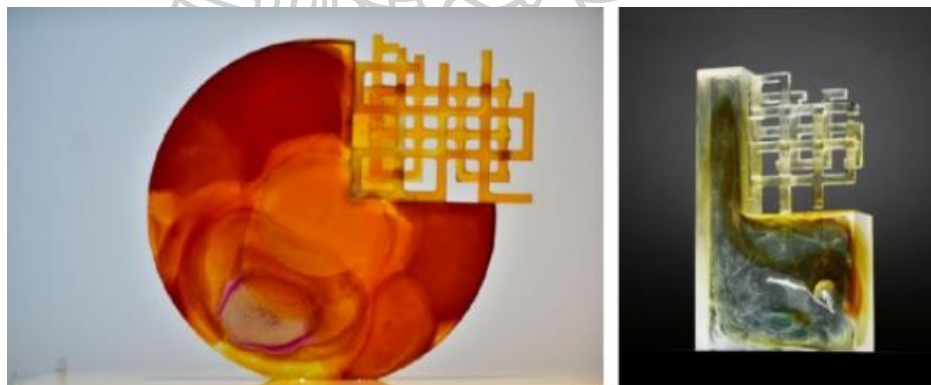


Figure 60. China, Wang Jianzhong, *Window Series*

Source: <https://wangjianzhong.artron.net/works>

Case study 3

The ceramic sculpture works *Window Scenery* by Shen Dongning's depicts the inner scenery of the heart through the changes of the mountains and the hollow

window lattice. The design language of the work contains elements of Chinese cultural symbols, which the artist integrates into the decoration and structure of the work, to guide the viewer's visual perception and evoke a spiritual resonance. This three-dimensional sculpture is constructed in the form of painting and decoration. It merge the inner landscape with the artistic creation and providing viewers with infinite an imaginative space.



Figure 61. China, Shen Dongning, *Window Scenery*
<http://www.tzefan.org.tw/img/Invit/706/1.html>

Case study 4

As shown in Figure 62, *Endless Window* is a work by Malaysian artist Pamela Tan. Inspired by the traditional Chinese window lattice motifs, the work is a colorful and intricate graphic design that constructs a cavernous tunnel through which light penetrates to create the atmosphere of walking under the tunnel, as if the visitor is transported back to the golden age of Kuala Lumpur's Chinatown in the 1960s, where the tunnel connects the past with the future.



Figure 62. Malaysia, Pamela Tan, *Endless Frames*

Source: <https://www.hhlloo.com/a/Endless-Frames.html>

Result: By studying the creative practices of artists working with window lattice as the theme, the researchers have gained some understanding of the creative concepts of these artists' works. Window lattice has various forms of expression in contemporary design, such as sculpture, glass, painting, colored glaze, and carving. These different methods of expression provide a clear understanding for the study of modern ceramic decoration creative design.

Creating art requires observing and understanding the works of many artists, absorbing advanced aesthetic concepts, and continuously improving techniques, in order to provide sufficient practical basis for creative researchers to create related works.

2.20 Summary

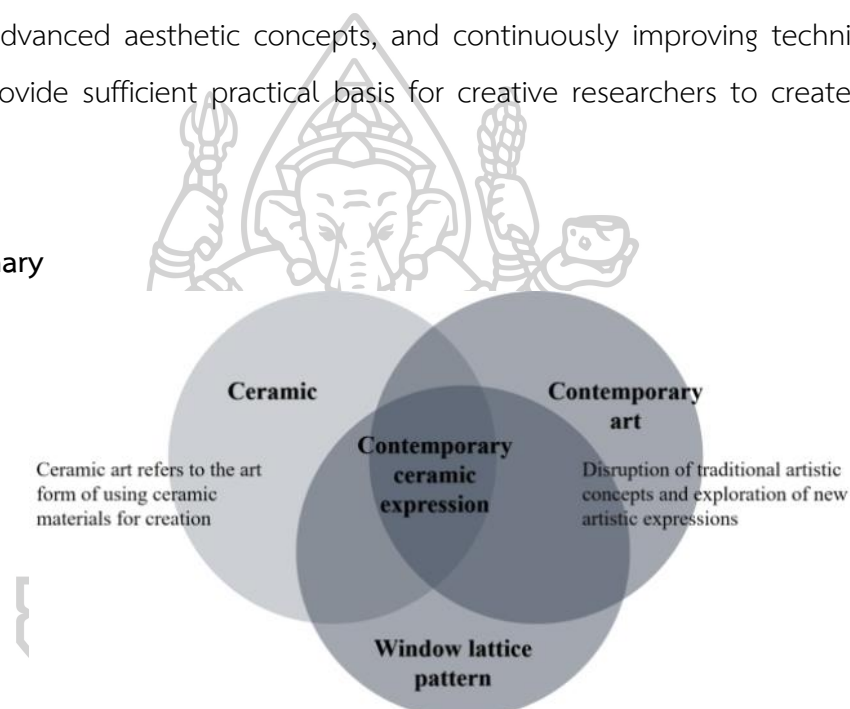


Figure 63. Contemporary ceramic expression

Source: Researcher's diagram. March, 2023.

At the present stage, traditional Chinese patterns have been closely integrated with contemporary design, and their presence can be observed in many art exhibitions. Ceramic materials, as a common material in our daily life, are closer to life compared to other art media, emphasizing innovation and modernity. Through the combination of ceramic decoration and window lattice patterns, they provide a wide design space and expressive methods for their development and innovation.

2.21 Conclusion of chapter 2

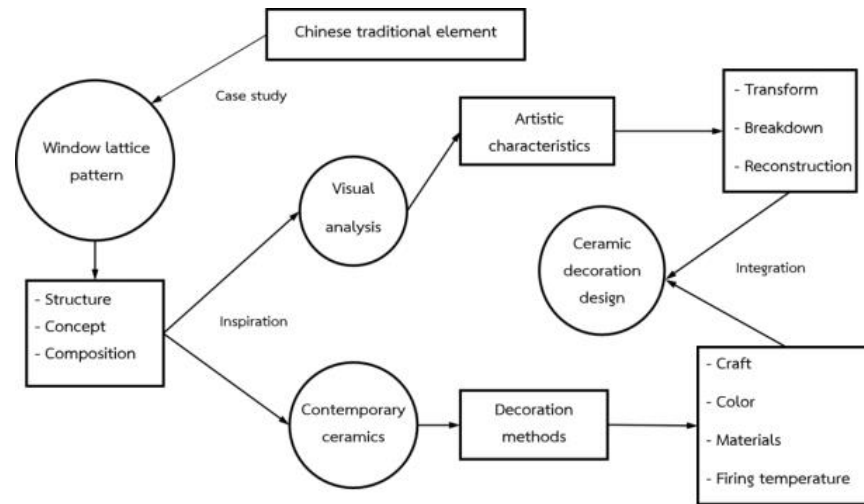


Figure 64. Analysis and development flowchart of window lattice patterns

Source: Researcher's diagram. March, 2023.

It is clear the above research that traditional patterns require innovation, but innovation is not simply copying, it's meeting the aesthetic demands of modern society for visual communication. By relying on the aesthetic taste of modern society, absorbing advanced design concepts and scientific technology, keeping up with the trend of the times, traditional patterns can maintain their original characteristics while presenting certain characteristics of the times. Nowadays, the inheritance and promotion of traditional Chinese culture has become a social focal point, which has prompted more and more designers to explore how to develop and apply traditional patterns in contemporary design. It can be seen that exploring and studying the development and expressions of traditional patterns is of great practical significance for the innovative application of contemporary ceramic decoration design.

Chapter 3

Research Methodology

3.1 Introduction

This chapter focuses on the research methods of analyzing and exploring window lattice patterns in traditional Chinese elements, as well as the forms and philosophical meanings that these patterns represent after their development applied to contemporary ceramic decoration design, with the aim of promoting the research methods and creative process of traditional Chinese patterns. Researchers have collected a large amount of data through literature, case studies, and field research and conducted a systematic study on Chinese window lattice patterns and ceramic decorative design. This demonstrates the researchers' creative thinking and processes and provides the readers with further valuable references.

The researcher divides this chapter into the following four phases. As shown in Figure 65.

Phase 01: Quantitative research

Its purpose is to verify the research scope of window lattice patterns and their research value in contemporary ceramic decoration design.

Phase 02: Data collection

To establish a theoretical basis for the in-depth exploration of window lattice patterns and explore their potential for contemporary ceramic decoration design

Phase 03: Experiment

Test the clay, glaze, colors, and firing temperatures of ceramics to provide a practical foundation for creative works.

Phase 04: Design process

Explore the possibilities of combining ceramic materials and decorative techniques in window lattice patterns, research and developing new visual languages and aesthetic values.



Figure 65. Research methodology

Source: Researcher's diagram. December, 2022

3.2 Quantitative research

3.2.1 Research purpose

Before conducting research on window lattice patterns, it is crucial to conduct initial questionnaire surveys. The research at this stage aims to evaluate the participants' cognitive level of traditional Chinese architectural areas, their understanding of window lattice patterns, and their recognition level. By analyzing these three basic dimensions and conducting quantitative analysis, the aim is to verify the research scope of window lattice patterns and their research value for contemporary ceramic decoration design.

3.2.2 Questionnaire analysis

In this study, an online questionnaire survey was used to obtain information on the topic. According to statistics, a total of 168 valid sample data were collected (with approximately 189 participants and an invalid questionnaire rate of 11.1%).

The online survey method has its advantages and disadvantages. The advantages include its eco-friendly, speed, wide geographical range and even age

distribution. However, the disadvantage is that there are doubts about the credibility of the data source, and that some participants provide untrue information to save time, which means that some questionnaire results do not truly reflect the thoughts and states of the participants.

| Online questionnaire survey | |
|--|---|
| Advantage | Disadvantage |
| Eco-friendly, speed, wide coverage and even age distribution of the surveyed | Sample bias, technological dependence, data authenticity. |

Table 2. Advantages and disadvantages of online questionnaire survey

Source: Researcher's Table. December, 2022

3.2.3 Questionnaire investigation

All participants were surveyed online.

| | Gender | | Age | | | | | China region | | |
|---------------------------------|--------|--------|-------|-------|-------|-------|-----|--------------|-------|---------|
| | Male | Female | 0-18 | 18-25 | 25-35 | 35-45 | >45 | North | South | Central |
| Number of people (unit: person) | 60 | 108 | 45 | 42 | 48 | 28 | 5 | 54 | 56 | 58 |
| | 35.7% | 64.3% | 26.8% | 25% | 28.6% | 16.6% | 3% | 32.1% | 33.3% | 34.6% |

Table 3. Basic information to participate in the survey of 168 persons

Source: Researcher's Table. December, 2022

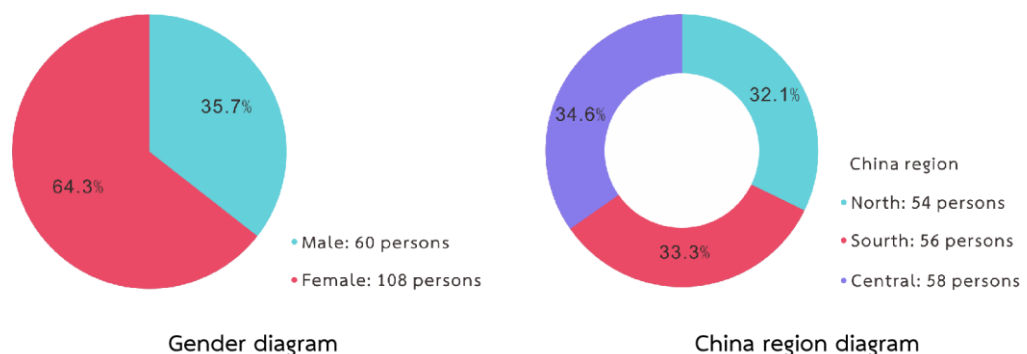


Figure 66. Gender and regional distribution diagram

Source: Researcher's diagram. December, 2022

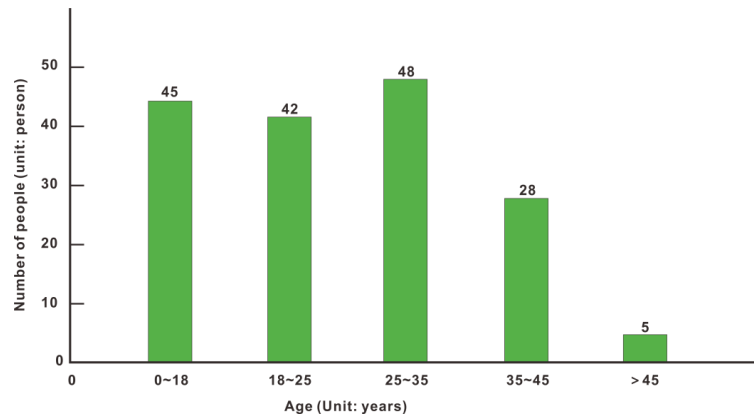


Figure 67. Age distribution diagram

Source: Researcher's diagram. December, 2022

A total of 168 valid participants were surveyed, with WeChat users being main source of participants. Among them, there were 60 male users, accounting for 35.7%, and 108 female users, accounting for 64.3%. The age group is mainly composed of young people, with a total of 45 users under the age of 18 years old, accounting for 26.8%, 42 users aged between 18 and 25 years old, accounting for 25%, and 48 users between the ages of 25 and 35 years old, accounting for 28.6%. The regional (hometown) locations of the participants were diverse and evenly distributed.

3.2.4 Result evaluation

After collecting 168 questionnaire data, the results are statistically analyzed. Summarizing the answers of all questionnaires, the following conclusions can be drawn, which will provide important information for further research.

1. Participants understanding of symbols in traditional Chinese architecture.

After analyzing the data, the researchers found that the participants had a profound impression of the Ming and Qing dynasties among the different historical periods of traditional Chinese architecture. These two eras were found to be highly representative of the significant international influence on traditional Chinese architecture, accounting for 35.1% and 37.5% respectively. Particularly, the Suzhou Gardens and the Forbidden City in Beijing were most familiar and favored by the

participants. Based on these results, the researchers decided to focus on this study of window lattice patterns in these specific regions.

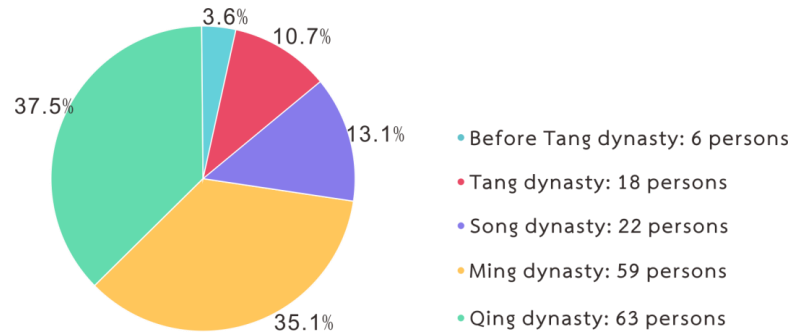


Figure 68. Analysis of participants' preferences for traditional Chinese architectural

Source: Researcher's diagram. December, 2022

2. Analysis of participants' understanding of window lattice patterns in Chinese architecture

Among the 168 people surveyed, 72% of the participants stated that they have heard of window lattice patterns and have some understanding, totaling 121 people. 50% of the participants stated that they had seen works with window lattice patterns design, totaling 84 people, and 53 people were interested in it, accounting for about 63%. The data indicates that a significant proportion of participants are initially unfamiliar with the concept of window lattice design, but once they understand it, they develop interest. This suggests promising prospects for the application and development of window lattice patterns, and provides a valuable foundation for further specific experimentation.

3. What features of the window lattice are recognized and applied in the design? (multiple choice)

As shown in Table 4, participants are more likely to prefer the redesign of window lattice patterns, adopt the pattern with the beautiful connotation, and use the hollowed out performance. In contrast, they have less need for color applications.

| Element | Number of people (unit: person) | Percentage | Ranking |
|--------------------------|------------------------------------|------------|---------|
| Redesign of patterns | 139 | 82.7% | 1 |
| Connotation | 114 | 67.9% | 2 |
| Hollowed out performance | 106 | 63.1% | 3 |
| Color application | 62 | 36.9% | 4 |






Table 4. Selection of window lattice pattern features

Source: Researcher's Table. December, 2022

4. The level of recognition of window lattice patterns by the participants (Multiple choice)

In order to comprehensively understand the participants' level of recognition regarding window lattice pattern features, the researchers decided to use a wide range of sample sources. Xu Huacheng's book "Traditional Chinese Door and Window Woodcarvings (Xu, 2010) provided a comprehensive and systematic description of the development, types, and categorization of window lattice patterns in traditional Chinese architecture. This work is widely cited in academic circles and is regarded as an authoritative account of the various characteristics of window lattice patterns and the esthetic and cultural symbolism in traditional architecture.

From the literature, researchers have mainly extracted two group of experimental patterns: one focused on the outer frame of window lattice patterns, the other on the inner structure.

| Window frame | | | | |
|---|---|---|--|---|
|  |  |  |  |  |
| Rectangle A1 | Rectangle A2 | Rectangle A3 | Pentagon A4 | Hexagon A5 |




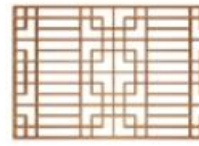





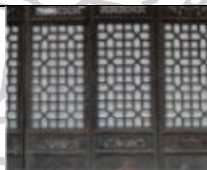












| | | | | |
|---|---|---|--|---|
|  |  |  |  |  |
| Octagon A6 | Circle A7 | Elliptic A8 | Cloud A9 | Flower A10 |
|  |  |  |  |  |
| Fan-shape A11 | Diamond A12 | Begonia A13 | Pomegranate A14 | Leaf A15 |

Table 5. The first group of window frame
Source: Researcher's Table. December, 2022

| Lattice structure | | | | |
|---|---|---|--|---|
|  |  |  |  |  |
| Straight lattice1 B1 | Straight lattice2 B2 | Straight lattice3 B3 | Crack1 B4 | Crack2 B5 |
|  |  |  |  |  |
| Windmill B6 | Rectangle B7 | Turtle back B8 | Hexagon B9 | Flower1 B10 |
|  |  |  |  |  |
| Flower2 B11 | Flower3 B12 | Flower4 B13 | Flower5 B14 | Flower6 B15 |
|  |  |  |  |  |
| Geometry1 B16 | Geometry2 B17 | Fish-scale B18 | Curve B19 | Overlay1 B20 |

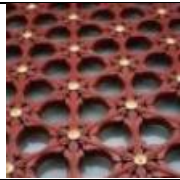
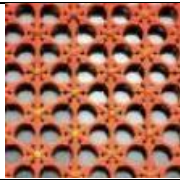
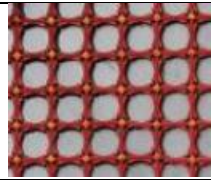


| | | | | |
|---|---|---|--|---|
|  |  |  |  |  |
| Overlay2 B21 | Overlay3 B22 | Overlay4 B23 | Overlay5 B24 | Overlay6 B25 |

Table 6. The second group of window lattice structure

Source: Researcher's Table. December, 2022

The results are as follows:

| Window frame | | | |
|---------------|------------------------------------|---------------|------------------------------------|
| Sample number | Number of people (unit: person) | Sample number | Number of people (unit: person) |
| A1 | 65 | A10 | 21 |
| A2 | 40 | A11 | 33 |
| A3 | 54 | A12 | 29 |
| A4 | 10 | A13 | 13 |
| A5 | 25 | A14 | 15 |
| A6 | 82 | A15 | 8 |
| A7 | 63 | | |
| A8 | 18 | | |
| A9 | 47 | | |

Table 7. Window frame sample survey

Source: Researcher's Table. December, 2022

| Lattice structure | | | | | |
|-------------------|------------------------------------|---------------|------------------------------------|---------------|------------------------------------|
| Sample number | Number of people (unit: person) | Sample number | Number of people (unit: person) | Sample number | Number of people (unit: person) |
| B1 | 98 | B10 | 85 | B19 | 35 |
| B2 | 93 | B11 | 55 | B20 | 16 |

| | | | | | |
|----|-----|-----|----|-----|-----|
| B3 | 39 | B12 | 72 | B21 | 27 |
| B4 | 105 | B13 | 44 | B22 | 54 |
| B5 | 43 | B14 | 26 | B23 | 70 |
| B6 | 57 | B15 | 19 | B24 | 68 |
| B7 | 46 | B16 | 55 | B25 | 116 |
| B8 | 58 | B17 | 42 | | |
| B9 | 18 | B18 | 76 | | |

Table 8. Lattice structure sample survey

Source: Researcher's Table. December, 2022

After evaluating the participants' recognition rates for the different window lattice, here are the top patterns that were most frequently selected by each group. The following represents the statistical results for the window lattice patterns.



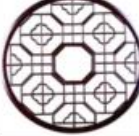







| | | | | |
|---|---|---|--|---|
| The first group result | | | | |
|  |  |  |  |  |
| Octagon A6 | Rectangle A1 | Circle A7 | Rectangle A3 | Cloud A9 |
| The second group result | | | | |
|  |  |  |  |  |
| Overlay6 B25 | Crack1 B4 | Straight lattice1 B8 | Straight lattice1 B10 | Fish-scale B18 |

Table 9. Summary results

Source: Researcher's Table. December, 2022

Based on the survey data regarding the recognition level of each window lattice pattern sample by the participants, the research scope can be further narrowed down. The window lattice patterns with the highest recognition rates can

be retained, and this information can be reflected in practical design schemes, serving as a guiding direction for the design.

3.3 Data collection methods

1. Collect data from books, articles, research, electronic documents, and websites.

2. Through direct observation of records, such as questionnaires, photographs, and videos. The data was analyzed using the percentage analysis method from the questionnaire.

According to the information collected, although the content of the pattern is in different the form of composition is also regular and can be categorized into three types:

1. Line composition the window lattice of one or more horizontal, vertical, oblique, and other straight lines of the pattern. These include the ice crack pattern, the straight lattice pattern, and the windmill pattern.

2. The composition of geometric patterns refers to the repetitive arrangement of one or more geometric shapes according to certain rules. Some also make minor changes to make the window lattice patterns more decorative, such as the turtle back patterns, the diamond patterns, and the plum blossom patterns.

3. The form of complex geometric shapes, also known as graphic overlay, refers to several geometric shapes overlapping each other to form another more complex pattern, which is then repeated and replicated to form visually rich window lattice patterns, such as the three intersections and six circles pattern, the double intersections and four circles pattern, and the coin patterns.

3.4 Data analysis

3.4.1 Window lattice structure breakdown

Breakdown the pattern based on the structure and composition of the window lattice, extracting the core motif. Analyze the pattern from the perspective of points, lines, and surfaces, then arrange the pattern. Optimize the design of the pattern based on the characteristics of the window lattice.

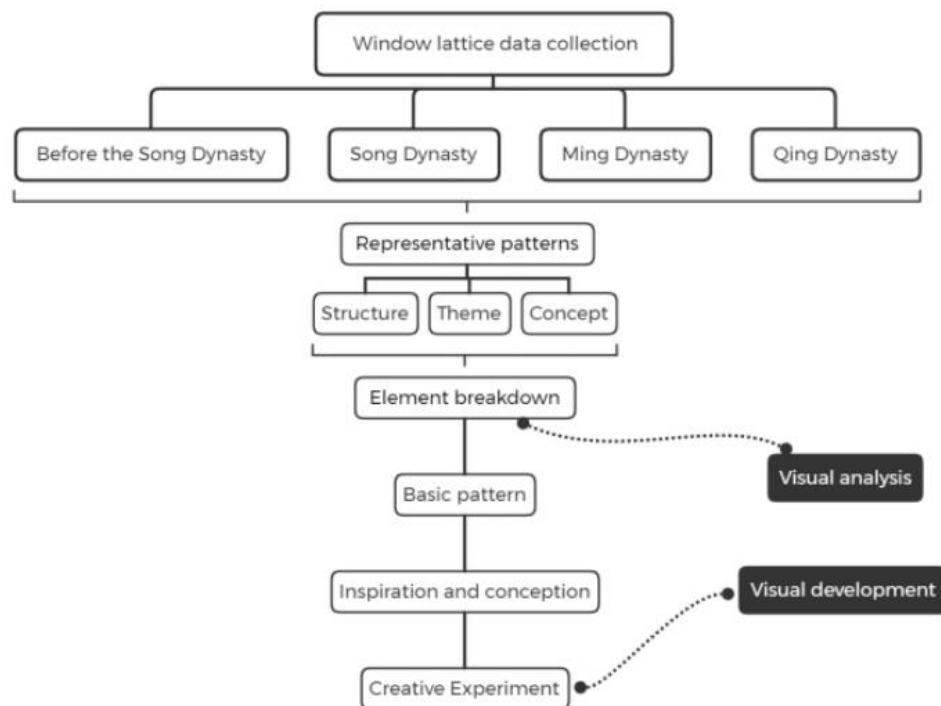


Figure 69. The research framework of window lattices

Source: Researcher's diagram. December, 2022

Case study on coin patterns from window lattice, this pattern is similar in shape to ancient Chinese copper coins and has evolved and developed from them. It has a beautiful meaning of wealth and prosperity. The composition is often arranged in two or four sided continuity, and is also depicted as an image of circles intersecting in pairs, which have a strong decorative value.

Based on the structural characteristics of window lattice coin patterns, first break them down into individual outlines, and then further deconstruct these outlines to determine the core pattern. Visual analysis, lattice hollow part of window and the solid parts are in a "positive" and "negative" relationship, can transform each other. Finally, it is through the window lattice visual effect. Analyzing the window lattice core pattern from multiple perspectives yields a more comprehensive design elements.

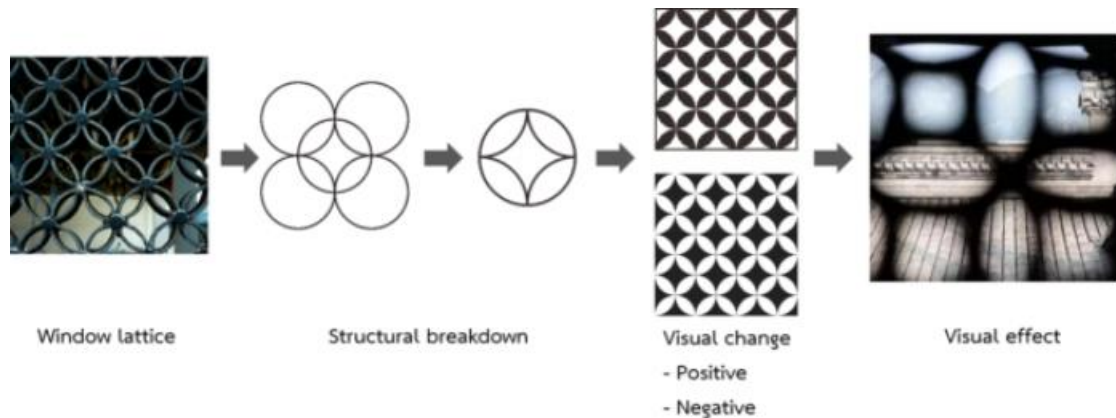


Figure 70. Breakdown process of window lattice

Source: Researcher's photos. December, 2022

3.4.2 Structural analysis of the line

The window lattice with line decoration structure is one of the most common forms, usually consisting of straight lines and curves, with simple shapes but numerous combination styles. The changes in the lines result in different patterns, making linear geometric patterns an indispensable design element in the window lattice.

As shown in Table 10, the breakdown patterns and structures of the window lattice composed of lines can create a visually diverse effect.

| Structure Type | Original window | Structure | Basic pattern | Visual change |
|--------------------|-----------------|-----------|---------------|---------------|
| Straight lattice | | | | |
| Crack pattern | | | | |
| Fish-scale pattern | | | | |

Table 10. Structural breakdown of line window lattice

Source: Researcher's December, 2022

3.4.3 Structural analysis of the geometry

The geometric decorative structure of the window lattice uses various simple geometric shapes, such as lines, circles, triangles, rectangles, and polygons, or combinations of these. This decoration method is simple and exquisite, suitable for various environmental styles, and presents a Chinese aesthetic and artistic atmosphere.


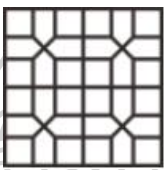







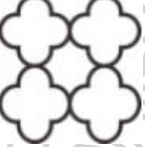






| Structure Type | Original window | Structure | Basic pattern | Visual change |
|----------------------|---|---|---|---|
| Turtle back pattern |  |  |  |  |
| Rhomboid pattern |  |  |  |  |
| Plum blossom pattern |  |  |  |  |
| Hexagonal pattern |  |  |  |  |

Table 11. Structural breakdown of geometric window lattice

Source: Researcher's Table. December, 2022

3.4.4 Structural analysis of the graphical overlay

The form of graphic overlay refers to the overlapping of graphics to form a different, more complex pattern. The most striking and artistic effect among them is the window lattice with double intersections and four circles as well as three intersections and six circles pattern.



Figure 71. The composition of the graphical overlay form

Source: Researcher's photos. December, 2022

Double intersections and four circles pattern

Taking the window lattice pattern of the Palace Museum of Accumulated Purity in Beijing as an example, CorelDraw software was used to draw the detailed analysis process of the double intersections and four circle window lattice structure, as shown in Figure 72.

Step 1: According to the graph, it can be observed that the window lattice pattern is composed of several diamond squares. The researchers selected a diamond pattern for analysis and connected the vertices ABCD in sequence based on the pattern.

Step 2: Connect the vertices of the diamond ABCD to obtain the line segments AC and BD, with the midpoint of intersection being E.

Step 3: Draw a vertical line from the center point E of the diamond towards the AC line segment, where the foot perpendicular to F.

Step 4: Draw a circle with E as the center and EF as the radius to obtain a diamond Inscription circle, forming the most basic inner structure.

Step 5: Obtain the most basic shape from the above steps, obtain the most basic shape. The window lattice style of the Palace of Accumulated Purity is decorated on this shape. For example, the line segment AD has made rich changes within the basic graphic structure.

Step 6: Based on the structural figure G, repeat the changes from step 5 for each line segment to obtain the figure H, and arrange them repeatedly to form the final figure I.

Step 7: This step is based on the repeated arrangement of the basic graphic structure G to form a pattern, which provides for a more intuitive observation of the structure of the window lattice, the structural relationship between the hollow part of the lattice and the solid part of the lattice, presents a visual effect of virtual and real patterns.

Structure Type A

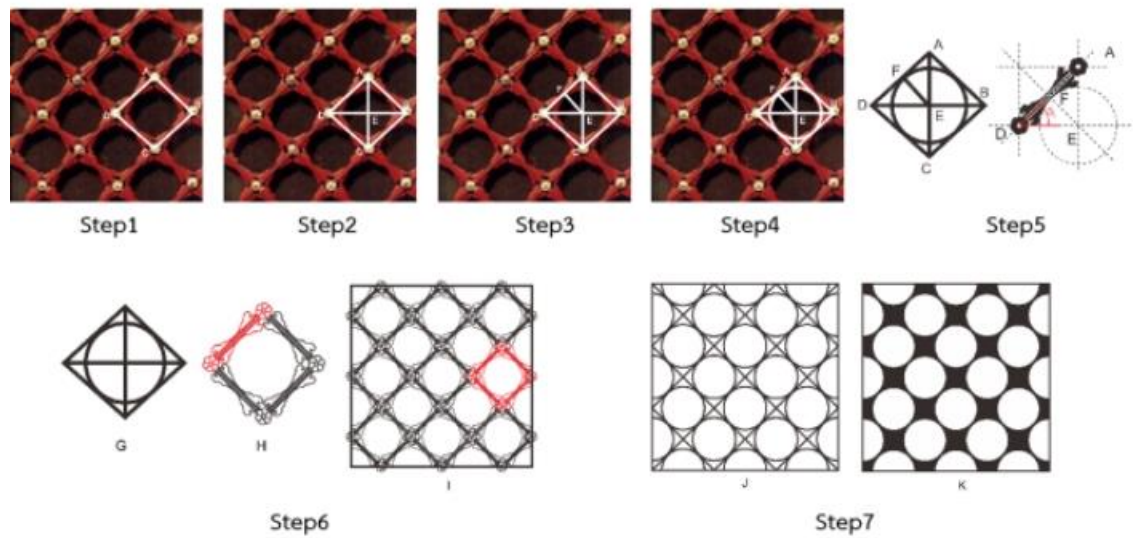


Figure 72. Analysis process of double intersections and four circles pattern
 Source: Researcher’s photos. February, 2023.

Based on the above method, the same research method was used to analyze other double intersections and four circles pattern.

| Structure Type | Original window | Structure | Basic pattern | Visual change |
|----------------|-----------------|-----------|---------------|---------------|
| B | | | | |
| C | | | | |

Table 12. Structural breakdown of graphical overlay window lattice

Source: Researcher’s Table. February, 2023.

The double intersections and four circles window lattice pattern in the Forbidden City can be divided into three styles: A, B, and C, as shown in Table 12. There are two types of structural combinations: orthogonal and oblique. The window

lattice style shown in Figure C is also known as coin pattern window lattice. It is used in the Hall of Mental Cultivation and the Hall of Devoted Esteem in the Forbidden City. The circular rings are nested inside each other. Each ring has carved lines on the inside, positioned on the inside of each petal, enriching the pattern content, and enhancing the visual effect. The joints between the circles are fixed with diamond-shaped nails the position of a quarter. The structural combination of the double intersections and four circles window lattice belongs to a grid composition, with even sized and regularly arranged hollow spaces.

Three intersections and six circles pattern

Taking the Hall of Supreme Harmony of the Forbidden City as an example, CorelDraw software was used to draw graphics to illustrate the structural analysis process of window lattice patterns in detail, as shown in Figure 73.

Step 1: Observe the window lattice pattern, which is based on a single shape and involves a large number of repeated arrangements. Therefore, researchers need to analyze the basic graphics of the pattern. Use CorelDraw software to redraw the shape, with A as the center and the distance between AB as the radius.

Step 2: Observe the figure. There are 6 segments within the circle. So, segment AB rotates 60° with A as the center and repeats 5 times. The resulting figure completely overlaps with the real image, and it can be observed that the adjacent angles inside the window lattices all 60° .

Step 3: Connect the vertices B, C, D, E, F, and G that intersect the line segment and the circle to obtain a regular hexagon

Step 4: The segments inside the circle divide the hexagon into six triangles of the same size. Select the triangle ABC, connecting the midpoint of A and BC, the midpoint of B and AC, and the midpoint of C and AB. The three line segments intersect at point H. The Inscribed circle of triangle ABC is obtained by drawing a circle with H as the center and the distance from H to the triangle edge as the radius.

Step 5: Repeat step 4 to obtain the most basic graphic structure J. The lattice style of the Palace Museum Hall of Supreme Harmony is to add decoration on the

basis of this figure. As shown in Figure K, rich decorative changes have been made on the basis of the line segment AB.

Step 6: Based on the M graph, make changes to each line segment according to the graph k to obtain the graph N, and repeat the arrangement to obtain the three intersections and six circles pattern.

Step 7: This step is based on the repeated arrangement of the basic graph M to form a graph. In the overall composition, the structure of the window lattice can be more intuitively recognized, with a regular and diversified visual beauty. Figure P represents the structural relationship between the hollow parts of the window lattice and the solid parts of the lattice, creating a visual effect that alternates in space.

Structure Type D

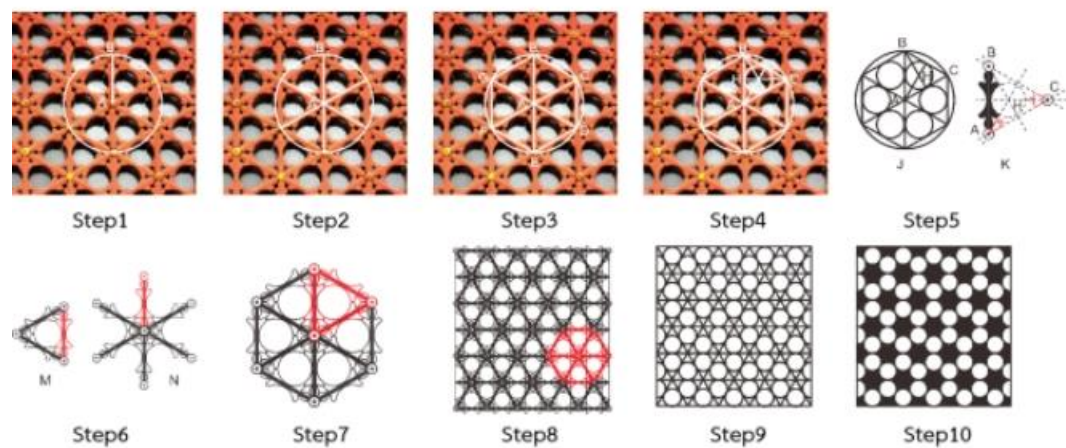


Figure 73. Analysis process of three intersections and six circles pattern

Source: Researcher's photos. February, 2023.

3.5 Summarize the structure of the window lattice pattern

With the development of traditional Chinese architecture, window lattice patterns have evolved greatly and their external forms and cultural connotations have gradually changed. Analyzing the structure of window lattice involves extracting effective features from a variety of graphics to identify the core characteristics of these patterns, to enable a precise redesign.

This section is based on the principles of pattern transformation, analyzing the evolution process of window lattice patterns and summarizing their morphological characteristics. Researcher have discovered significant variations in the shapes of

window lattice across China and different regions. However, these differences due to changes in China's historical environment. Despite these variations, the core patterns remain unchanged, so ensuring the recognition of window lattice is not affected.

The structural breakdown of window lattice patterns reveals that their initial form is composed of simple geometric shapes. These shapes undergo graphical transformations such as copying, rotating, scaling, and deleting in a repetitive manner to create entirely new patterns. Under the influence of these evolution rules, the pattern not only gives people a fresh feeling, but also look familiar feeling due to the characteristics of the initial structure. Based on the development of core patterns and combined with contemporary ceramic decorative design, traditional patterns can present certain characteristics of the times while maintaining their original characteristics.

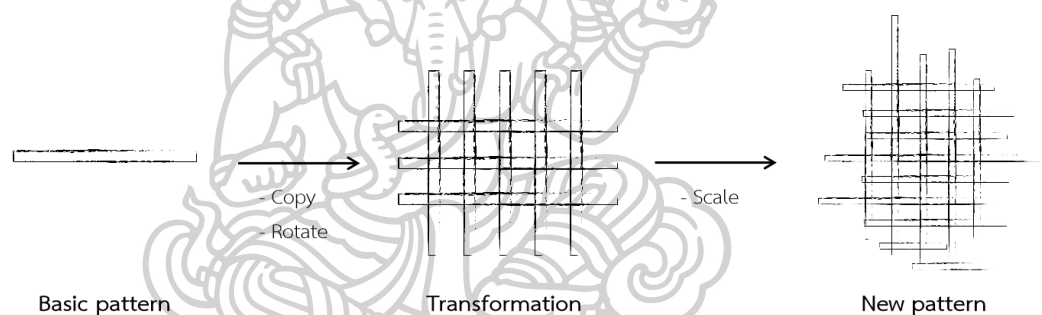


Figure 74. Evolution rules of window lattice pattern

Source: Researcher's design. February, 2023.

Based on the above analysis and discussion, the composition of window lattice patterns exhibits certain regular characteristics and produces visual changes. A conclusion can be drawn as follows:

1. The window lattice pattern evolves from geometric shapes according to certain rules.
2. The hollow and solid parts of the window lattice pattern establish a visual "positive" and "negative" relationship, which can transform into each other.
3. Based on the evolution rules of patterns and combined with contemporary ceramic decorative design, the patterns can maintain their original features while also

presenting certain characteristics of the times, expanding the application scope of window lattice patterns.

3.6 Design Process

Stage 1 Experimental: The experimental process in terms of clay, glaze materials, color, and firing conditions involves the recording of data that serves as the experimental basis for the creative work.

Stage 2 Inspiration and conception: Design inspiration and concepts of window lattice patterns in contemporary ceramic decoration, to study and develop new visual language

Stage 3 Creative experiment: Creative experiments is about exploring the possibilities of combining ceramic materials and decorative techniques in window lattice patterns

Stage 4 Summary: Based on the conclusions derived from the creative experiment, they are applied to the design development in the fourth chapter.

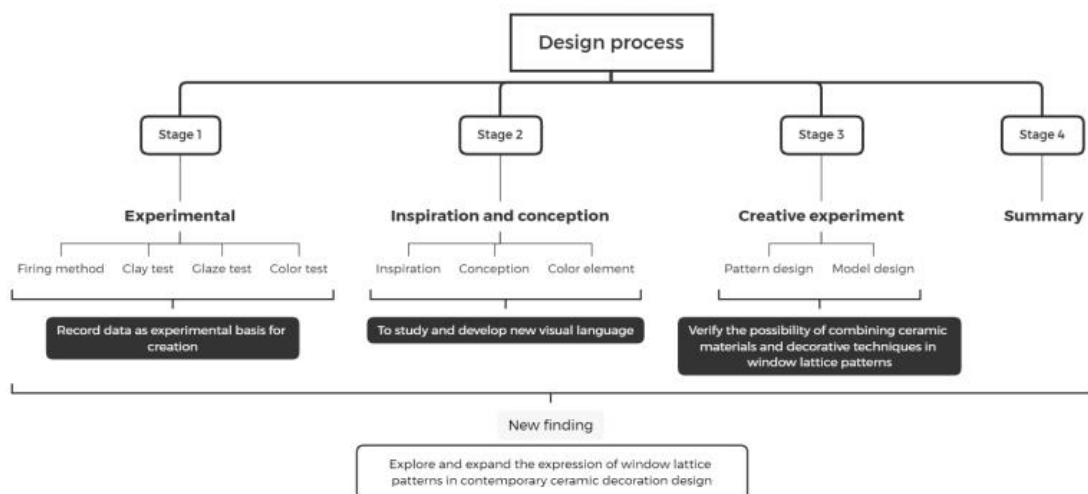


Figure 75. Design process

Source: Researcher's design. February, 2023.

3.6.1 First phase (Stage 1): Experimental

The first phase of the experiment is to test the clay, color decoration, and firing temperature of ceramics, obtain a large amount of experimental data and

record them, observe their differences, as the basic data for creation, and provide practical for contemporary ceramic decoration design with window lattice pattern as the theme.

The experimental part was divided into two stages and the data were obtained from the researchers' experimental results.

Stage 1: Introduction to the firing methods of ceramics, divided into electric kiln firing and gas kiln firing, which can cause different reaction changes through oxidation and reduction.

Stage 2: Testing the clay, glaze, and color of ceramics, and the changes in the results of different firing methods.

3.6.1.1 Firing method

The researchers use electric and gas kilns to show the effects of firing ceramics in different combustion environments. The so-called different combustion environments refer to the oxidation and reduction reactions that occur during the ceramic combustion process, which are the two major watershed of ceramic firing. These are two completely different systems, the main difference being whether there is sufficient air in the kiln during the firing process. The oxidation reaction refers to the presence of a large amount of oxygen during the firing process of ceramics. And the reduction reaction is that there is very little oxygen in the kiln during firing, and the flame is not completely burned, resulting in a lot of carbon monoxide and hydrogen gas. Both ceramics and glazes contain a certain amount of iron, which is strongly affected by the reduction reaction. The oxidation reaction produces iron oxide and the reduction, and Iron(II) oxide is produced under the reduction reaction, so that different combustion environments will produce different colors.



| | |
|---|--|
|  |  |
| Electric kiln: Biscuit firing: 800°C High-temperature: 1200°C~1250°C Firing reaction: oxidation reaction | Gas kiln: Biscuit firing: 800°C High-temperature: 1200°C~1300°C Firing reaction: reduction reaction |

Table 13. The types of kilns

Source: Researcher's table. February, 2023.

The electric kiln converts electrical energy into thermal energy via the electric heating element. There is no flame, there will be a lot of oxygen in the kiln, oxidation reactions occurs during the firing process. The high temperature of the electric kiln can reach up to 1250°C.

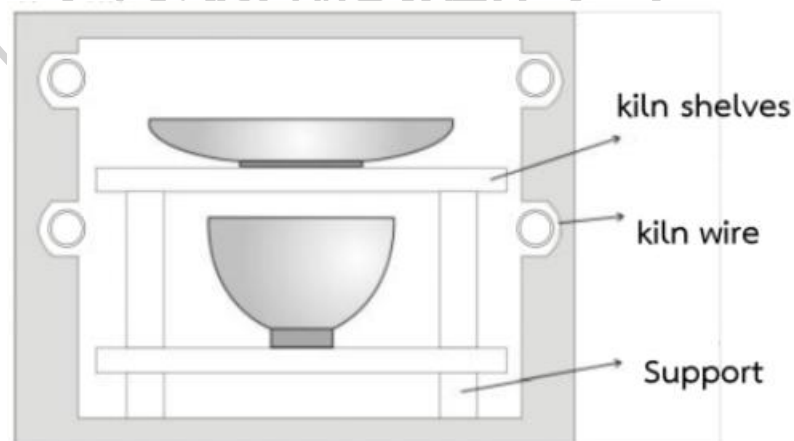


Figure 76. Electric kiln structure

Source: Researcher's photos. February, 2023.

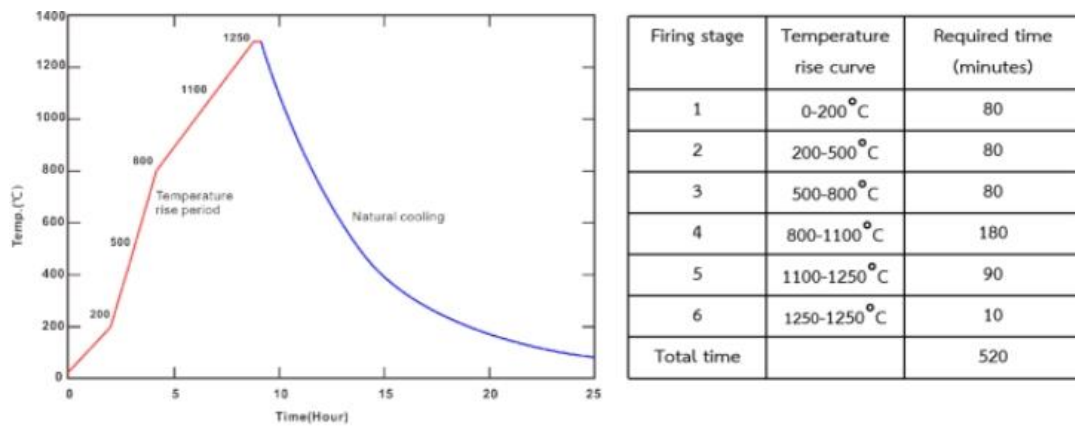


Figure 77. Electric kiln temperature curve

Source: Researcher's photos. February, 2023.

The gas kiln uses liquefied gas as fuel, which can stably control the temperature and atmosphere required for firing ceramics, and can create a closed space environment. During the firing process, a large amount of oxygen is consumed, resulting in a reduction reaction in a low oxygen environment. The combustion temperature can reach up to 1300°C.

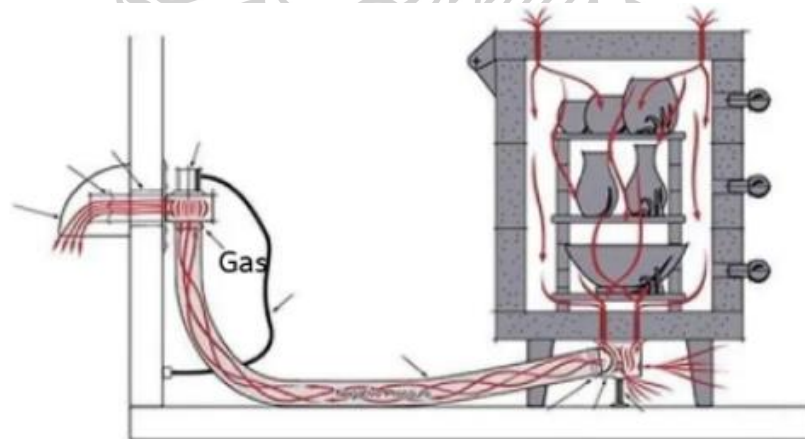


Figure 78. Gas kiln structure

Source: Researcher's photos. February, 2023.

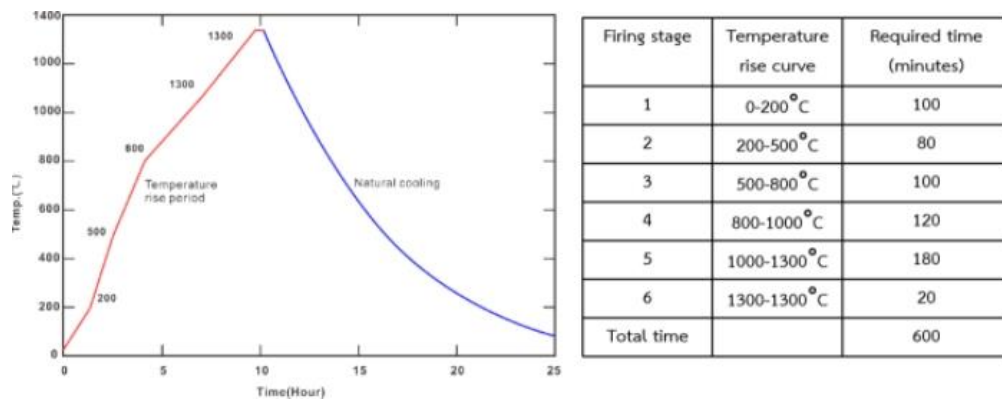


Figure 79. Gas kiln temperature curve

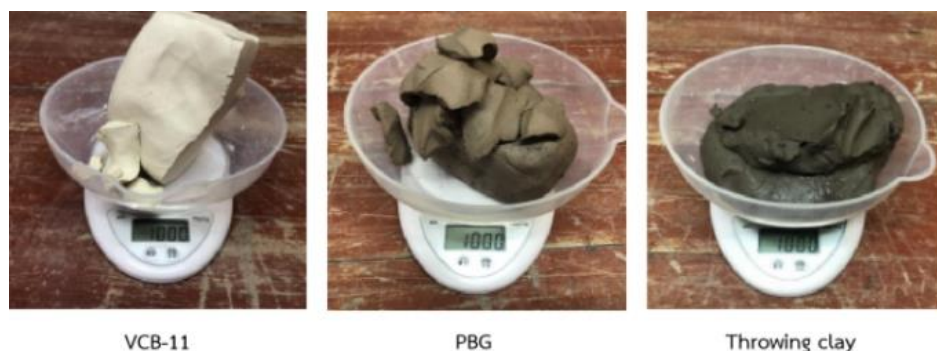
Source: Researcher's photos. February, 2023.

Firing of clay in a kiln usually involves several stages:

1. Room temperature up to 200°C: Evaporation of the residual moisture.
2. 400°C to 800°C: Evaporation of water, the clay begins to shrink, and its strength increases.
3. 800°C to 1300°C: The clay begins to undergo a porcelain reaction.
4. Cool naturally until the temperature in the kiln approaches normal, and then take out the work.

3.6.1.2 Clay test

In the testing stage of clay, the researcher divided the clay into two types: porcelain and pottery clay, both of which are common produced in Thailand. Three types of clay with significant color differences were selected for the experiment, namely porcelain is VCB-11, pottery clay PBG, and throwing clay.



VCB-11

PBG

Throwing clay

Figure 80. Choose different clay

Source: Researcher's photos. February, 2023.

To further observe the differences between the different types of clay, the researcher mixed VCB-11 with PBG and PBG with Throwing clay in a 1:1 ratio, kneaded them evenly, and obtained two types of mixed mud, namely 50% VCB-11+50% PBG and 50% PBG+50% Throwing clay.

Preparation of test pieces

Select a suitable amount of clay VCB-11 and knead it repeatedly to remove the air from the clay, and avoid cracking when firing at high-temperature. Next, flatten the clay and split it into evenly sized squares for testing purposes.



Knead clay

Making clay pieces

Split

Figure 81. Making test pieces

Source: Researcher's photos. February, 2023.

Using the same method, make blocks of the same size from other clay types and number them accordingly for future testing records.



PBG

Throwing clay

Record number

Figure 82. Record number

Source: Researcher's photos. February, 2023.

After the high-temperature oxidation firing in an electric kiln at 1250°C and the high-temperature reduction firing in gas kiln at 1300°C, the results of these five clay types after firing are shown in Table 14.











| Model | Test number | Electrical kiln 1250°C | Gas kiln 1300°C |
|-----------------------------|-------------|--|---|
| VCB-11 | Type-A |  |  |
| 50%VCB-11+50%PBG | Type-B |  |  |
| PBG | Type-C |  |  |
| 50%PBG+50% Throwing clay | Type-D |  |  |
| Throwing clay | Type-E |  |  |

Table 14. Clay test

Source: Researcher's table. February, 2023.

3.6.1.3 Glaze test

The researcher selected the most common, frequency used, and representative glaze materials for the test.

Clear Glaze: Clear glaze is a colorless glaze that is widely used in the ceramics industry. It has a high degree of transparency and gloss, which can protect the ceramic surface and increase its aesthetics.

Black glaze: It is a type of black ceramic glaze whose color is usually obtained by adding iron containing oxides. Black glaze can make the surface of ceramics appear deep, heavy, and usually has a certain luster.

Celadon Glaze: It is a green ceramic glaze with a color between blue and white. It is a representative glaze material in Jingdezhen, China. Celadon is a kind of Cuprate glaze, which is obtained by coating Cuprate on the surface of ceramics and firing at high temperature. It is characterized by full and delicate colors, which can create various patterns and texture effects.

Ice-cracked glaze: It is a ceramic glaze with a cracked texture. During the firing process, the ice-cracking in the glaze can cause small surface cracks, forming a unique texture effect. This type of glaze is usually used to make decorative ceramics, which can create a unique natural beauty.

Glaze preparation

After the initial manual grinding of the glaze, the process can be repeatedly refined with a grinding machine until the glaze no longer has any visible particles.



Grinding galze



Machine grinding

Figure 83. Making glaze process

Source: Researcher's photos. February, 2023.

Prepare according to the ratio of 1:1.5 between glaze and water, add water to the glaze, stir thoroughly, filter through a sieve, and remove too large glaze particles and other impurities.



Figure 84. Glaze preparation

Source: Researcher's photos. February, 2023.

Before decorating the glaze on the test piece, it is necessary to wipe it with a sponge to prevent dust from sticking to the surface and affecting the firing result. Place the test piece in the prepared glaze, dip it into the glaze for 3-5 seconds, and then remove the glaze behind the test piece to avoid sticking and damaging the test piece when the glaze comes into contact with the kiln-shelf during high-temperature firing.



Figure 85. Decorative glaze

Source: Researcher's photos. February, 2023

Using the same method, apply different glazes to each type of clay decoration and record the test numbers in sequence.

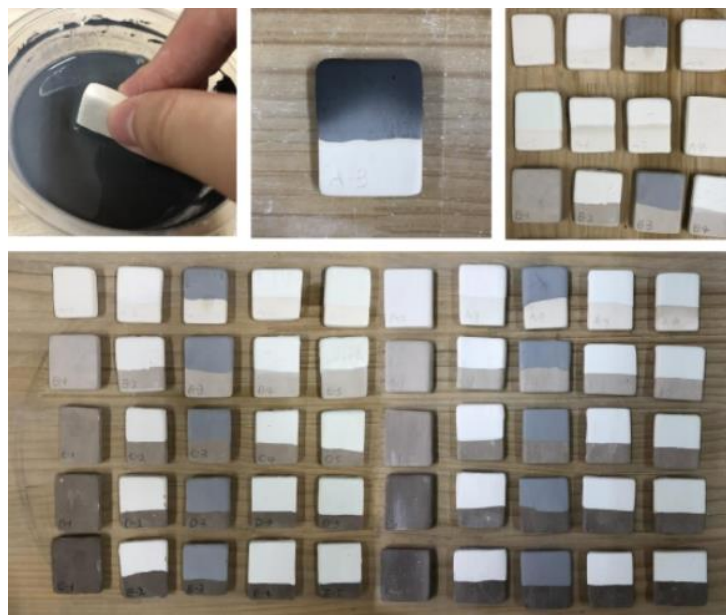


Figure 86. Glaze test before firing

Source: Researcher's photos. February, 2023.

Test clay: VCB-11 (type A), 50%VCB-11+50%PBG (type B), PBG (type C), 50%PBG+50% Throwing clay (type D), Throwing clay (type E).

Test glaze: Clear glaze, black glaze, celadon glaze, Ice-crack glaze.


Electric kiln glaze test 1

Experimental tool: Electric kiln (firing temperature: 1250°C. Kiln size: Middle size)

Firing method: High-temperature oxidation firing

Glazing method: Dip glaze

Firing time: 8.5 hours (4 hours for 0°C~800°C, and 4.5 hours for 800°C~1250°C).

| Without glaze | clear glaze | Black glaze | Celadon Glaze | Ice-crack glaze | Test results |
|---------------|-------------|-------------|---------------|-----------------|---|
| A-1 | A-2 | A-3 | A-4 | A-5 |  |

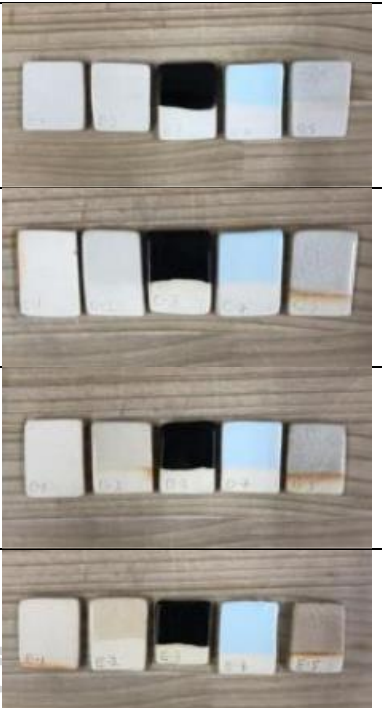
| | | | | | |
|-----|-----|-----|-----|-----|---|
| B-1 | B-2 | B-3 | B-4 | B-5 |  |
| C-1 | C-2 | C-3 | C-4 | C-5 | |
| D-1 | D-2 | D-3 | D-4 | D-5 | |
| E-1 | E-2 | E-3 | E-4 | E-5 | |

Table 15. Electric kiln glaze test

Source: Researcher's table. May, 2023.


Gas kiln glaze test 2

Experimental tool: Gas kiln (firing temperature: 1300°C kiln size: Middle size)

Firing method: High-temperature reduction reaction

Glazing Method: Dip glaze

Firing time: 9 hours (4 hours for 0°C~800°C, and 5 hours for 800°C~1300°C).

| Without glaze | clear glaze | Black glaze | Celadon Glaze | Ice-crack glaze | Test results |
|---------------|-------------|-------------|---------------|-----------------|---|
| A-6 | A-7 | A-8 | A-9 | A-10 |  |
| B-6 | B-7 | B-8 | B-9 | B-10 | |

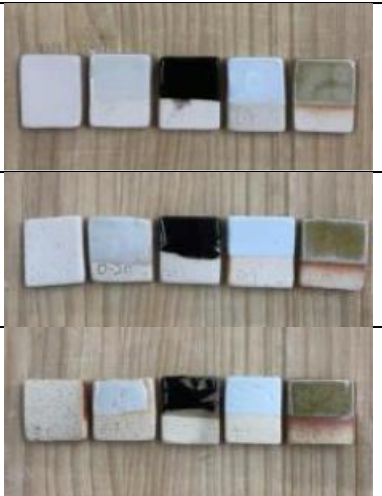
| | | | | | |
|-----|-----|-----|-----|------|---|
| C-6 | C-7 | C-8 | C-9 | C-10 |  |
| D-6 | D-7 | D-8 | D-9 | D-10 | |
| E-6 | E-7 | E-8 | E-9 | E-10 | |

Table 16. Gas kiln glaze test

Source: Researcher’s table. May, 2023.

Color glazes test

Color glazes have changes that require a reduction reaction in a high temperature gas kiln at 1300°C to produce different color variations.

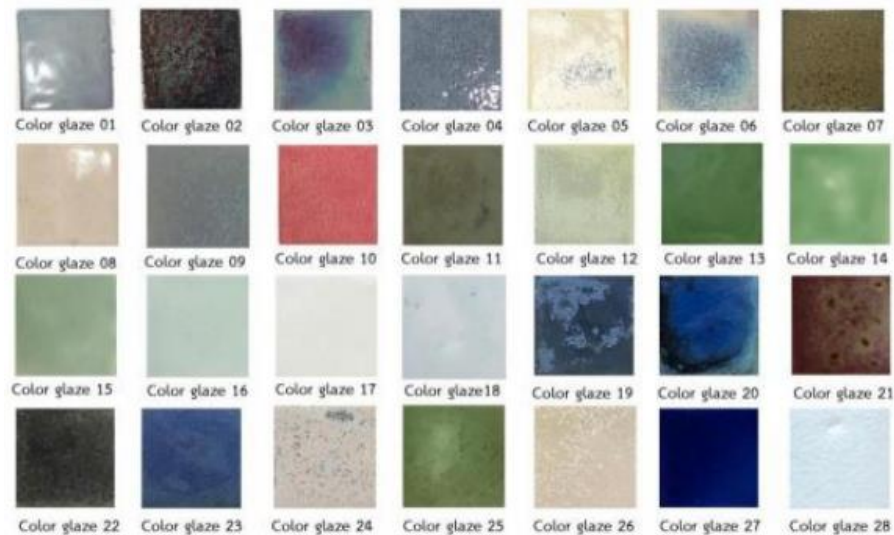


Figure 87. High temperature color glaze test

Source: Researcher’s photos. February, 2023.

3.6.1.4 Color test

Colorant test

The difference between colorants and glazes in ceramic decoration is that colorants can color the entire object evenly, whereas in glaze decoration, the part of

the object that comes into contact with the kiln shelves cannot be coated with glaze. This is because the glaze sticks to the shelves during firing at high-temperatures. Therefore, no decorative color can appear on the contact surface. To compensate for this deficiency, colorants can be used, but they do not achieve the glossy finish of glazes.

The researchers conducted color tests with high-temperature colorants and clay slips in a 1:10 ratio to record the effects of different colors.

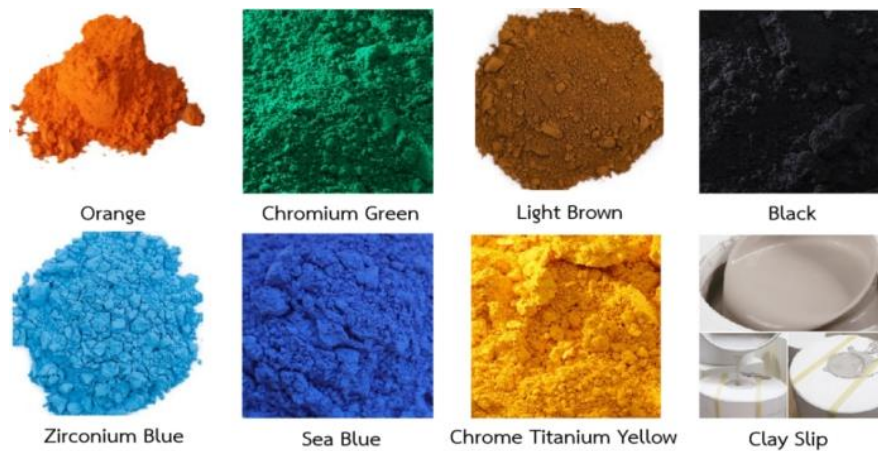


Figure 88. Selection colorants

Source: Researcher's photos. March, 2023.

The testing process is shown in Figure 89:

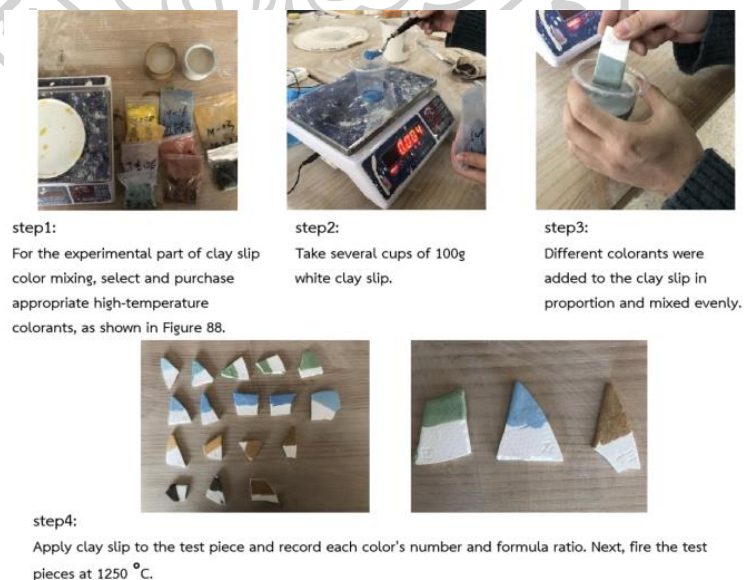


Figure 89. The picture shows the colorants mud production process

Source: Researcher's photos. March, 2023.

Test results:



Figure 90. High temperature colorant test
Source: Researcher's photos. March, 2023.

Blue-white test

Blue-white is the most distinctive decoration of Chinese ceramics, has a long history, is stably fired, and is extremely popular with modern artists. It has developed the artistic concept of modern blue and white, and is a representative decoration that combines tradition and modernity.

The blue pattern on the ceramic surface is drawn with blue and white pigments. The main components of the pigments are cobalt oxide and copper(II) oxide, which react strangely when fired at under high temperatures and form a unique color pattern. In the firing process of blue-white porcelain, the oxidation and reduction atmosphere affect the color of blue-white. The blue-white color fired in an oxidizing atmosphere usually appears bright blue, while the blue-white color fired in a reducing atmosphere appears dark blue.

The change between oxidizing and reducing atmosphere is determined by the combustion situation of the fuel in the kiln. In an oxidizing atmosphere, the fuel in the kiln burns completely, creating a large amount of oxygen that allows cobalt ions on the surface of the blue-white porcelain to oxidize completely, resulting in a bright

blue color. In a reducing atmosphere, the fuel inside the kiln burns incompletely, generating a significant amount of reducing gasses such as carbon monoxide. These reducing gasses compete with the oxygen, and prevent the cobalt ions from fully oxidizing, resulting in a dark and dull blue color. Therefore, controlling the atmosphere during the firing of blue and white porcelain is crucial, and the firing process also requires monitoring parameters such as firing temperature and time to achieve the best color effect.

Researcher is conducting comparative experiments to gain a more accurate understanding of the firing results of blue and white glazes under different conditions, such as different environments, types of clay, and whether they are decorated with glaze. This is based on previous observations of the reactions of oxidation and reduction produced by different kiln combustion processes, which lead to varying outcomes.

As the blue-white pigment contains numerous minerals, it needs to be carefully ground before use to avoid any large solid particles that could impair the decorative effect. After grinding, 5g, 10g, and 15g of the blue-white pigment are weighed separately and mixed with 100g of water to create a uniform mixture. This results in different concentrations of blue-white pigment in water, ranging from 5% to 15%, starting from a lighter concentration to a denser one. These mixtures can be used to observe the firing results of blue-white colors in different concentrations.

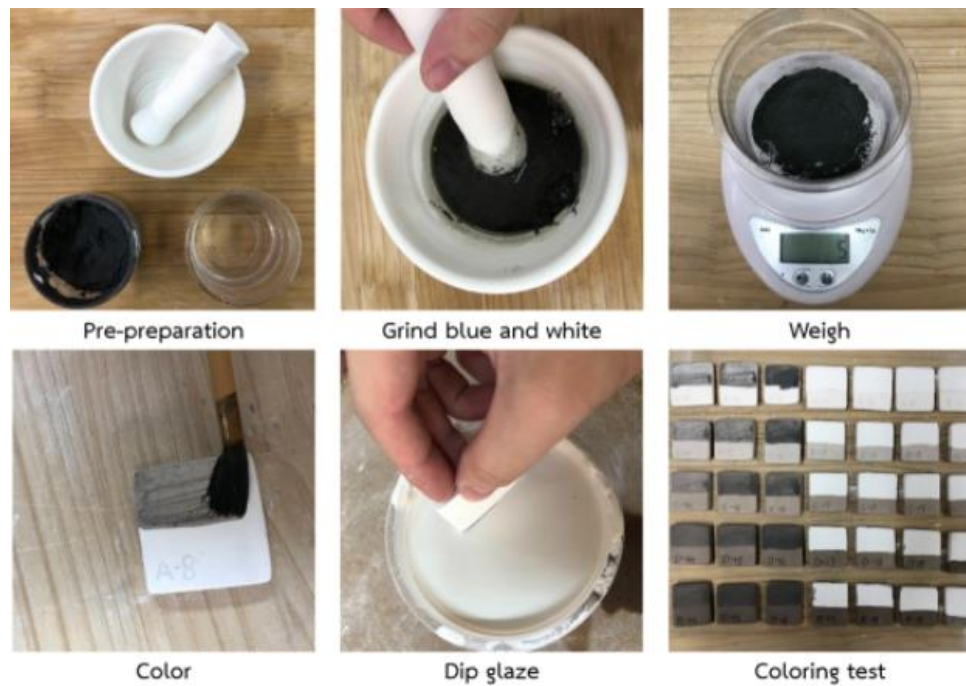


Figure 91. Blue-white color test

Source: Researcher's photos. March, 2023.

The researcher decorated five types of soil with different proportions of blue and white color and recorded the corresponding numbers. In order to observe the color difference between glazed and without glaze blue-white colors, clear glaze was chosen so as not to disturb the observation of the color after glazing. Clear glaze has the characteristics of being colorless and firing stably, which dose not affect the color presentation of the blue-white colors. The researcher conducted four sets of comparative experiments to observe the firing results of blue and white colors in electric kilns and gas kilns. The test results are as follows:

Blue-white color test 1

Experimental tool: Electric kiln (kiln size: Middle size)

Firing method: High-temperature oxidation reaction

Decoration: Blue-white color

Glazing method: Without glaze

Firing time: 8.5 hours (4 hours for 0°C~800°C, and 5 hours for 800°C~1250°C)






| Electric kiln (oxidation reaction) | | | | |
|------------------------------------|-------------------------|------|------|---|
| Without glaze | | | | |
| Test model | Ratio (Colorant: Water) | | | Color test results |
| | 5% | 10% | 15% | |
| VCB-11 | A-11 | A-12 | A-13 |  |
| 50%VCB-11 +50%PBG | B-11 | B-12 | B-13 |  |
| PBG | C-11 | C-12 | C-13 |  |
| 50%PBG +50%Throwing clay | D-11 | D-12 | D-13 |  |
| Throwing clay | E-11 | E-12 | E-13 |  |

Table 17. Blue-white color test 1

Source: Researcher's table. May, 2023.

Blue-white color test 2

Experimental tool: Electric kiln (kiln size: Middle size)

Firing method: High-temperature oxidation reaction

Decoration: Blue-white color

Glazing method: Dip clear glaze

Firing time: 8.5 hours (4 hours for 0°C~800°C, and 5 hours for 800°C~1250°C).






| Electric kiln 1250°C (oxidation reaction) | | | | |
|---|-------------------------|------|------|---|
| Clear glaze | | | | |
| Test model | Ratio (Colorant: Water) | | | Color test results |
| | 5% | 10% | 15% | |
| VCB-11 | A-14 | A-15 | A-16 |  |
| 50%VCB-11 +50%PBG | B-14 | B-15 | B-16 |  |
| PBG | C-14 | C-15 | C-16 |  |
| 50%PBG +50%Throwing clay | D-14 | D-15 | D-16 |  |
| Throwing clay | E-14 | E-15 | E-16 |  |

Table 18. Blue-white color test 2

Source: Researcher's table. May, 2023.

Blue-white color test 3

Experimental tool: Gas kiln (kiln size: Middle size)

Firing method: High-temperature reduction reaction

Decoration: Blue and white color

Glazing method: Without glaze

Firing time: 9 hours (4 hours for 0°C~800°C, and 5 hours for 800°C~1300°C).






| Gas kiln 1300°C (reduction reaction) | | | | |
|--------------------------------------|-------------------------|------|------|---|
| Without glaze | | | | |
| Test model | Ratio (Colorant: Water) | | | Color test results |
| | 5% | 10% | 15% | |
| VCB-11 | A-17 | A-18 | A-19 |  |
| 50%VCB-11 +50%PBG | B-17 | B-18 | B-19 |  |
| PBG | C-17 | C-18 | C-19 |  |
| 50%PBG +50%Throwing clay | D-17 | D-18 | D-19 |  |
| Throwing clay | E-17 | E-18 | E-19 |  |

Table 19. Blue-white color test 3

Source: Researcher's table. May, 2023.

Blue-white color test 4

Experimental tool: Gas kiln (kiln size: Middle size)

Firing method: High-temperature reduction reaction

Decoration: Blue-white color

Glazing method: Dip clear glaze

Firing time: 9 hours (4 hours for 0°C~800°C, and 5 hours for 800°C~1300°C).






| Gas kiln 1300°C (reduction reaction) | | | | |
|--------------------------------------|-------------------------|------|------|---|
| Clear glaze | | | | |
| Test model | Ratio (Colorant: Water) | | | Color test results |
| | 5% | 10% | 15% | |
| VCB-11 | A-20 | A-21 | A-22 |  |
| 50%VCB-11 +50%PBG | B-20 | B-21 | B-22 |  |
| PBG | C-20 | C-21 | C-22 |  |
| 50%PBG +50%Throwing clay | D-20 | D-21 | D-22 |  |
| Throwing clay | E-20 | E-21 | E-22 |  |

Table 20. Blue-white color test 4

Source: Researcher's table. May, 2023.

3.6.2 Second phase (Stage 2): Inspiration and conception

3.6.2.1 Inspiration

Contemporary ceramic decoration refers to the creation of ceramic works with artistic style and expressive power, based on ceramic production techniques and combined with modern aesthetic and artistic concepts. Window lattice patterns serve as a source of inspiration for creation, exploring patterns through ceramic decorative design to enhance the aesthetic value and expressive of the work.

In "Yuanye", author Ji Cheng highlights that "borrowing scenery is the most important aspect of gardens (Ji, 2020)." In "Casual Expressions of Idle Feeling", Li Yu also states that "opening windows is not better than borrowing scenery (Li, 2015)." That is, using window frames to complete the function of borrowing scenery. Architectural designer I.M. Pei said, "Western windows are just meant to put air and light into them, but for China, windows belong to picture frames, and the scenery outside the window is also an important part of the painting. A window on the wall becomes a painting." The scenery outside the window changes with the seasons and weather, like a dynamic three-dimensional painting that expands the visual space.



Figure 92. Borrowing scenery from window lattices

Source: Researcher's photos. March, 2023.

3.6.2.2 Conception

The range of scenery seen through the window lattice is related to the position of the person, as well as the direction and range of vision. When a person is far away from the window, the range of sight seen through the window frame is

narrower, and the scale of the scenery is also smaller. As the person gradually approaches the window, their visual threshold becomes wider, and the spatial range that the person see also gradually expands. This change is a dynamic and continuous process.

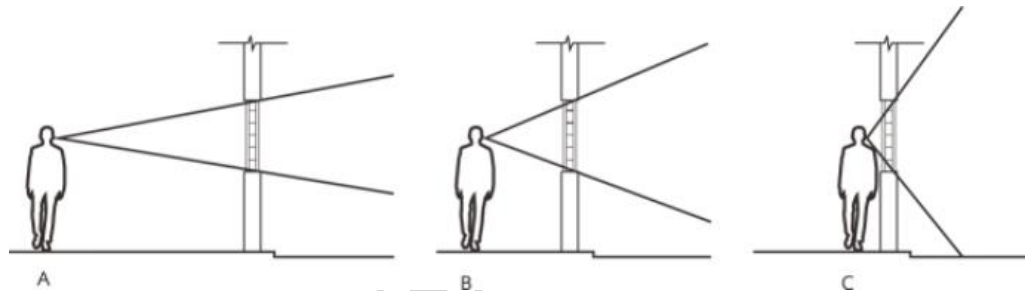


Figure 93. Different viewpoints can see the different landscapes and scope

Source: Researcher's design. March, 2023.

Observing the scenery through the window lattice, the range of vision is limited. As shown in Figure 94, the shape of the window lattice can influence the visual experience of the viewer. Borrowing a window lattice to incorporate the infinite natural world outside into a limited space.

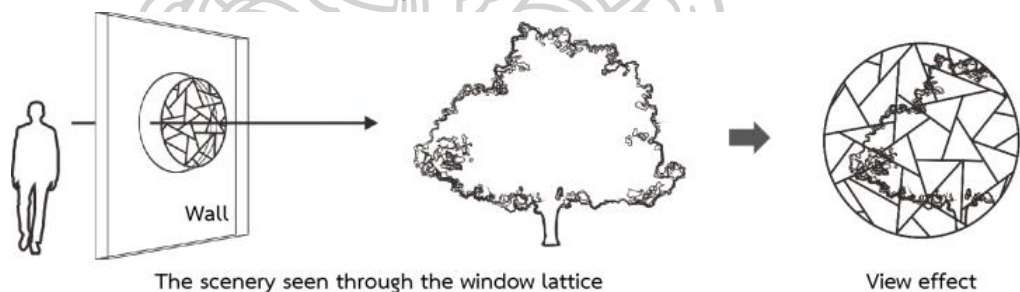


Figure 94. Observe the scenery through the window lattice

Source: Researcher's design. March, 2023.

The visual effect is not only related to the position and sight of the person, but also closely related to the window lattice pattern. As shown in Figure 95, the visual effect of the same scene varies due to different structures of the window lattice.



Figure 95. View seen from different window lattice structures

Source: Researcher's design. March, 2023.

3.6.2.3 Color element

Black and white color

In traditional Chinese art, black and white are regarded as highly expressive elements. Artists often convey various emotions and artistic conceptions in their works by employing different shades, depths, densities, and variations of colors.

The relationship between black and white is a part of the traditional Chinese philosophy of yin and yang, which emphasizes balance and harmony in the universe. It is believed that everything in nature is made up of opposing but interdependent forces, representing two opposing qualities and attributes. This philosophical idea is expressed through various aspects of Chinese culture, including painting, poetry, decorative patterns and more. Therefore, the expression of Chinese artworks is often combined with elements such as abstraction, simplicity, and imagery. The representation of black and white is usually not overly complex, but focuses more on the simplicity of form and expression of imagery.

In Chinese art, there is never a shortage of artworks expressed in black and white. White represents the origin of all colors, while black signifies their endpoint. They exist as two extremes that often overlap and transform into something new. As Zhang Zai said, "In Chinese philosophy, Yin and Yang coexist without conflict." When these contradictory forces, are able to adapt, unite, and merge, the tension of beauty is created. In ink painting, which emphasizes the contrast between black and white, the integration with the traditional Chinese Yin-Yang philosophical thoughts is highly evident. This form of expression focuses on simplicity, aims to convey deeper

thoughts and emotions through minimalist lines and ink tones when portraying natural landscapes, human figures, or emotional states.

Overall, traditional Chinese art is characterized by the Yin-Yang philosophy through the use of black and white contrast and exerts a profound influence. This artistic approach reflects Chinese culture of the natural. The artists ability to convey profound thoughts and emotions through the use of black and white enhances the aesthetic value and cultural significance of traditional Chinese art.

Blue-white color

There is a certain connection between blue-white patterns and the philosophy of Yin-Yang, which emphasizes the complementary yet opposing forces in the universe. In blue-white porcelain, blue typically symbolizes Yin, while white symbolizes Yang, reflecting the concept of Yin-Yang philosophy through this color contrast. In the article "On the Similarities between Modern Blue-White Landscape Porcelain Painting and Chinese Ink Painting (Hu & Zheng, 2009)" by Hu Xiaobing and Zheng Yuxiao, they conducted an in-depth comparative study of blue-white ceramic decoration and Chinese ink painting, revealing their similarities. Both art forms emphasize the contrast of colors, embodying the Yin-Yang concept in traditional Chinese philosophy. This similarity is not only evident in technique but also reflects the core values of Chinese aesthetic culture—harmony between humans and nature, emphasizing balance, contrast, and complementary. This laid the theoretical foundation for subsequent decorative ceramic creations.

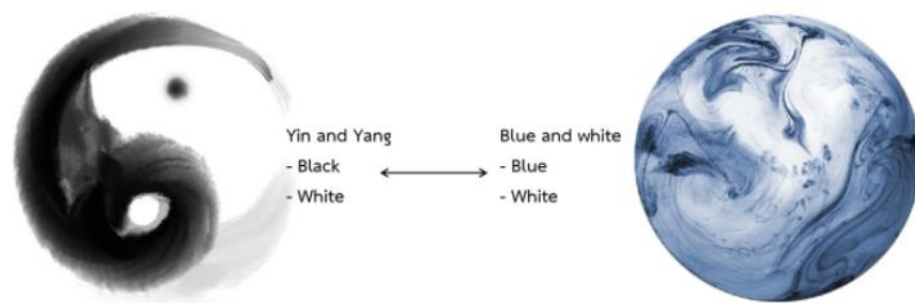


Figure 96. The artistic similarity between Yin-Yang and blue-white

Source: Researcher's design. March, 2023.

Blue-white decoration is one of the traditional Chinese decoration techniques. It gradually matured after the Yuan Dynasty and became widely used in ceramics. The porcelain's surface is pure white, and the blue-white pigment used for decoration remains stable, and can withstand high temperatures without fading. Blue-white paintings in ceramics share similarities in brushwork, materials, colors, and techniques with traditional Chinese paintings, especially influenced by Chinese ink painting. The variety of decorative themes corresponds to the aesthetic preferences of the masses. The artistic style expressed by blue-white combines the artistic conception of ink painting with the decorative beauty of ceramics. It can be said that the art of blue-white landscape painting is to use ceramics a material to express the artistic conception of ink painting (Long, 2008).

3.6.3 Third phase (Stage 3): Creative experiment

3.6.3.1 Creative experiment 1: Pattern design

The scenery in nature is ever-changing, and the scenery seen outside the window lattice is also different. It is impossible to express everything in tangible images. Researchers have adopted the traditional Chinese philosophy of Yin-Yang, Xunzi said, "The harmony of yin and yang leads to the creation of all things." advocating the harmonious unity of human and nature, abstracted the scenery in black and white, similar to the expression of Chinese ink painting. In ceramic decoration, the artistic characteristics of blue-white colors share similarities with the representation of Yin-Yang philosophy through black and white, using two contrasting things to show the infinite world. For researchers who create ceramic works, using blue-white as decoration provides a basis for creativity.

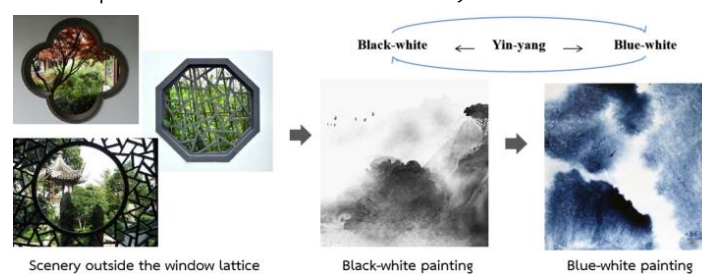


Figure 97. Artistic changes in window lattice scenery

Source: Researcher's design. March, 2023.

Pattern creation

Through the window lattice, different landscapes can be observed, and it is necessary to consider how to transform this scenery into the desired blue-white ceramic decorations. Influenced by the philosophy of Yin-Yang, the researchers adopt the expressive style of Chinese ink painting to pursue artistic conception in their painting creations.

In terms of craftsmanship, there is a significant difference between Chinese ink painting and ceramic blue-white art. Ink painting is painted on paper, while blue-white pigments are decorated on ceramics. The two have different application carriers, so blue-white decoration needs to be experimented with different methods to achieve the same freehand effect as ink painting.

Firstly, the researchers attempted to apply techniques similar to ink painting, combining a large amount of water with blue-white pigments. However, clay does not absorb water as quickly as paper, which prevents rapid diffusion of the paint color. In addition, blue and white pigments contain many substances that are difficult to dissolve in water, which further hinders the water absorption of clay and the fluidity of the painting, and has a negative impact on the decorative effect.



Figure 98. The experiment of blue-white with water

Source: Researcher's photos. March, 2023.

Another method is to replace the water with clay slip, and blue-white pigments gradually spread with the flow of the clay slip, as if ink were spreading on the paper. Researcher pour a small amount of clay slip onto the clay piece and decorate it with blue-white. During this process, they control the flow speed of the

clay slip, and the blue-white will flow to create a different pattern. This creates a freehand effect, similar to ink painting, making it more natural and artistic.



Figure 99. The experiment of blue-white with clay slip

Source: Researcher's photos. March, 2023.

After the experiment, determine the creative method. Choose to mix blue-white pigments with clay slip for creation, wait for the clay to completely dry, apply clear glaze, and fire in a high-temperature reducing atmosphere at 1300°C.



Figure 100. Blue-white decoration process

Source: Researcher's photos. March, 2023.

After high-temperature firing, the color changes from black-white to blue-white, forming a set of color patterns with unique visual appeal and creative expression.



Figure 101. Blue-white decoration

Source: Researcher's photos. March, 2023.

Based on the results of the creative experiment, it can be observed that the structure of window lattice is like an interwoven net that divides the observed scene and enhancing the spatial sense of the pattern, Clive Bell mentioned in "Art" that "In each, lines and colors combined in a particular way, certain forms and relations of forms, stir our aesthetic emotions (Bell, 2005)." The structure of the tangible window lattices a contrasting relationship with the intangible space, adding richness to the decoration of ceramic flat painting.

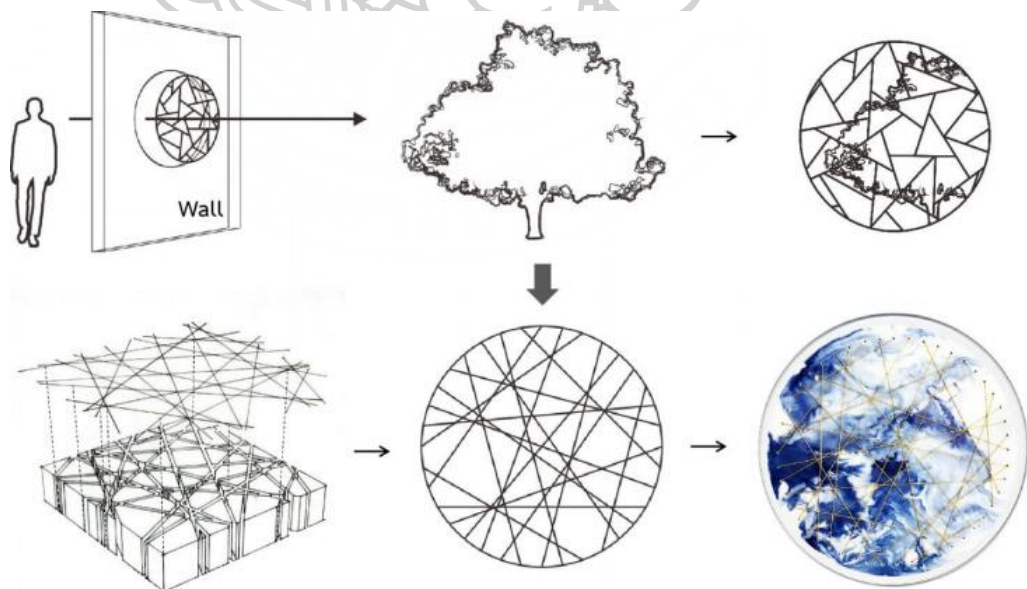


Figure 102. Segmentation of window lattice structure

Source: Researcher's design. March, 2023.



Figure 103. Work detail

Source: Researcher's photos. March, 2023.



Figure 104. Work display

Source: Researcher's photos. March, 2023.

Design ideal: This set of ceramic works adopts blue-white and black-white for pattern creation. The color selection is based on the traditional Chinese philosophy of Yin-Yang, aims to show the world viewed through the window lattice, with no specific objects appearing throughout the pattern, but rather the expression of subjective imagery.

The window lattice serves as a bridge for spatial connection, presenting an intertwined visual effect when observed through it, the lattice like a network connecting the world. Performance visual effects by the combining window lattice patterns and ceramic decoration to show the intangible world.

3.6.3.2 Creative experiment 2: Model design

By analyzing the evolution of the window lattice, the researcher gradually reveals the geometric structure of the pattern and the transformation rule, the application of which helps to maintain the traditional elements while introducing modern creativity, achieving various design effects.

Case study of the window lattice coin pattern, this pattern is similar in shape to ancient Chinese copper coins and has evolved from them. It has a beautiful meaning of wealth and prosperity. The composition is often arranged in two or four party continuity, and is also depicted as an image of circles intersecting in pairs, which have strong decorative value.

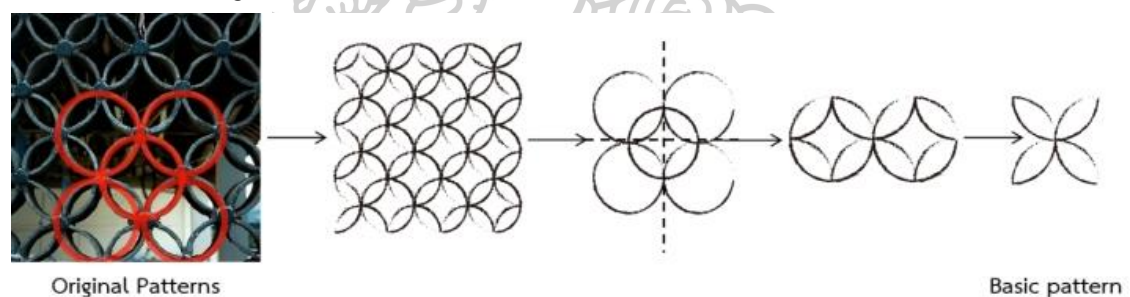


Figure 105. Transform of window lattice patterns

Source: Researcher's design. May, 2023.

In the philosophy of Yin-Yang, "solid" and "void" are opposites and transform each other. In the visual effect, the window lattice's "positive" and the "negative" of the space, can transform each other. Based on the creative experiments with blue-white patterns, these patterns are integrated into the window lattice structure.

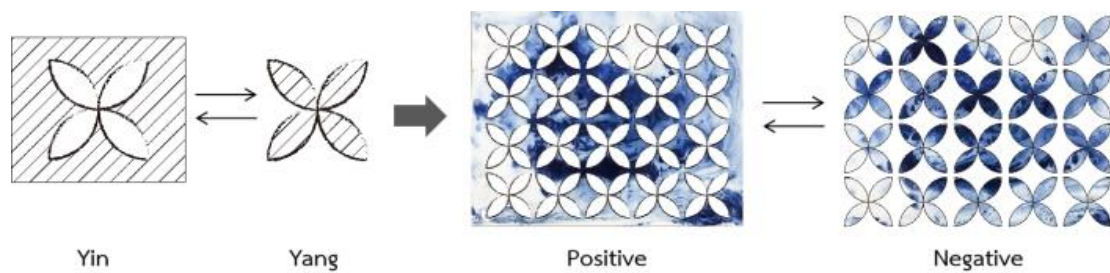


Figure 106. Visual transformation

Source: Researcher's design. May, 2023.

Considering the problem of a too simplistic form, researchers adjusted the size ratio of the graphics without changing their shape, increasing the variation of the patterns.

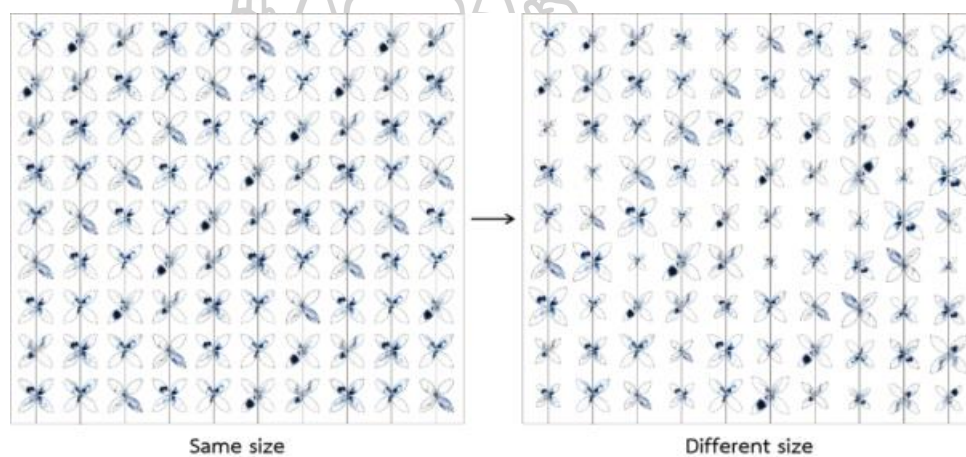


Figure 107. Window lattice arrangement

Source: Researcher's design. May, 2023.

Through the creation of blue-white patterns, the integration of ceramic decoration and window lattice has been successfully achieved, creating artistic works with cultural connotations. This is the fusion of traditional culture and contemporary art, giving a new vitality to ceramic art.

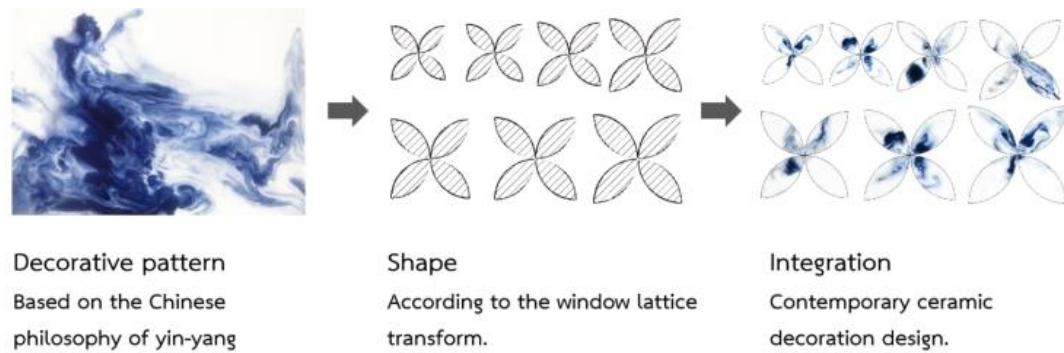


Figure 108. Decorative design process

Source: Researcher's design. May, 2023.

The researcher's main focus was on the variations in design. Based on common wind chime shapes, a simple but inspiring pattern and presentation method was found. This process stimulated further thoughts and ideas, and provided useful guidance and creativity for the development of the design.

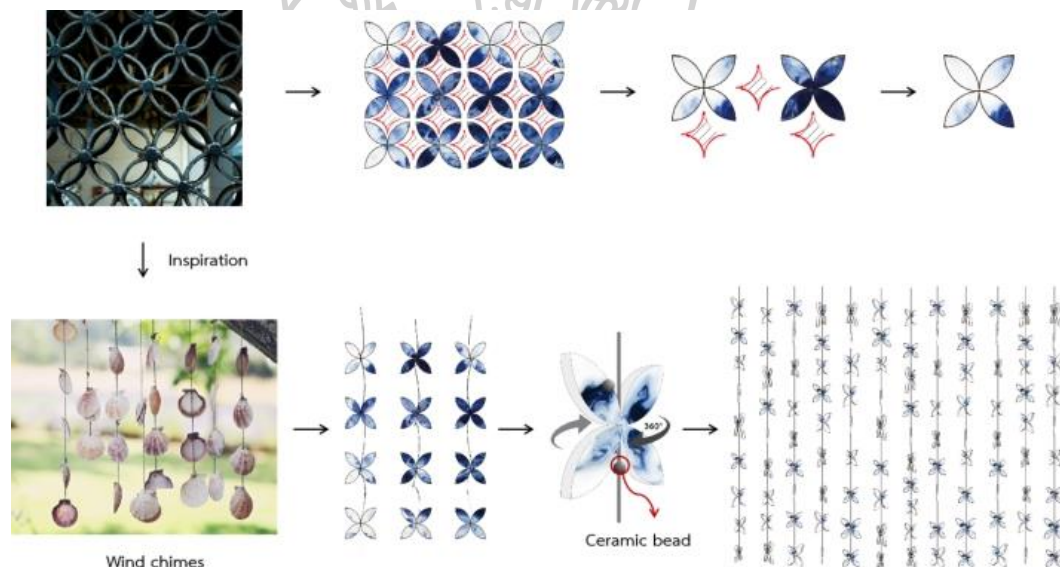


Figure 109. The process of pattern development

Source: Researcher's design. May, 2023.

This ceramic work was designed based on the window lattice pattern, while retaining the traditional shapes and decorated with blue-white patterns. The work can be displayed hanging, and rotating with the wind, it will produce a slight collision sound of ceramics, like a wind chime.

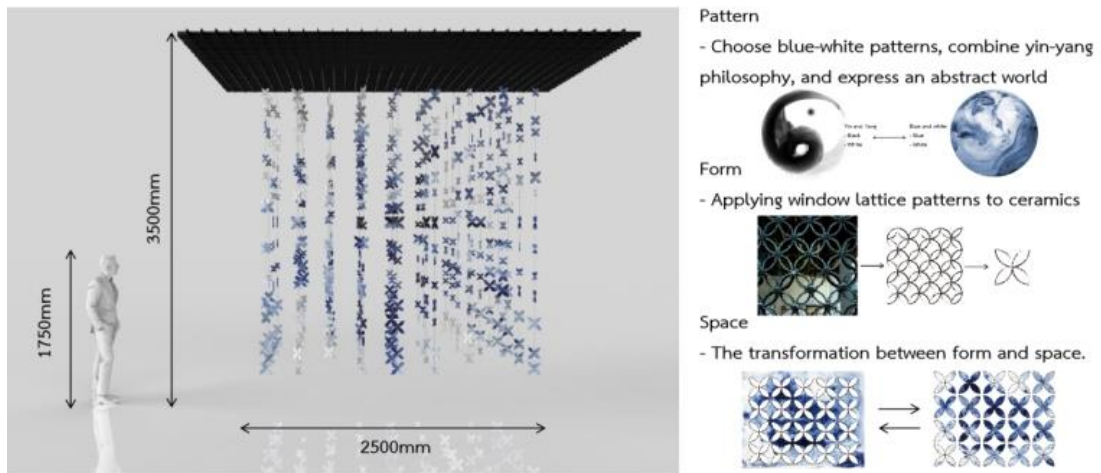


Figure 110. Design sketch

Source: Researcher's design. May, 2023.

Production process

First, use a machine to press the clay into clay slabs and cut them according to the shape's dimensions. When the clay reaches optimal moisture levels, use tools to perforate the artwork, preparing it for installation. According to the previous experimental color production process, decorate the shape, and then place the work in the kiln for firing in a high-temperature reducing atmosphere. The kiln is set with two heating stages. The first stage is fired for 4 hours, with a temperature curve of 0°C~800°C. The second stage is fired for 5 hours, with a temperature curve of 800°C~1300°C.

As this work will be presented in a hanging manner, special attention should be paid to the double-sided decoration to ensure the best visual effect and viewing experience can be achieved from all angles.

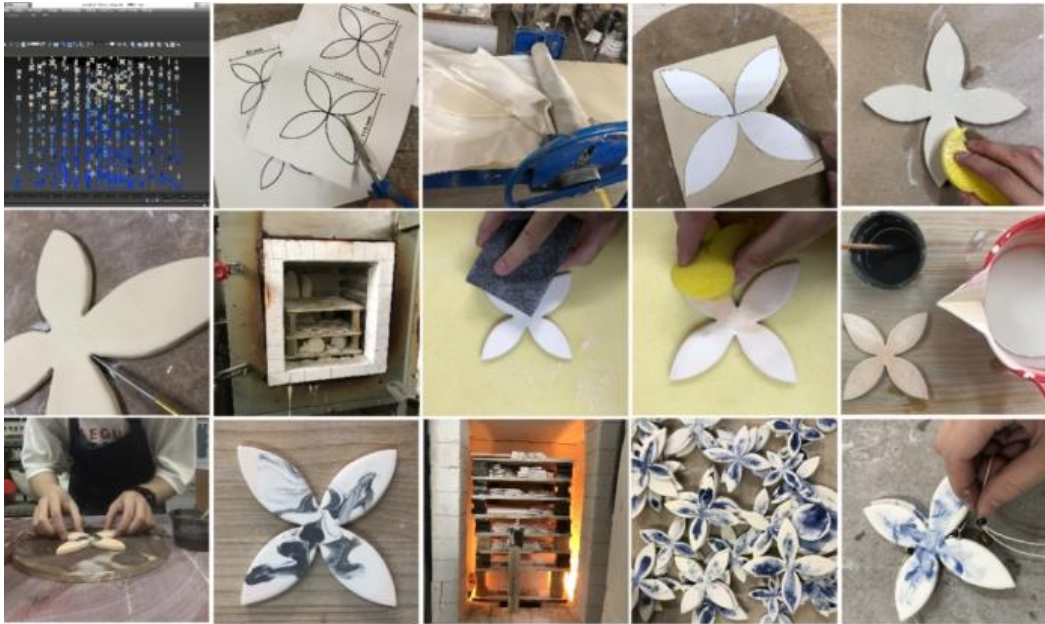


Figure 111. Production process
 Source: Researcher's design. May, 2023.



Figure 112. Work pictures
 Source: Researcher's photos. May, 2023.



Figure 113. Work display

Source: Researcher's photos. May, 2023.

Design ideal: This series of ceramic works was designed based on the window lattice, while retaining the traditional shapes and decorated with blue-white patterns. In the philosophy of Yin-Yang, the concepts of "void" and "solid" represent aesthetic ideology belonging to the Eastern culture. The "solid" of the window lattice structure and its interaction with the "void" of the surrounding space create a unity of opposites that interconnect and transform with each other.

The works are hung from the ceiling. When you look at the works or walk through them, you will have the feeling of being immersed in a blue-white world surrounded by window lattice. The use of molding and installation techniques for the clay pieces creates the visual effect of a collision of window lattice and blue-white ceramic decoration.

3.6.4 Fourth phase (Stage 4): Summary

Starting from the development of window lattice patterns and the philosophical meanings they contain, the researcher conduct a series of transformations and creative experiments, in order to break the inherent concepts of traditional expression. Through the creation of patterns and models, the integration of ceramic decoration and window lattice has been successfully achieved, resulting in artistic works with cultural connotations. This is the fusion of traditional culture and contemporary art, giving a new vitality to the ceramic works. The experiments have confirmed the possibility of combining ceramic materials and decorative techniques in window lattice patterns, developing new visual languages and aesthetic values. Satisfaction with the creative experimental results also allows researchers to further explore and expand the expression of window lattice patterns in ceramic decoration design.

3.7 Conclusion

A large number of experimental research results can help to determine the materials and decorative patterns required for creation. Through the creative experiment of window lattice patterns in contemporary ceramic decoration design, the following conclusions are drawn:

1. Complete the induction and organization of window lattice patterns, analyze the structural characteristics and evolution rules.
2. Through experiments, selecting the colors and materials for ceramic decoration under the optimal firing conditions and integrating them into the window lattice patterns.
3. The window lattice serves as a bridge for the spatial connection, presenting an intertwined visual effect when observed through it, like a network connects the world. The choice of blue-white patterns and black-white colors from the traditional Chinese philosophy of yin-yang, aims to highlight the world observed through the window lattice, and transformation of things, expand the forms of expression in ceramic decoration design, and use it for the design development of the next chapter.

Chapter 4

Design Development

The researcher conducted an in-depth analysis based on the experimental results from Chapter Three, used them as a pivotal foundation for design development. This groundwork supports for a series of creative activities.

Based on the results of the creative experiment in Chapter 3, the design concept and expression form of the work were determined to ensure the subsequent production can achieve the expected artistic effect. In the creation ceramic works with traditional Chinese elements as the theme, the researchers focus on the developed form of window lattice patterns and the philosophical significance they contain. This exploration aims to explore various expression in ceramic decoration, and highlight the visual language and creativity.

4.1 Design elements

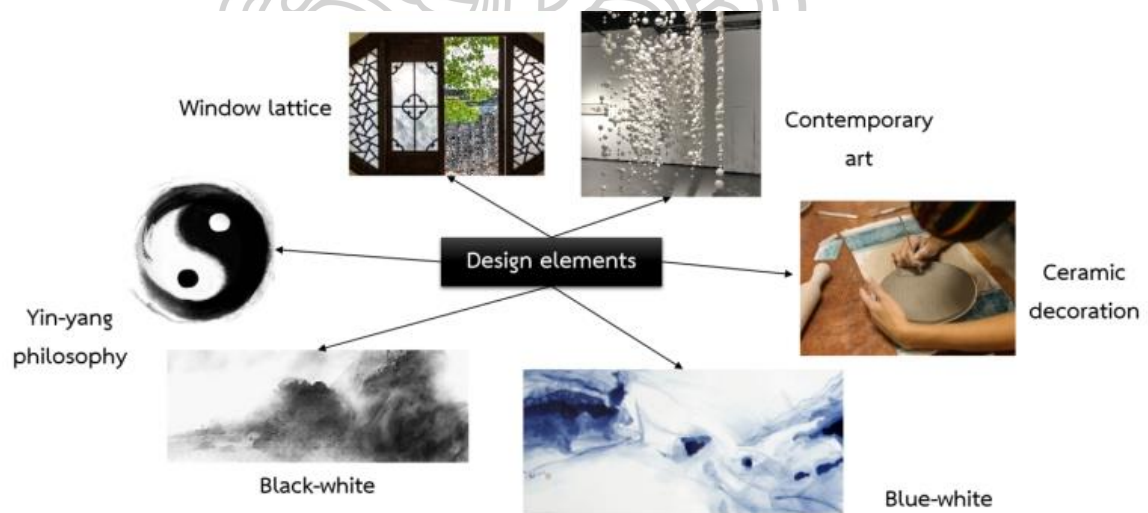


Figure 114. Design elements

Source: Researcher's diagram. July, 2023.

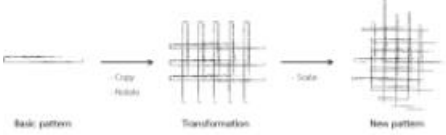
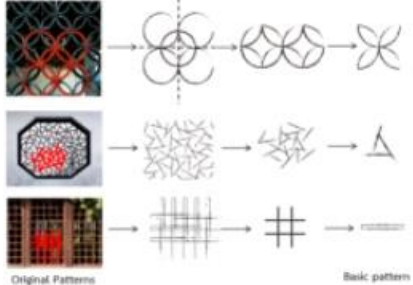


| Design elements | Creative experiment | Design development |
|---------------------|---|---|
| Window lattice |  <p>The window lattice pattern evolves from geometric shapes according to rules.</p> |  <p>Basis on the evolution rules of window lattice patterns, to creation a series of works, and maintain their original features.</p> |
| Contemporary art |  <p>Explore the contemporary expression of window lattice.</p> | <p>The forms of expression in a work:</p> <ul style="list-style-type: none"> — Tangible — Intangible |
| Yin-Yang philosophy |  <p>Yin-Yang: Opposition and unity, mutual transformation</p> | <p>Aesthetic characteristics:</p> <ul style="list-style-type: none"> Black—White Positive—Negative Void—Solid Light—Shadow |
| Ceramic decoration | <p>Experiment with clay, glazes, colors, and firing method, combined with window lattice patterns to create works.</p> | <p>Yin-Yang aesthetic works expression:</p> <ul style="list-style-type: none"> — Color expression — Light and shadow — Artwork intervention |

Table 21. Design elements development

Source: Researcher's diagram. July, 2023.

The researcher's inspiration from a visual analysis of window lattice patterns, serving as the foundation for the work's design. Combined with contemporary ceramic decoration, this approach offered a wider range of creative possibilities. During the research process, based on the creative experiment in Chapter 3, design and develop it. Researcher deconstructed the form and decoration of window lattice patterns, so that they are not limited to flat creative expression, and can be displayed in various aspects in contemporary art. The integration expression of blue-white and black-white patterns is mainly inspired by the traditional Chinese Yin-Yang philosophy. Employing the framework of Yin-Yang philosophy, the researcher interpreted their own thoughts and answers, art does not depict visible things, but creates invisible things (Cui, 2000), transforming the world beyond the window lattice into abstract patterns that outline inner landscapes. This process gave the artwork with a unique decorative language.

This philosophical concept gives the work with a deeper meaning. Symbols from Chinese culture not only appear in the decoration but are also integrated into the structure in a complex way. This design directs visual perception, evokes inner resonance, and offers the viewer a space for profound contemplation.

4.2 Project 1: Expression of flat decoration

4.2.1 Design inspiration

The design inspiration originates from the concept of "borrowed scenery" in gardens, using window lattice decorations to introduce distant landscapes, expanding the space and enrich visual effects.



Figure 115. Design Inspiration

Source: Researcher's photos. July, 2023.

4.2.2 Development of window lattice decoration

For the design process of contemporary ceramics, the researcher pursues the aesthetics of the works in harmony with the scenery, based on the shapes of the window lattice, which are expressed in the ceramic decorations through the experimental blue-white patterns. As shown in Figure 116 the geometric shape of the window lattice is used as the basis for design development.

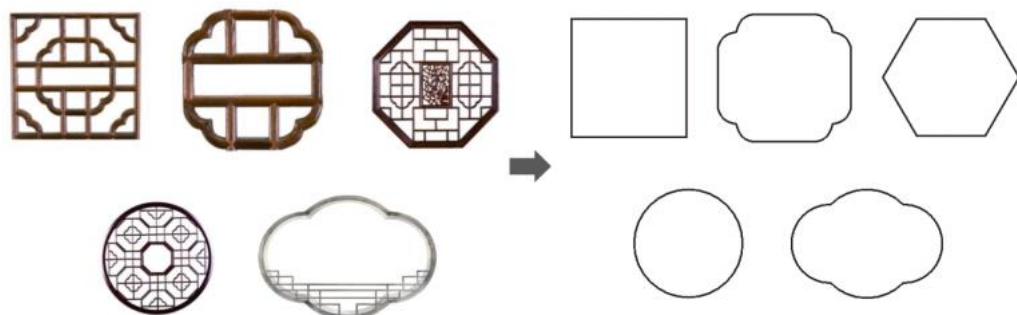


Figure 116. Basic shape of window frame

Source: Researcher's design. July, 2023.

As shown in Figure 117, it can be clearly observed that the development of the design based on the geometric framework, which adds different window lattice structures, is like a net dividing the observed world. The "solid" of lattice and the "void" of space, as the center of the picture, capture the viewer's attention and enrich the visual effect.

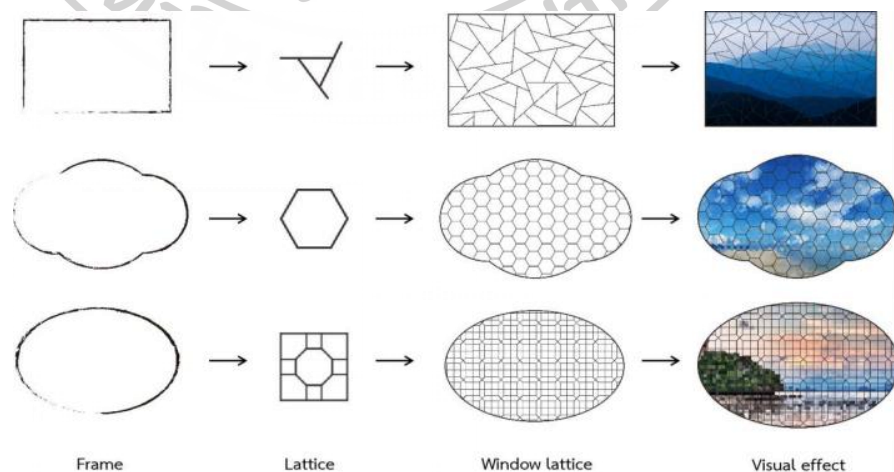


Figure 117. The window borrows the outside scenery

Source: Researcher's design. July, 2023.

Lao Tzu said: "Shape the doors and windows to make a room; it is the emptiness within that makes it useful", each window lattice shape contains the dialectical relationship between "nothing" and "existence", "void" and "solid", "positive" and "negative" in the philosophy of Yin-Yang. Inspired by the philosophy of Yin-Yang, the ceramic blue-white decoration abstractly interprets the scenery outside the window, integrating the interwoven window lattice patterns. The contrast between blue and white colors in the picture does not appear abrupt, but has a harmonious feeling, just like traditional Chinese ink painting, which is natural, to show the intangible world.

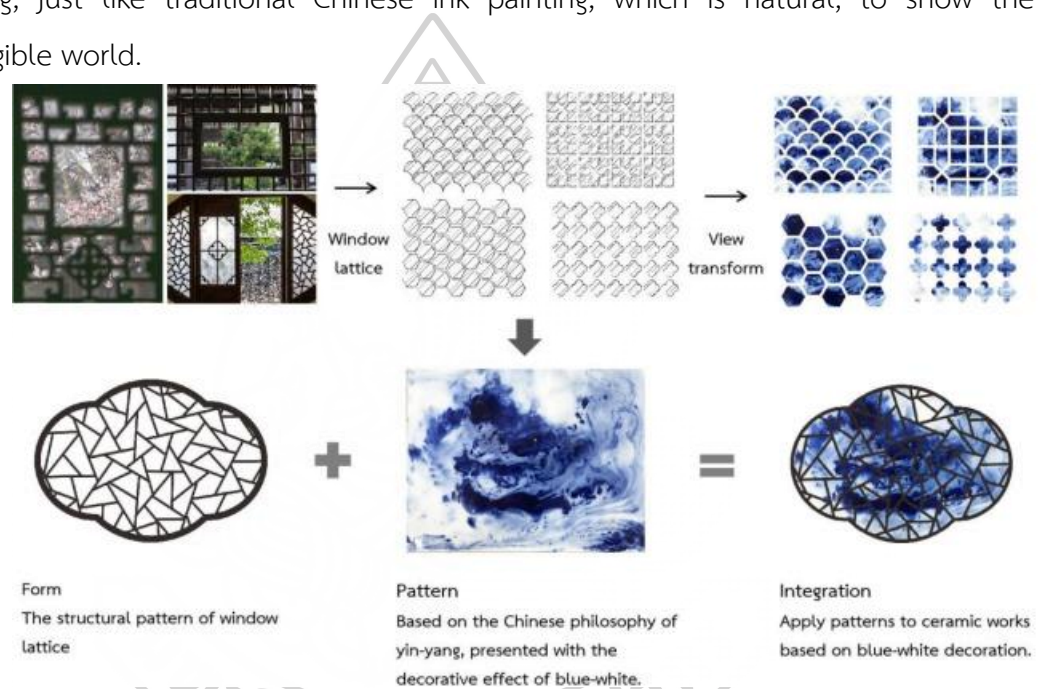


Figure 118. Decorative color design process

Source: Researcher's design. July, 2023.

In order to enhance the presentation effect of the work, researchers combine patterns from several ceramics and hang them on the wall like artistic paintings. This gives viewer feeling of experiencing natural beauty through the structure of window lattice. The color of the lattice is made of gold, which has a special symbolic meaning in Chinese culture, and it regarded as an auspicious and flashy color. The blue-white patterns are cleverly divided by the window lattice structure, presenting a profound and vivid sense of scenery, making the entire decorative work full of artistic charm, bringing viewers visual experience of blending with nature.

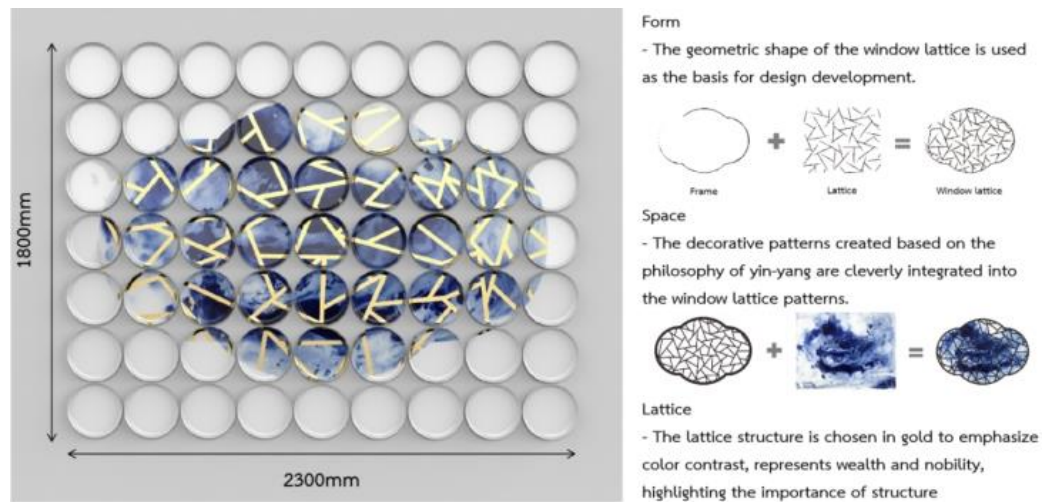


Figure 119. Work size and design description

Source: Researcher's design. July, 2023.

4.2.3 Production process

Based on the dimensions in the design sketch of the work, create ceramic pieces that match the size. Afterwards, blue-white patterns are decorated in ceramics, clear glaze is applied and fired at high temperature. Then, gold foil is attached according to the shape of the window lattice structure to ensure flatness and no bubbles are generated. Finally, use a blade tool to remove excess gold foil and decorate the flat window lattice shape.



Figure 120. Production process

Source: Researcher's photos. July, 2023.



Figure 121. Decorative details 1
Source: Researcher's photos. July, 2023.



Figure 122. Decoration details 2
Source: Researcher's photos. July, 2023.



Figure 123. Work pictures
Source: Researcher's photos. July, 2023.

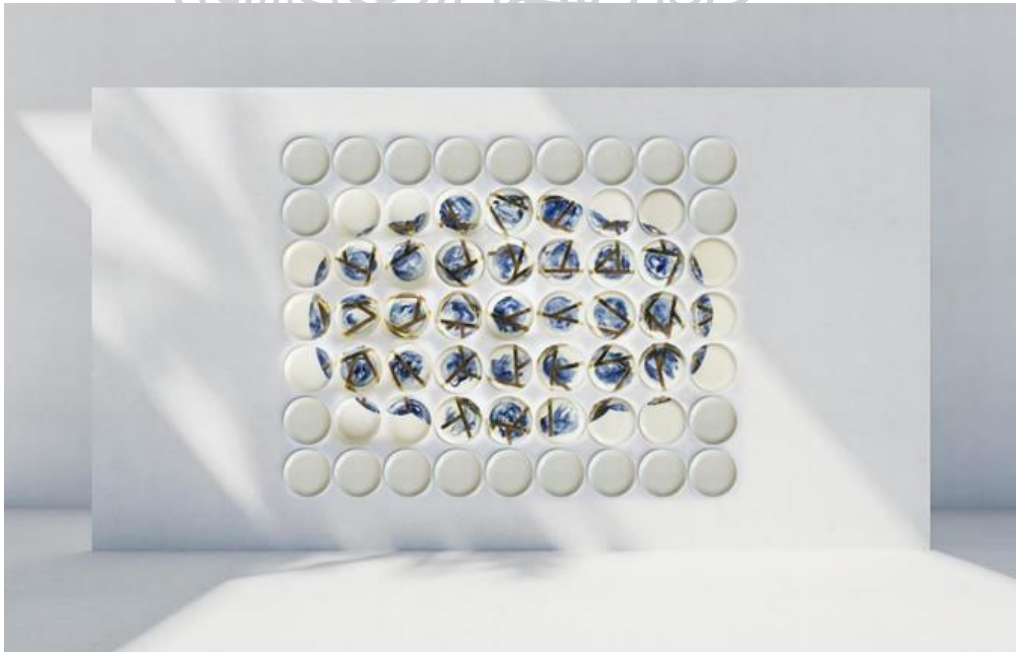


Figure 124. Work display 1
Source: Researcher's photos. July, 2023.

When the work is hung for display, it can be used as a partition in the space.



Figure 125. Work display 2

Source: Researcher's photos. August, 2023.

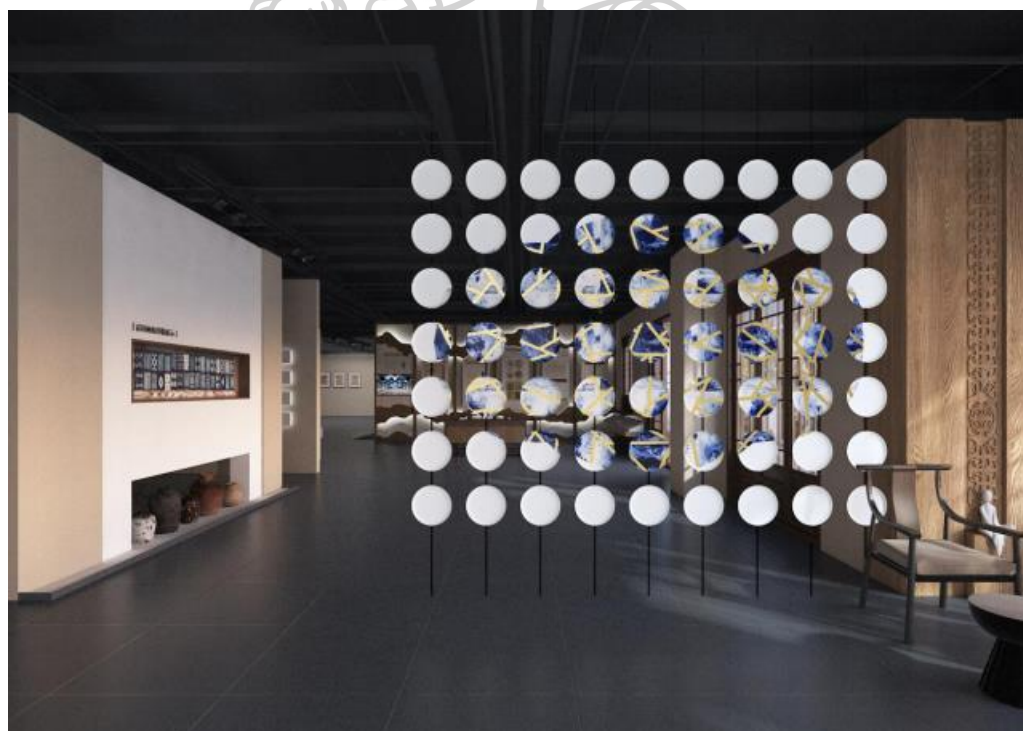


Figure 126. Work display 3

Source: Researcher's photos. August, 2023.

Design ideal: The artwork hanging on the wall feels like an artistic painting, and gives the viewer feel as if they are admiring the natural beauty through the window lattice. Based on Chinese Yin-Yang philosophy, the created decorative patterns abstractly interpret the scenery outside the window, with no specific objects appearing in the entire pattern, but rather the expression of subjective imagery. By using variations in color to arrange and organize different shapes in the composition, this form of expression originates from the traditional Chinese pursuit of the "harmony between heaven and humanity" in the Yin-Yang philosophical thought. It also conforms to the statement in "The Principles of Art": "The work of art proper is something not seen or heard, but something imagined (Collingwood, 1938)."

The process is mainly use underglaze blue-white painting and high-temperature reduction firing. The window lattice structure is made of gold color, which has a special symbolic significance in Chinese culture and is considered auspicious and luxurious. The performance is the combination of ceramic blue-white decoration and window lattice pattern to produce visual artistic effects.

4.3 Project 2: Exploring the light and shadow of window lattices

4.3.1 Design inspiration

When sunlight through the window lattice, light and shadow are projected onto the ground and the wall. As time passes, shadows constantly change, creating a dynamic picture. Different patterns present varied light and shadow effects as the light passes through, creating a visual language. Lin Bu, a poet of the Song Dynasty, wrote in his poem "The Little Plum in the Mountain Garden": "The sparse shadows slant horizontally, the water is clear and shallow, and the faint fragrance floats in the moonlight at dusk." It describes the beautiful atmosphere under the light and shadow.



Figure 127. Window lattice light and shadow

Source: Researcher's photos. October, 2023.

4.3.2 Design concept

The philosophy of Yin-Yang often expresses opposition and complementary concepts. Yin-Yang are relative, one existing on the opposite side of another. Concepts of contrast, such as light and shadow, brightness and darkness, can be seen as concrete display of Yin-Yang. In this philosophy, light and shadow are mutually dependent on each other. Through the use of light and shadow, the beauty of light and shadow in the window lattice pattern is presented in ceramic craftsmanship.

Make the pattern no longer limited to a flat surface, but interact with the space, bringing a brand new experience. The interplay of light and shadow creates a sense of aesthetic beauty within the space.

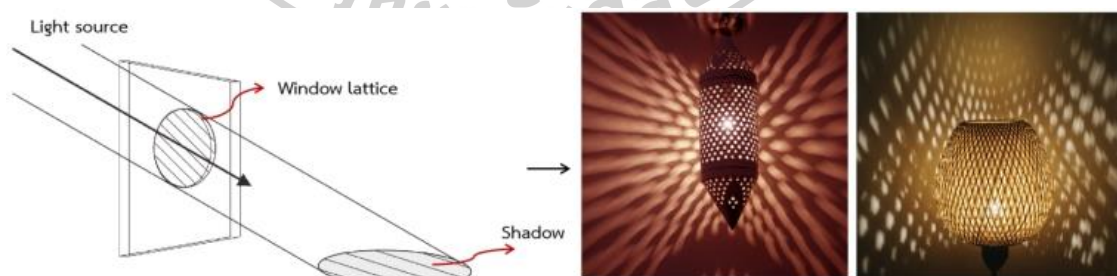


Figure 128. Lighting effects

Source: Researcher's design. October, 2023.

4.3.3 Ceramic carving craft

Ceramic carving craft is a technique in which uses tools to carve, cut, and hollow out ceramic products. This process endows ceramic products with more decorative and artistic, and makes them widely popular in the fields of art and decoration. The window lattice structure can be displayed using ceramic carving craft.

In the ceramic category, the carving process encounters some limitations due to the shaping process. The carved holes cannot be designed too close to the edges of the object or at turning points, requiring careful distance control to avoid damaging the clay body. The distance between adjacent holes should be at least 1.2mm to prevent thinning of the clay body between holes, which might cause breakage or cracks during punching or firing. An even arrangement and distribution of the holes is necessary to prevent uneven stress on the clay body during firing, preventing deformation or collapse.



Figure 129. Ceramic carving craft

Source: Researcher's photos. October, 2023.

4.3.4 Design process

| | |
|---------------------|---|
| Product positioning | Ceramic lamp design with window lattice patterns. |
| Function | Lighting. |
| Material | Ceramic, wood. |
| Decoration craft | Ceramic carving craft |
| Decoration elements | Window lattice patterns. |

| | |
|--|--|
| | Using ceramic carving craft to showcase the structure of window lattice patterns, and combining light and shadow effects for design and development. |
|--|--|

Table 22. Design positioning

Source: Researcher’s table. October, 2023.

In ceramic carving craft, there are generally two types: flat carving and three-dimensional carving.

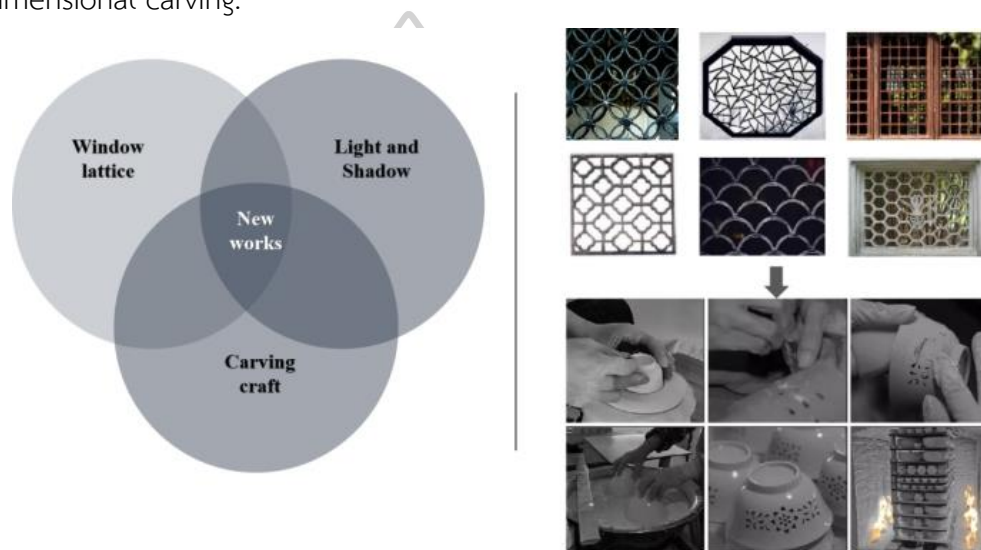


Figure 130. Design process

Source: Researcher’s design. October, 2023.

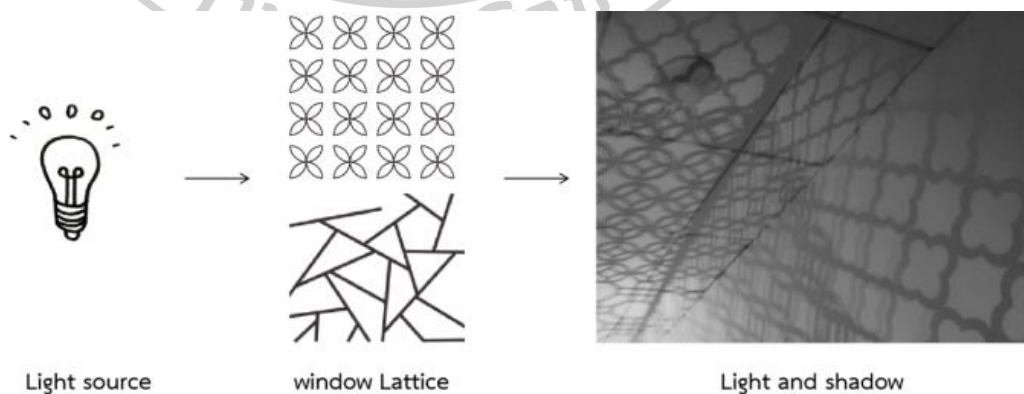


Figure 131. Light and shadow effect

Source: Researcher’s design. October, 2023.

4.3.4.1 Design Sketch 1: Flat carving lamp design

Flat carving focuses on carving and pattern design on ceramic surfaces.

The lamp design is based on the simple geometric shape evolution of window lattice, extracting basic form, and combining them with ceramic carving craft. This process involves the aesthetics and function of the window lattice structure, which is then incorporated into the lamp design.

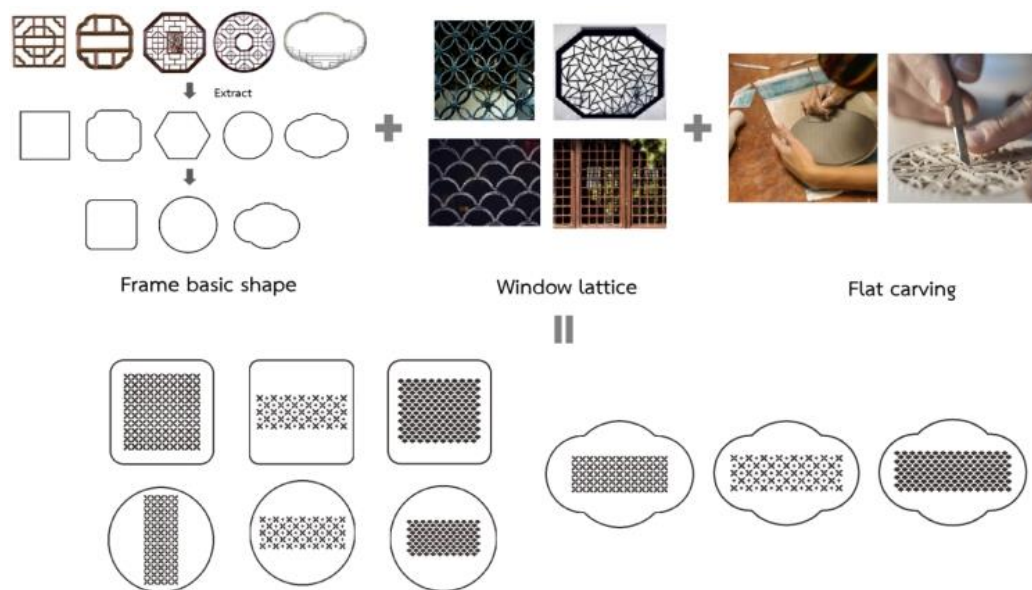


Figure 132. Design process

Source: Researcher's design. October, 2023.

Based on the dimensions of the design sketch, the product is made, and the light passes through the carved window lattice pattern, creating a warm and comfortable atmosphere for the space. In order to enhance safety, the wooden base and the corners of the circular plates are designed with rounded edges. At the same time, in order to achieve the best transparency effect, the porcelain pieces are made as thin as possible, with a thickness controlled between 2~3 millimeters.

Lamps utilize the characteristics of light and shadow in decoration, creating a richer visual effect through variations in the thickness, distance, and shape of the lampshades. In terms of functionality, can adjust the direction of light and the range of transparency, to meet the needs if refined use.

A light bulb or candle can be chosen as the light source. The horizontal and vertical arrangement of the window lattice pattern allows for a clear observation of the burning process from top to bottom of the candle, observing the casting lighting effect.

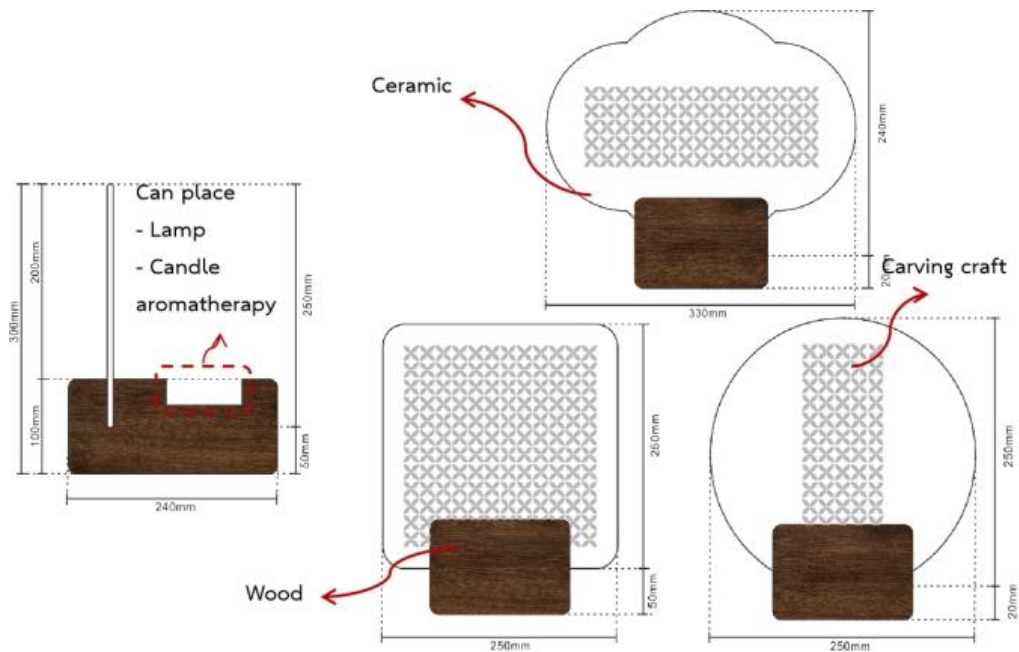


Figure 133. Design sketch

Source: Researcher's design. October, 2023.

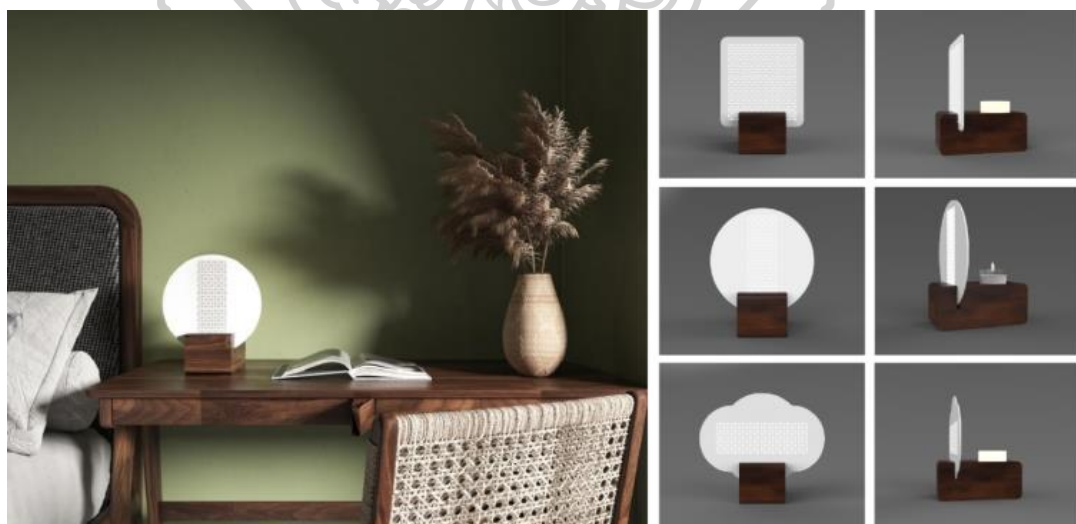


Figure 134. Work display

Source: Researcher's photos. October, 2023.

4.3.4.2 Design sketch 2: 3D carving lamp design

3d carving focuses on creating three-dimensional forms and structures, giving the artwork enriched visual effect.



Figure 135. 3D carving

Source: Researcher's photos. November, 2023.

Choose window lattice patterns to carve on three-dimensional ceramics and test the patterns lighting presentation effects and the lamps display method.

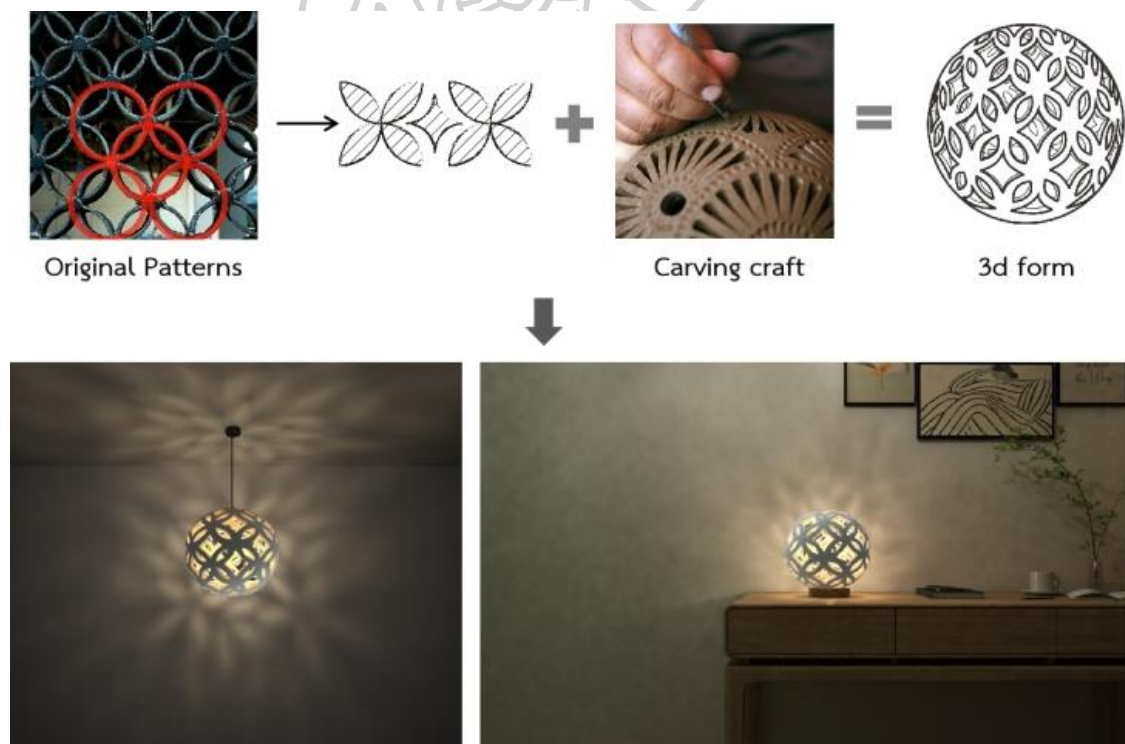


Figure 136. Lamp design sketches

Source: Researcher's design. November, 2023.

Based on the basic structure of window lattice patterns, apply them to 3D images.

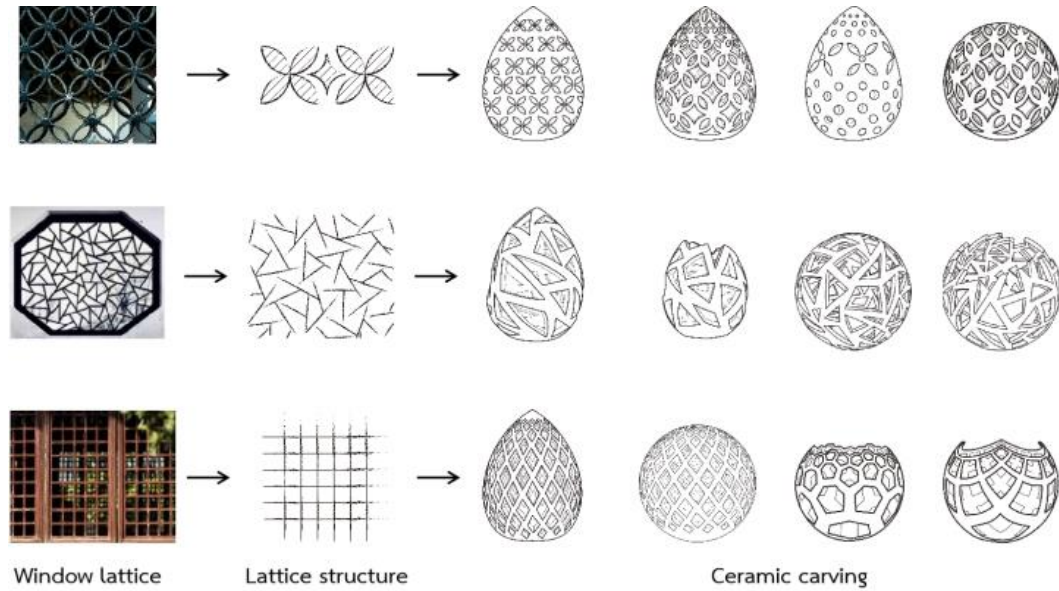


Figure 137. Window lattice pattern carving

Source: Researcher's design. November, 2023.

Test the different patterns lighting effects, the experiments can help determine the most suitable design to achieve the light projection



Figure 138. Light test

Source: Researcher's photos. November, 2023.

In the table lamp design structure, the light bulb is embedded within the base, with the cord entering from the rear of the base to maintain an aesthetic appearance. If a candle is used as the light source, the space within the bulb area will be provided for placing the candle.

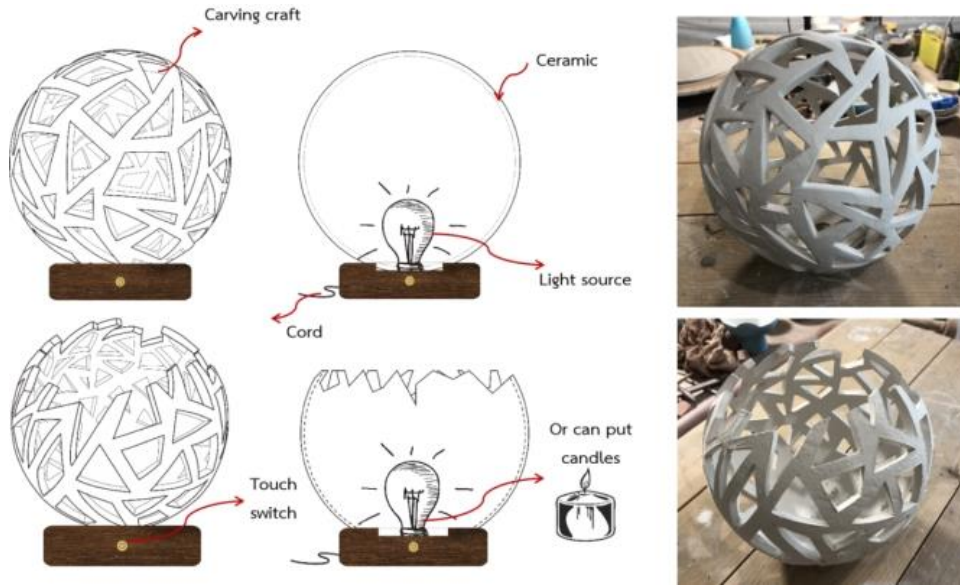


Figure 139. Lamp structure
Source: Researcher's photos. November, 2023.

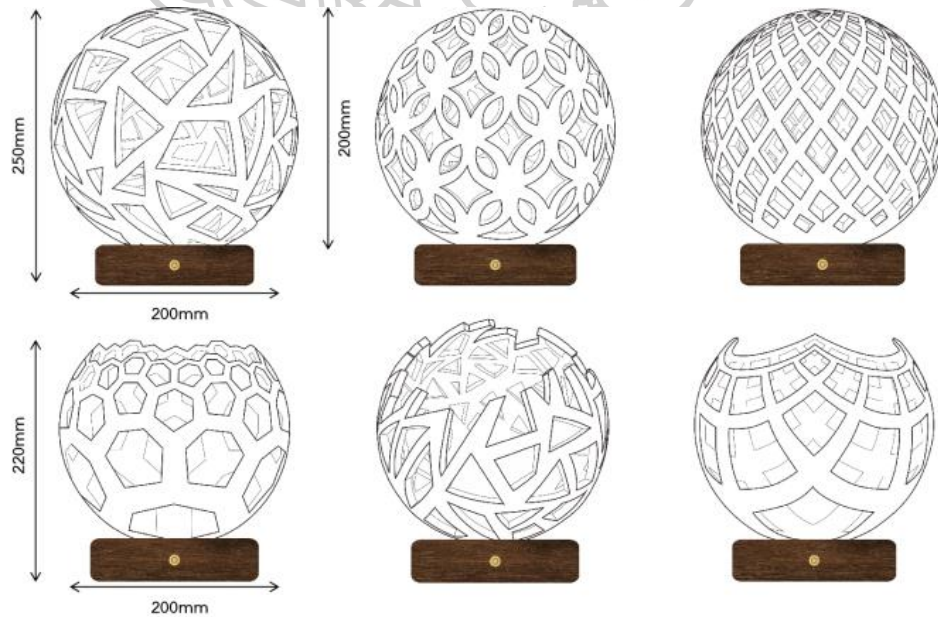


Figure 140. Lamp size
Source: Researcher's design November, 2023.

4.3.5 Production process and display

Firstly, use gypsum to make a spherical mold, then pour in clay slip. After an appropriate duration, the slip is poured out, to create in a hollow spherical ceramic structure. A sketch is drawn on the ceramic surface with a pencil, and carving tools are employed to hollow out the designated areas. During the carving process, care is taken to maintain the moisture level of the ceramic. Excessive moisture can lead to deformation, while excessive dryness makes carving more difficult and leads to breakage. After carving is completed, it is placed in the kiln for 800°C firing to increase the hardness of the ceramic, and facilitate the subsequent polishing and trimming of the edges. Finally, after being fired at a high temperature of 1250°C, it was combined with a wooden base to complete the production of the work.



Figure 141. Production process

Source: Researcher's photos. November, 2023.

Choosing a circular wooden base combined with ceramics, the base is equipped with a touch switch for user convenience.

Based on the test results of lighting, select the pattern with the best light and shadow effect as the final work.



Figure 142. Light and shadow effect

Source: Researcher's photos. November, 2023.



Figure 143. Work display 1

Source: Researcher's photos. November, 2023.



Figure 144. Work display 2

Source: Researcher's photos. November, 2023.



Figure 145. Hanging lamp display 1

Source: Researcher's photos. November, 2023.



Figure 146. Hanging lamp display 2
Source: Researcher's photos. November, 2023.



Figure 147. Table lamp display
Source: Researcher's photos. November, 2023.

Design ideal: This design adopts the shape of window lattice in its basic form, and uses carving craft to create a series of ceramic works that combine light and shadow. The base of the work is made of wood, which is combined with ceramics. Each material has its own artistic language, and the application of comprehensive materials enrich the expression form of traditional ceramic materials. The performance effect uses light and shadow to represent the characteristics of window lattice patterns, and create an interactive relationship with the space.

4.4 Project 3: The window lattice artwork intervention

4.4.1 Design concept

In this creative practice, researcher use window lattice patterns as inspiration, and one of their main characteristics is its emphasis on the connection between internal and external space. The world seen through the window lattice presents an intertwined structure, like a net that connects everyone. We live in a world surrounded by countless networks, which are intertwined and opposed to each other. Researchers observe window lattice, exploring their significance and expression in artistic works.

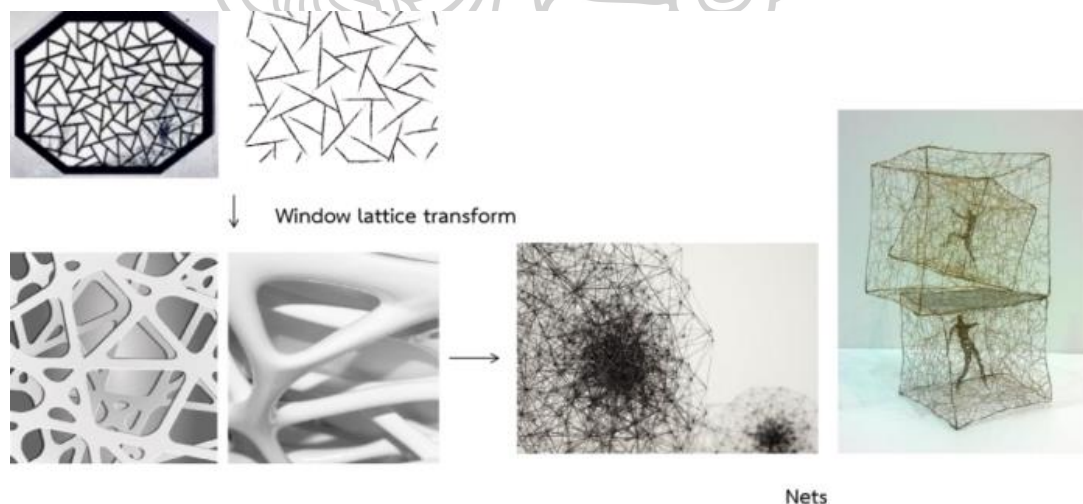


Figure 148. The derivation of the concept of window lattice

Source: Researcher's design. December, 2023.

4.4.2 Design process

Researcher use black and white colors to emphasize the contrast between window lattice patterns and space. Integrate the complex, colorful, and ever-changing world into a whole, achieving the transformation of "void " and "solid", symbolizing the profound integration between the individual and the outside world, and reflecting the complex inner world of human being.

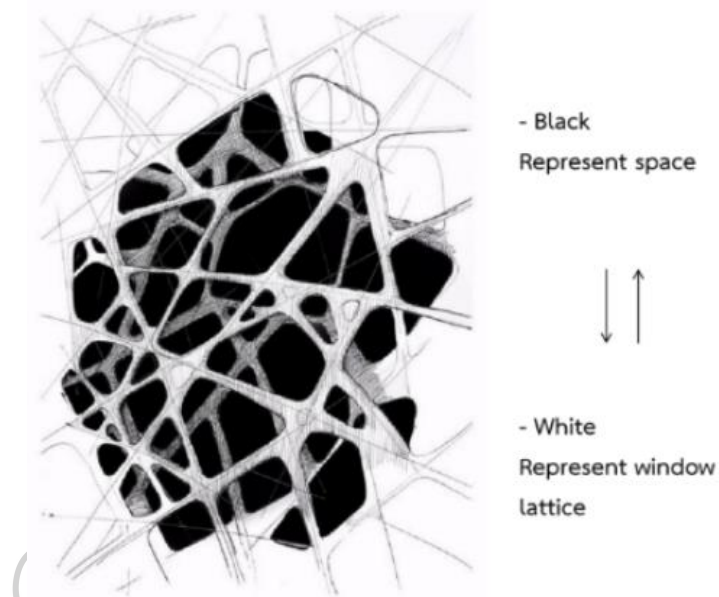


Figure 149. Interweaving of black and white structures

Source: Researcher's photos. December, 2023.

The work adopts circles and squares as the main structural forms, and as the ancients often said, the sky is round and the earth is square, which is also the most common window shape. The work treats the middle parts of rectangles and circles in a hollowed out manner, with window lattice structures interwoven, like a network connecting the world.

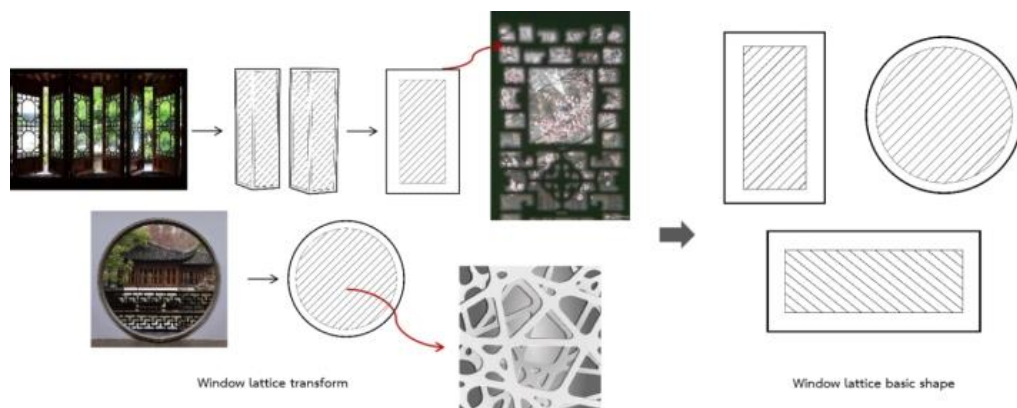


Figure 150. The structural transformation of window lattice

Source: Researcher's design. December, 2023.

In terms of color, black and white have been chosen, which is a part of Chinese Yin-Yang philosophy where everything is consist of opposing and interdependent elements. The window lattice and the space it occupied are mutually dependent on and exist independently of each other.

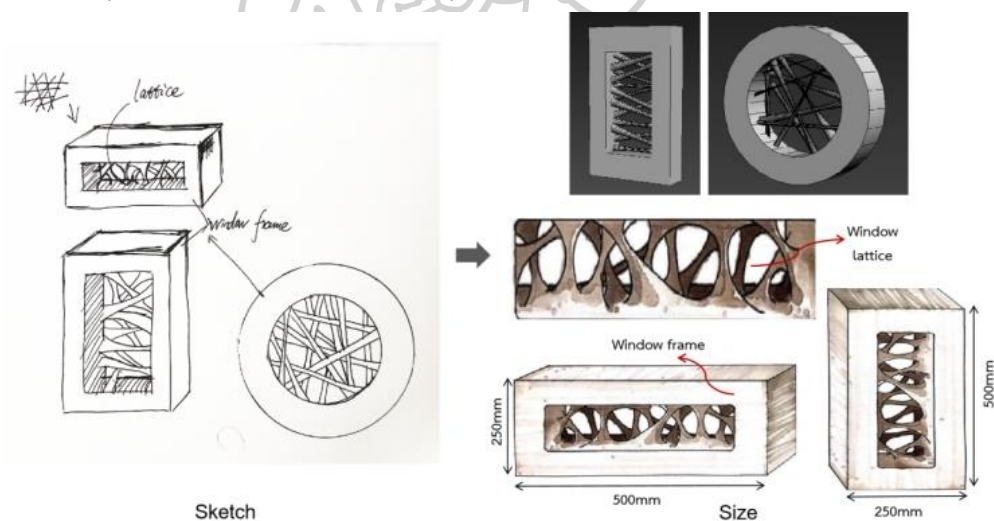


Figure 151. Design sketch

Source: Researcher's design. December, 2023.

4.4.3 The creative process

Choosing pottery clay for production. The pottery clay is a type of lean material, with a relatively low shrinkage rate during high-temperature firing and strong structural support, which is an advantage for creating larger-sized artworks.



Figure 152. Clay selection

Source: Researcher's photos. December, 2023.

Based on the artwork's dimensions, a clay base is crafted, and then coil-building is commenced, layer by layer, following the outline of the clay base. Throughout the coil-building process, it is crucial to maintain the optimal moisture level of the entire piece. After each layer had reached a height of about ten centimeters, using a heat gun to dry it is necessary to prevent it from collapsing due to excessive moisture during the building process.



Figure 153. Coil-building method

Source: Researcher's photos. December, 2023.

After the overall shape has been completed, the surface details may have some unevenness. Fill the concave areas with the same mud material, and then use tools to repair them. After the work is completely dry, it is placed in a kiln and fired at 800°C to polish it further. As the overall shape of the work is a regular shape, special attention needs to be paid to the straight lines of the edge contour, which needs to be continuously adjusted to create a sense of volume in the geometric contour.



Figure 154. Adjusting the shape

Source: Researcher's photos. December, 2023.

In order to enrich the variation in the artwork, it is necessary to prepare appropriate decorative colors. Firstly, small test pieces are made from the same clay material. Subsequently, several prepared colored slips are brushed onto these test pieces, which are then placed in the kiln for firing.



Figure 155. Colored clay slip test

Source: Researcher's photos. December, 2023.

Once the appropriate colored clay slip is selected, the artwork can be brushed. First, before brushing, the entire piece needs to be moistened to remove surface dust. Then, choose a softer brush for the application. Make sure that every corner of the artwork is evenly coated with the colored clay slip. It is important to avoid repeatedly brushing while the clay is still wet so that prevent the underlying clay does not show through and affect the color uniformity. Finally, use a glaze to spray another layer of colored clay slip evenly over the artwork for the second coating.



Figure 156. Decorative colors

Source: Researcher's photos. December, 2023.

Before placing the artwork in the kiln, it is necessary to sprinkle a layer of aluminum oxide powder on the kiln shelf to prevent uneven shrinkage of the clay during the firing process, which might cause the piece to crack. Firing takes place in an electric kiln at 1250°C, ensuring a stable atmosphere conducive to the artwork's firing process.



Figure 157. High temperature firing

Source: Researcher's photos. December, 2023.

4.4.4 Work display



Figure 158. Work pictures 1

Source: Researcher's photos. December, 2023.



Figure 159. Work pictures 2

Source: Researcher's photos. December, 2023.

Indoor display



Figure 160. Work indoor display 1

Source: Researcher's photos. December, 2023.



Figure 161. Work indoor display 2
Source: Researcher's photos. December, 2023.

Outdoor display

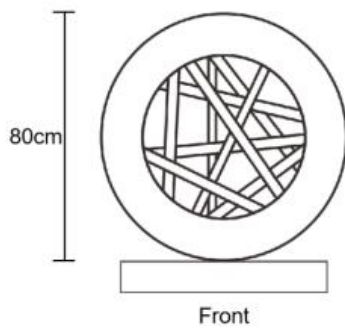


Figure 162. Work outdoor display 1
Source: Researcher's photos. December, 2023.



Figure 163. Work outdoor display 2

Source: Researcher's photos. December, 2023.



Figure 164. Work outdoor display 3

Source: Researcher's photos. December, 2023.



Figure 165. Work outdoor display 4

Source: Researcher's photos. December, 2023.

Design ideal: The artworks are created using the coil-building technique, with a central hollow geometric with interspersed window lattice structures, symbolizing the connection and integration of the space. This series of works is inspired by window lattice patterns, through the interweaving of structures, and perceiving the complex and connected relationships between all things. As the viewing point changes, the observed scenery will also be different. The performance effect is created by the connection between the structure and space, it produce aesthetic emotions and visual effects.

4.5 Results and conclusion

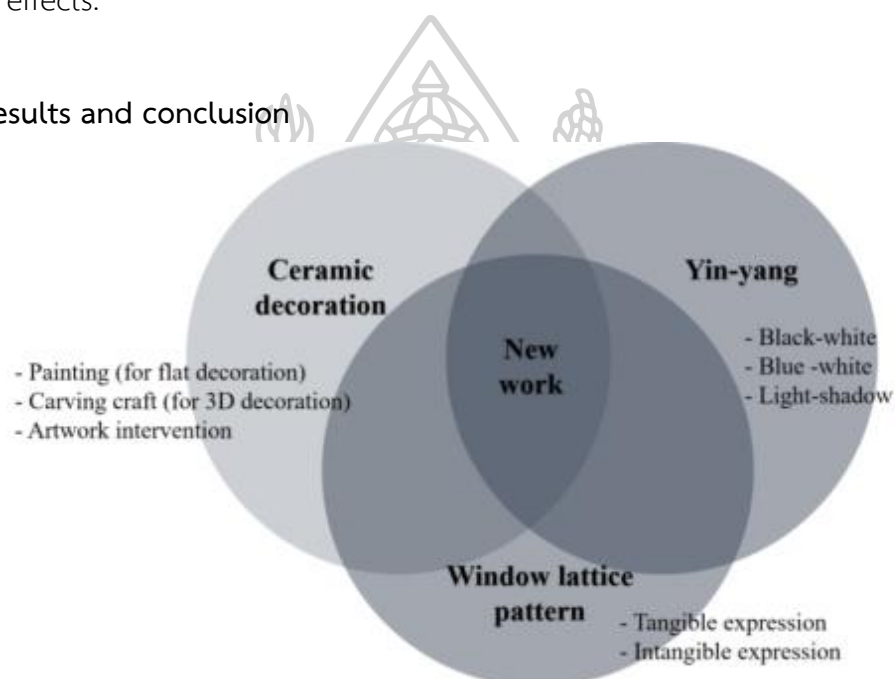


Figure 166. The relationship between design elements

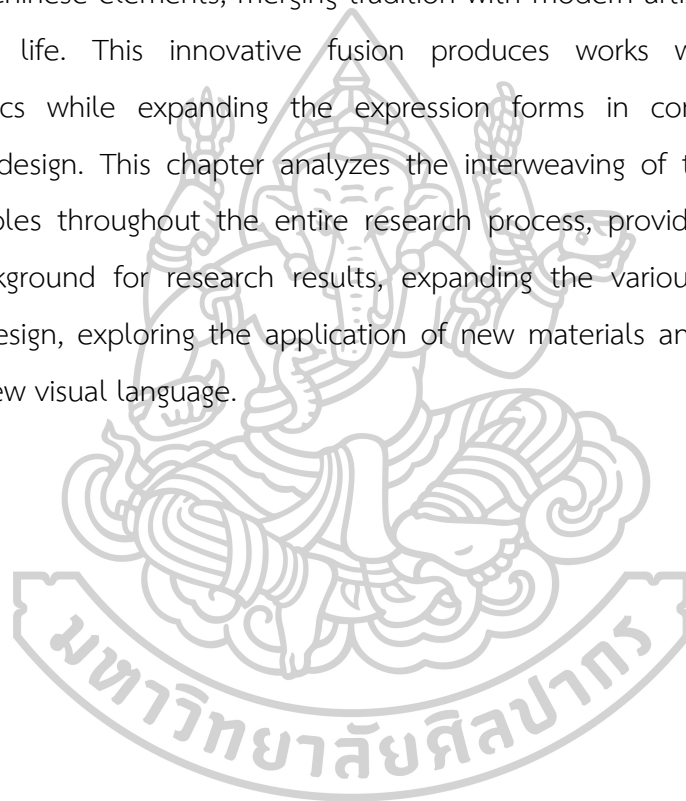
Source: Researcher's diagram. January, 2024

This section of the research explores the various expressions of window lattice patterns in ceramic decoration design and their influence on the final artwork, aiming to provide the readers with a deeper understanding of the research outcomes.

The inspiration for the research comes from the visual analysis of window lattice patterns, which serve as the design basis for creation and combine contemporary ceramic decoration to diversify the creative process. During the research process, there was a deconstructed of the window lattice patterns, exploring their underlying philosophical meanings. The selection of blue-white

patterns and black-white colors has its origins in the traditional Chinese philosophy of Yin-Yang, using this philosophical thought to interpret the author's ideas and responses, depicting the world outside the window lattice, outlining the inner scene, and endowing the work with a unique visual language. This philosophical concept gives the work with a deeper significance. The traditional culture is not only reflected in the decoration, but also deeply integrated into the structure of the work.

The window lattice as the primary symbol in the work, represents a part of traditional Chinese elements, merging tradition with modern artistic aesthetics, giving them new life. This innovative fusion produces works with distinct ethnic characteristics while expanding the expression forms in contemporary ceramic decorative design. This chapter analyzes the interweaving of these elements and their key roles throughout the entire research process, provides the cultural and artistic background for research results, expanding the various forms of window lattice in design, exploring the application of new materials and technologies, and creates a new visual language.



Chapter 5

Conclusion

This chapter includes the research conclusions, discussions on issues arising during the creative process, and suggestions for future research and development on this topic. The chapter is divided into three parts:

Part 1: Summarizes the theoretical research of the thesis.

Part 2: Summarizes the creative process and the problems encountered.

Part 3: The research contributions, recommendations for future development and study.

5.1 Restatement of the study

Response to research objective 1: To investigate the origins, historical evolution, and cultural connotations of the window lattice, providing a theoretical basis for exploration of window lattice patterns, and their potential in contemporary ceramic decoration design.

By collecting window lattice patterns and conducting visual analysis and research, there is a rethinking of their forms and decorative elements, have delved deeper into the Yin-Yang philosophical ideas and expression hidden behind the window lattice. However, the current design research of window lattice patterns mainly focuses on graphic design or utilizes wood or stone as creative materials in architecture. There is a lack of exploration using new materials and technologies for the design of window lattice patterns. Ceramic materials, as common material in our daily lives, are closer to life compared to other art media. The contemporary ceramic decoration design attaches more emphasis on innovation and modernity. Window lattice, as a form of folk cultural expression, is a display of the spirit of traditional Chinese culture. Through contemporary ceramic decoration design techniques, it provides broad design space and diverse expressive methods for the development

and innovation of window lattice patterns, enriching the contemporary expression of traditional Chinese culture.

Response to research objective 2: Explore how window lattice patterns can be combined with contemporary ceramic decoration.

The performance and characteristics of ceramic materials have been summarized through experiments. Ceramic materials have unique characteristics, and the color, toughness, and shrinkage ratio of clay in each region are different. When using ceramics as a production material, a large number of tests need to be conducted on the clay, color, glaze, and firing temperature environment to understand the differences and serve as the basis for creation.

The window lattice patterns have rich shapes, and researcher through visual analysis and exploration of the pattern's composition, summarize morphological features and evolution rule, and carry out a series of transformations and creations. The window lattice pattern evolves from geometric shapes according to a certain rule. In terms of visual effects, the "positive" structure and the surrounding "negative" space, like philosophical concept of Yin-Yang, which are mutually opposed and transformed. Ceramics can be created based on the form and visual characteristics of window lattice patterns. By integrating contemporary ceramic decoration design, the patterns can maintain their original features while also presenting certain characteristics of the times. This approach validates the possibility of combining ceramic materials and decoration techniques with window lattice patterns.

Response to research objective 3: 3. Explore the combination of ceramic materials and decorative techniques in window lattice patterns, research and develop new visual languages and aesthetic values, to create ceramic decorative works that combine tradition and modernity.

The window lattice pattern, as a foundation for creative design, combined with contemporary ceramic decoration, allows for a more divers expression. In the research process, the shapes in the window lattice patterns were developed and the philosophical meanings were explored, making them no longer limited to traditional flat expressions.

1. The blue-white patterns and black-white colors are based on the Chinese Yin-Yang philosophy, to create intangible decorative patterns to express the world seen through the window lattice.

2. Through ceramic carving craft expresses the beauty of light and shadow of window lattice pattern.

3. Through artistic intervention, window lattice are used as bridges for spatial communication, presenting an intertwined structure, like a net connecting the world, perceiving the complex and connected relationships between all things.

The exploration of window lattice patterns through the use of new materials and techniques, has led to the development of new visual language and aesthetic values. This has breathed new life into traditional Chinese elements, creating ceramic decorative works that combine tradition and modernity. This process not only provides a unique visual and ideological experience, but also opens up new possibilities for the integration of tradition and modernity, revitalizing the new life and meaning of window lattice patterns.

5.2 The problems encountered during the creation process

During the research, researchers encountered the following problems at different stages:

1. In order to improve readers' understanding of Chinese lattice windows, especially those with limited knowledge, it is crucial to gain a deeper insight into the culture of window lattice before creating ceramic works. This includes a detailed understanding and memory of its graphic structure to ensure accurate extraction and integration of representative elements, combine them into contemporary ceramics, and achieving visual effect transform. This process not only requires researchers to have a deep knowledge reserve, but also knowledge dissemination ability, in order to convey these cultural elements to the audience, enabling them to better comprehend and appreciate the significance and cultural value behind the work.

2. In the design process of transforming two-dimensional window lattice patterns into three-dimensional artworks, researchers have been exploring how to achieve this transformation. Before the creation, researchers accumulated new

knowledge about window lattice patterns through multidimensional observations, extensive collecting, in-depth study, and understanding them. They select the most representative patterns and creatively visualize them, ensuring they are presented in an easily understandable and communicable manner for widespread dissemination.

3. Regarding the various expressions of window lattice patterns in ceramic decoration, such as form, color, and glaze, repeated experimentation is necessary. With the assistance of the Ceramic Studio at the Silpakorn University in Thailand, researchers successfully acquired various types of clay samples. Through experiments, they discovered distinctive characteristics among these samples in terms of color, adhesion, and the shrinkage ratio after high-temperature firing. In order to be able to use these clay materials precisely in practical ceramic production, the researcher recognized the need to record these important parameters in detail. Specifically, porcelain clay VCB-11 exhibits the whitest color after firing, which can effectively highlight the contrast between blue-white or black-white colors. However, researchers noticed that VCB-11 has relatively poor adhesion and toughness. It often cracks when faced with complex hollow shaped parts of window lattice. Therefore, the researchers chose PBG clay with better toughness for carving, and used clay slip to cover up the color difference problem of the material. Strictly controlling the firing temperature is essential in experiments because effective temperature control can reduce the deformation of work during the firing process.

4. In order to inherit Chinese window lattice and ceramic culture, it is necessary to handle the following relationships well: 1. Origin and Genes (Chinese Style and Local Culture). 2. Art and Function. 3. Innovation and development (the relationship between tradition and modernity).

5. Throughout the process of ceramic decoration design featuring window lattice patterns, researcher have encountered numerous failures and lessons, including challenges in kiln temperature control, material selection, and various factors that are not suitable for Chinese ceramic technology.

5.3 The Summary of the creation process

The research topic "Visual Analysis and Exploration of Chinese Window Lattice Patterns in Contemporary Ceramic Decoration Design." The creative process can be summarized as follows:

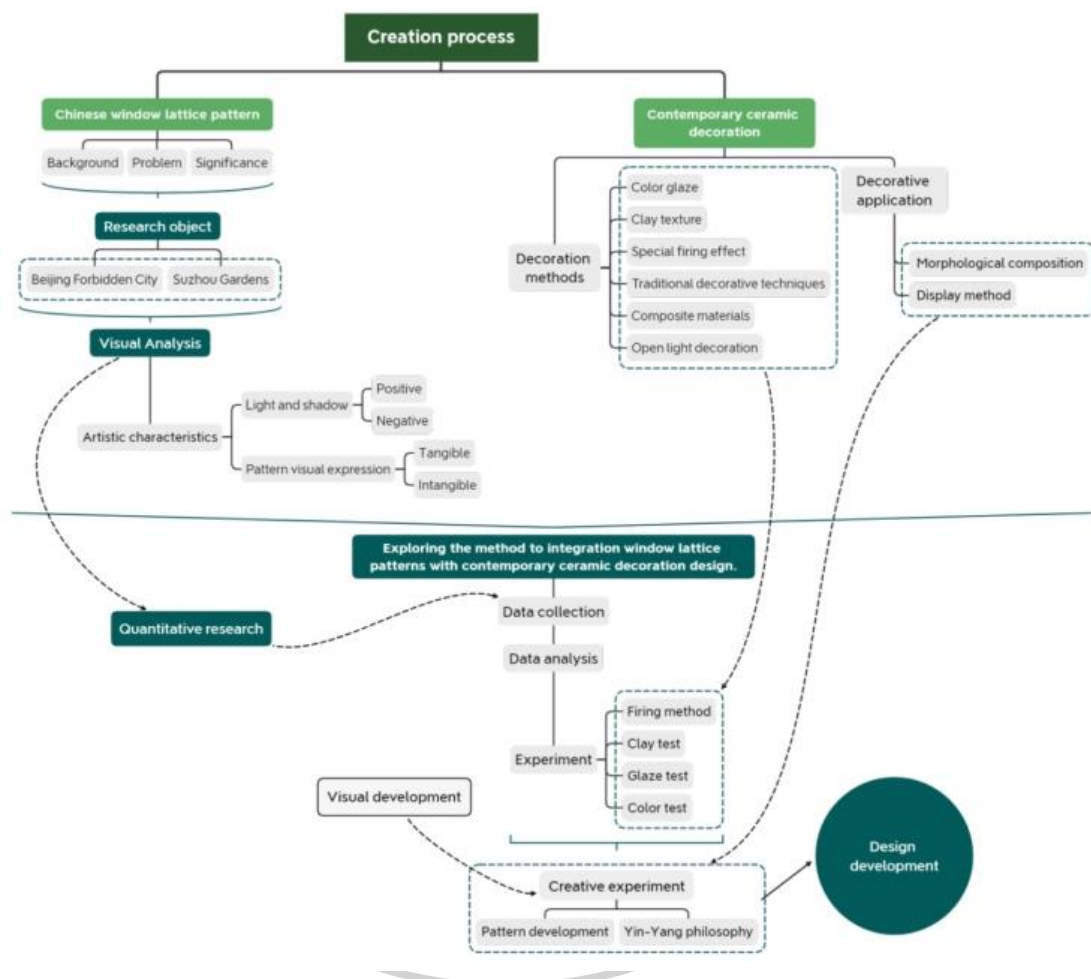


Figure 167. Creation process

Source: Researcher's diagram. January, 2024.

1. This thesis deals in-depth with window lattice patterns, an integral part of traditional Chinese visual elements, containing rich artistic forms. They are of great value for research in the field of design. However, their current development remains in the stage of applied art, lack a solid theoretical foundation for their exploration. Factors such as the lag in foundational theory and the limitation of expression methods have constrained the window lattice patterns development. More

exploration is needed to enhance the sustainability of window lattice patterns by employing new materials and new technologies.

2. Collecting window lattice data from various regions of China, focusing on the Forbidden City in Beijing and gardens in Suzhou, to understand the characteristics of window lattice patterns under different regional cultural backgrounds. By analyzing the window lattice in different regions, can more comprehensively discover their structural characteristics.

3. Analyzing the contemporary application of window lattice designs, drawing innovative aspects from case studies and artists' design concepts, exploring the method to integration window lattice patterns with contemporary ceramic decoration design.

4. Visual analysis is completed to summarize the window lattice patterns, outlining their structural characteristics and evolution rules to explore their potential in contemporary ceramic decoration design.

5. Through experiments, selecting the colors and materials for ceramic decoration under the optimal firing condition and integrating them with window lattice patterns. The window lattice serves as a bridge for spatial connection and provides an intertwined visual effect when observed through it, like a network connecting the world. Exploring the Yin-Yang philosophy hidden in window lattice designs, where "void" and "solid" are in opposition and transformed. In the visual effect, "positive" of lattice and the "negative" of space, also can transform each other. The choice of blue-white patterns and black-white colors from the traditional Chinese philosophy of Yin-Yang, aiming to showcase the world observed through window lattice. Art does not depict visible things, but creates invisible things (Cui, 2000).

6. The window lattice, as the primary symbol in the artwork, represents a part of traditional Chinese elements. It deconstructed the patterns of window lattice design and explores the underlying philosophical meanings, integrating traditional and modern artistic aesthetics to breathe new life into it. This expansion encompasses various expressions of window lattice in ceramic decoration design, as well as the application outcomes of new materials and technologies.

5.4 Contribution

This research aims to explore and develop the forms and underlying philosophical meanings that emerge after the evolution of patterns in ceramic works themed around Chinese traditional elements, expand the different ways of expression in ceramic decoration, and promote its inheritance and development. Through visual analysis of patterns, classify and summarize evolution rules by the window lattice, conduct experiments on ceramic clay, color, and glazes at different temperatures and firing conditions. The evaluation the research outcomes, and finally obtain the practical results of the artwork.

1. This study summarizes the types, characteristics, and cultural significance of window lattice patterns. It has contributed to the enrichment of the theory of window lattice culture.

2. This study, based on visual analysis of patterns, completes the organization, analyzing their structural and establishing evolution rules of window lattice patterns. This method not only retains the traditional feature of window lattice in the creative process, also exhibits contemporary characteristics.

3. Exploring the window lattice patterns development and underlying philosophical significance, expands the diverse expressions in ceramic decoration design, and creates the new visual language.

5.5 Recommendation

Window lattice patterns possess significant decorative and artistic features, representing the pinnacle of window ornamentation art during the Ming and Qing dynasties. Windows serve as conduits for indoor-outdoor communication and hold rich cultural connotations. This article conducts a comprehensive visual analysis of the morphological aspects of window lattice patterns in the Forbidden City and Suzhou classical gardens, summarizing the aesthetic characteristics of window lattices and emphasizing the importance of aesthetic research in this field. The application of the essence of traditional window decoration culture to contemporary design is of great reference value. Although this article provides a comprehensive macroscopic

study of window lattice patterns, there is still ample room for in-depth research into the details of window lattices.

Regarding future research directions for window lattices, the researcher suggests the following recommendations and areas for further study.

1. Window lattice patterns themselves are rich in artistic and cultural features. The various types of window lattice differ from one another in their aesthetics. For example, window lattices in residential buildings and in private gardens have their distinct focal points while also maintaining connections, and showcasing different visual forms. Therefore, designers interested in the art of window lattice patterns can further develop their understanding based on this research.

2. This research introduces an innovative approach to window lattice pattern analysis and application based on visual analysis, aiming to apply traditional window decorative elements in modern design. It is hoped that this approach can provide meaningful reference value for designers seeking innovation. Window lattice aesthetics research is not limited to the study of visual forms and characteristics, nor is it confined solely to ceramic decoration. Once the aesthetic aspects of window lattice patterns are understood, further research can delve deeper, facilitating the better preservation and development of traditional elements in contemporary society.

3. With the changing times, an increasing number of new concepts are influencing the development of the design field. The medium for window lattice design is not limited to ceramics but can also explore combinations with various emerging materials. Therefore, future research could focus on improving and expanding the materials used in window lattice design, incorporating new techniques and materials. This aims to apply window lattice patterns in contemporary settings, exploring and further develop traditional Chinese aesthetic elements, and enrich design themes.

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ATTENDED

PUBLICATION

1. Publication journal: Journal of Fine Arts, Chiang Mai University

Paper name: Redesign of Chinese Landscape painting in Ceramic Decoration Case Study on A Thousand Miles of Rivers and Mountains.

2. Publication journal: Journal of Roi kaensarn Academi.

Paper name: The Exploring of Chinese Window Lattice Patterns in Ceramic Decoration: A Case Study in Suzhou Gardens.

3. Conference : The 2nd International Conference on Intelligent Design and Innovative Technology (ICIDIT 2023).

Paper name: Application Research of Installation Art Based on Digital Media——Case Study on LED Display Technology.

AWARD RECEIVED

Ceramic works "Ground Surface" and "Red Change" were collected by the Museum of South Korea University in July 2019.

Ceramic works "Cute Chinese Zodiac" and "CHINA+China" were selected into China Ceramic Design Exhibition.

Ceramic work Impression of Water was selected in 2021 KSB DI-JCI International Art Special Exhibition (2021).

Ceramic work "Reshap series: Mountains" won the Franz Rising Star Project rookie award (2021).