

**STUDY ON THE CULTURAL CAPITAL OF MID-MING
DYNASTY FURNITURE FOR NEW PRODUCT DESIGN**



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Title	STUDY ON THE CULTURAL CAPITAL OF MID-MING DYNASTY FURNITURE FOR NEW PRODUCT DESIGN
Student	HAOMING HE
Student ID	67036001
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Advisor	Associate Professor Dr. CHATURONG LOUHAPENSANG

ABSTRACT

การออกแบบเฟอร์นิเจอร์ในราชวงศ์หมิงเป็นมรดกทางวัฒนธรรมที่มีเอกลักษณ์เฉพาะในประวัติศาสตร์จีนและได้รับการยกย่องว่าเป็นแบบอย่างของการผสมผสานฟังก์ชันการใช้งานเข้ากับ ความงามได้อย่างสมบูรณ์แบบการศึกษาครั้งนี้มีวัตถุประสงค์หลักสามประการได้แก่ประการแรก เพื่อทบทวนอย่างเป็นระบบถึงภูมิหลังทางประวัติศาสตร์ของการออกแบบและความงามของเฟอร์นิเจอร์ในช่วงกลางราชวงศ์หมิงและเพื่อสำรวจเทคนิคหลักแก่นสารทางวัฒนธรรมและลักษณะทางสุนทรียศาสตร์ของเฟอร์นิเจอร์ดังกล่าวประการที่สองโดยยึดถือสาระสำคัญของการออกแบบเฟอร์นิเจอร์ในราชวงศ์หมิงการศึกษานี้มุ่งเน้นไปที่การผสมผสานระหว่างการออกแบบดั้งเดิมกับการออกแบบผลิตภัณฑ์ร่วมสมัยโดยคำนึงถึงความต้องการทางสังคมในปัจจุบันและแนวโน้มด้านการออกแบบและประการสุดท้ายผ่านการวิจัยเกี่ยวกับความพึงพอใจต่อผลิตภัณฑ์นวัตกรรม การศึกษานี้จะประเมินการยอมรับและความคิดเห็นของสาธารณชนต่อฟังก์ชันการใช้งานคุณค่าด้านความงามและประสบการณ์ทางวัฒนธรรมของผลิตภัณฑ์ใหม่เพื่อเป็นพื้นฐานสำหรับการปรับปรุงการออกแบบในขั้นต่อไปการศึกษานี้จะใช้วิธีการหลากหลายรวมถึงการวิเคราะห์เอกสารและแบบสอบถามโดยในด้านหนึ่งจะตั้งอยู่บนบริบททางประวัติศาสตร์ของงานฝีมือและธรรมเนียมทางวรรณกรรมในราชวงศ์หมิงและในอีกด้านหนึ่งจะสอดคล้องกับความต้องการของผู้บริโภคในยุคปัจจุบันและประสบการณ์ของผู้ใช้การเจาะลึกแนวคิดความงามดั้งเดิมร่วมกับภูมิปัญญาด้านการออกแบบผลิตภัณฑ์สมัยใหม่จะช่วยให้การสร้างสรรคผลิตภัณฑ์ออกแบบร่วมสมัยที่สอดคล้องกับรสนิยมความงามและรูปแบบการใช้ชีวิตในยุคปัจจุบันมากยิ่งขึ้น

คำสำคัญ:การออกแบบเฟอร์นิเจอร์ราชวงศ์หมิง, สุนทรียศาสตร์จีนโบราณ, การออกแบบร่วมสมัย

Ming Dynasty furniture design is a unique cultural heritage in Chinese history, renowned as a paradigm of the perfect fusion of functionality and aesthetics. This study aims to focus on three core objectives: first, to systematically review the historical background of Ming Dynasty furniture design and aesthetics during the mid-Ming period, and to explore its core techniques, cultural connotations, and aesthetic characteristics; second, based on the essence of Ming Dynasty furniture design, this study aims to explore the integration of traditional and modern product design by combining contemporary social needs and design trends; finally, through research on the satisfaction of innovative products, this study will assess the public's acceptance and evaluation of the functionality, aesthetic value, and cultural experience of new products, providing a basis for subsequent design optimization. This study will employ a variety of methods, including literature analysis and questionnaire surveys. On one hand, the research will be grounded in the historical context of Ming Dynasty craftsmanship and literary interests; on the other hand, it will closely align with contemporary consumer needs and user experience. A deep exploration of traditional aesthetic concepts and modern product design wisdom will contribute to the creation of modern design products that better align with contemporary aesthetic preferences and lifestyles.

Keywords: Ming Dynasty furniture design, ancient Chinese aesthetics, modern design.

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HAOMING HE

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CHAPTER 1

Introduction

1.1 Background

As an important component of traditional culture, the furniture cultural heritage of the mid-Ming Dynasty plays a significant role in enhancing our understanding of the outstanding traditional culture and history of the Chinese nation, promoting the spirit of national culture, and strengthening cultural confidence. Studying the furniture cultural heritage of the mid-Ming Dynasty can enhance people's aesthetic standards, helping them to understand and appreciate beauty more deeply. In the study of furniture design aesthetics during the mid-Ming period, people can understand the elements of furniture, such as form, color, and materials, as well as their expression in space, thereby gaining a deeper aesthetic experience. Additionally, studying the cultural heritage of Ming Dynasty furniture can guide people to correctly recognize and understand artistic works, thereby improving their artistic appreciation skills. Furthermore, when analyzing traditional design aesthetics, traditional design concepts hold significant guidance for modern furniture design. By studying the aesthetic theories and practices of Ming Dynasty furniture cultural heritage, research can better grasp contemporary trends, understand consumer needs, optimize design concepts, and enhance design quality. Product designers can draw inspiration from the classic elements and design concepts of mid-Ming Dynasty furniture cultural heritage, combine them with modern technology and market demands, and create modern innovative designs with aesthetic value. This, in turn, can innovate methods, concepts, and products, stimulate people's innovative awareness and spirit, and drive technological and industrial innovation. Under the guidance of Ming Dynasty furniture cultural heritage, research should continuously explore new design concepts and innovative thinking patterns to promote the innovation and development of the product design industry. For mid-Ming Dynasty furniture, which advocates nature, environmental protection is equally important. By studying the aesthetics of mid-Ming Dynasty furniture cultural heritage and establishing a connection between ecological protection and sustainable development, research can guide people to pay more attention to environmental protection and promote green development. Therefore, in practice, designers should incorporate environmental protection concepts into product design, use green materials and production processes, reduce negative impacts on the environment, and promote the sustainable development of the product design industry. In summary, the significance of studying the cultural heritage of Ming Dynasty-style furniture lies not only in preserving culture, enhancing aesthetics, guiding design, promoting innovation, and protecting the environment, but also in driving the development and progress of the industry. Additionally, it will promote the excellent traditional culture of the Chinese nation and enhance cultural confidence. Therefore, research should strengthen research

on the cultural capital aesthetics of mid-Ming Dynasty furniture, explore its greater value, and contribute to the development of modern society and culture.

Figure 1

Representative Mid-Ming Dynasty Furniture

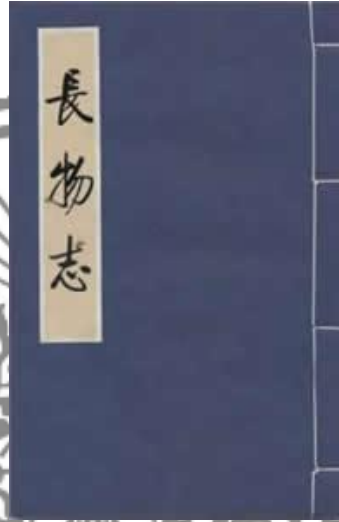


Note: Images are sourced from Baidu search engine.

In the early Mid-Ming Dynasty, the furniture style was still relatively rough and bold, but with the rise of the literati and doctors, they began to pursue a simple and elegant lifestyle, which is also reflected in the furniture design. In the middle and late Mid-Ming Dynasty, the furniture style gradually tended to be delicate and delicate, the lines were smooth and straight, the shape was simple and changeable, and the decoration was moderate and elegant. This style not only met the needs of the literati and doctors, but also gradually became popular among the people and became a fashion and trend.

Figure 2

Chinese Ancient Books Recording Mid-Ming Dynasty Furniture



Note: Images are sourced from Baidu search engine.

In the development process of furniture in the Mid-Ming Dynasty, a group of outstanding craftsmen and designers emerged, who made great contributions to the prosperity and development of Mid-Ming Dynasty furniture by virtue of their wisdom and talent. Zhu Youzhen is the Ming Xianzong. Although he did nothing politically, he was extremely talented and passionate in art. Chu was particularly skilled in carpentry, and he personally designed and improved the shape of the furniture, and his creativity and skill were unmatched at the time. His furniture is not only solid in structure and smooth in line, but also beautifully decorated and creative, injecting new vitality into the development of Mid-Ming-style furniture. Wen Zhenheng was one of the representatives of the late Ming literati and doctors.

The book details and summarizes the design, production, and use of furniture in the Mid-Ming Dynasty. Wen Zhenheng advocated a simple and elegant lifestyle, and his aesthetic ideas had a profound impact on the style of Mid-Ming Dynasty furniture. He advocated that furniture design should be "rather ancient than refined, rather simple than clever, rather frugal than vulgar", this concept is still respected by later generations.

Li Yu was a writer and dramatist in the early Qing Dynasty, but he also had a strong interest in furniture design. The furniture designed by Li Yu is both practical and beautiful, creative and individual. He recorded the various furniture styles and production techniques he designed in the book "Idle Love", which provided valuable reference materials for future generations. Tu Long was a famous literati and

connoisseur of the Mid-Ming Dynasty, and had deep attainments and unique insights into literati painting. Tu Long's "Gao Nuan Yu Words" records in detail the life and cultural items of the literati in the late Mid-Ming Dynasty, including many exquisite furniture. These works not only reflect Tu Long's aesthetic pursuit and interest in life, but also provide important clues and basis for future research on Mid-Ming-style furniture.

In April 1966, the Shanghai Municipal Administration of Cultural Relics excavated an ancient tomb from the Wanli period of the Mid-Ming Dynasty in Baoshan, Shanghai, and unearthed a number of exquisite furniture, including rosewood inlaid marble inkstone screens. The discovery of these furniture provides valuable material for future generations to study Mid-Ming Dynasty furniture, and also provides an important basis for the Mid-Ming Dynasty furniture. These furniture not only have exquisite craftsmanship and beautiful shapes, but also have rich and diverse decorative themes, which fully reflect the artistic charm and cultural connotation of Mid-Ming Dynasty furniture. With the opening of the Maritime Silk Road and the promotion of historical events such as Zheng He's voyage to the West, Mid-Ming-style furniture gradually spread to Southeast Asia, Europe and other places, and was loved and respected by the locals. The production process of furniture in these regions has also been developed and improved under the influence of Mid-Ming-style furniture, forming a furniture style with local characteristics.

Figure 3

Imperial Furniture Of The Mid-Ming Dynasty



Note: Images are sourced from Baidu search engine.

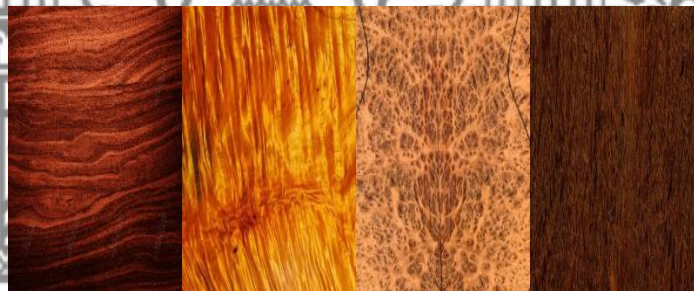
At present, the study of furniture in the Mid-Ming Dynasty is facing many problems that need to be solved urgently.

1. Shortage of raw materials and rising costs

Ancient Chinese furniture is mostly made of precious hardwood materials such as mahogany, red sandalwood, and huanghuali. These timbers have a long growth cycle and limited resources, and with the increasing demand, the shortage of raw materials is becoming more and more prominent. At the same time, the procurement cost of hardwood materials is also rising year by year, which makes the production cost of furniture increase significantly. This not only limits the scale of furniture production, but also raises the market price of furniture, thereby affecting the popularity and market competitiveness of furniture.

Figure 4

Traditional Precious Woods



Note: Images are sourced from Baidu search engine.

2. The difficulty of passing on traditional handicrafts

Ancient Chinese furniture craftsmanship was intricate and required highly skilled and experienced craftsmen. However, in modern society, with the decline of the younger generation's interest in traditional culture and the acceleration of the pace of life, fewer and fewer people are willing to learn and inherit traditional furniture making skills. As a result, traditional craftsmanship is at risk of being lost, and it is difficult to guarantee the quality and uniqueness of the furniture.

3. Combine with modern home style

Ancient Chinese furniture is designed in a unique style, often with strong traditional cultural elements and historical imprints. However, in the modern home environment, how to integrate these traditional furniture with modern decoration styles

has become a difficult problem. Many consumers pay more attention to the practicality of furniture and the coordination with modern home style when purchasing furniture, which makes the audience of traditional furniture in the modern market relatively limited.

4. Changes in market demand and consumer attitudes

With the development of the times, the needs and consumption concepts of consumers are also changing. Modern consumers pay more attention to the comfort, practicality and individual needs of furniture. Ancient Chinese furniture tends to pay more attention to its cultural value and artistic beauty, which deviates from the needs of modern consumers to a certain extent. Therefore, how to innovate and improve traditional furniture according to the changes in market demand and consumption concepts to meet the needs of modern consumers has become an important topic.

An in-depth analysis of the current situation of the furniture industry can find that as a unique traditional craft category, Mid-Ming-style furniture is undoubtedly one of the bright pearls. It not only represents the classic traditional art form, but also forms a unique aesthetic standard and a strong literati atmosphere in the long-term development, and gradually builds an independent furniture style system. This style not only focuses on practicality, but also takes simplicity, elegance and nature as the core, which is deeply imprinted with the characteristics of traditional Chinese culture. However, as a cultural treasure that has not yet been fully recognized and developed by the world, the true value of Mid-Ming-style furniture design aesthetics has not yet been fully explored.

Figure 5

Conference On The Preservation Of Mid-Ming Dynasty Culture



Note: Images are sourced from Baidu search engine.

1.2 Research Objectives

1.2.1 Cultural Capital and Furniture Aesthetics in the Middle Mid-Ming Dynasty

1.2.2 Design new products according to the cultural capital of furniture in the

middle of the Mid-Ming Dynasty

1.2.3 New product design satisfaction research

1.3 Research Concepts

1.3.1 The theoretical basis of the study of cultural capital in the middle of the Mid-Ming Dynasty and the aesthetic research of furniture in the middle of the Mid-Ming Dynasty

Many documents from the Mid-Ming Dynasty and later generations recorded information about furniture, such as the "Chronicles of Long Things" and the "Eight Notes of Zunsheng". These documents provide valuable written materials for researchers, and the existing Mid-Ming Dynasty furniture objects are the most direct and reliable evidence for studying its history, style and craftsmanship. Through physical evidence, researchers can more intuitively understand the characteristics and production process of Mid-Ming Dynasty furniture. From several aspects, whether the research on furniture cultural capital in the Mid-Ming Dynasty is supportive, the society in the Mid-Ming Dynasty was stable, agriculture and handicrafts were developed, and craftsmen gained more freedom. Especially in the middle and late Mid-Ming Dynasty, the abundance of goods, the wide range of circulation channels, the opening of foreign trade, and the rapid rise of the economy of large towns provided favorable conditions for the prosperity of the furniture manufacturing industry. These characteristics reflect the aesthetic orientation and craftsmanship level of Ming society. The design follows the value orientation of traditional Chinese culture and etiquette, and pays attention to the combination of practicality and beauty. In terms of craftsmanship, the production technology of Mid-Ming-style furniture has reached an unprecedented peak, with extremely precise mortise and tenon structures, small and concise contours of components, and fine workmanship of decorative lines and feet. The use of these techniques makes Mid-Ming-style furniture extremely practical and artistic.

Figure 6

Chinese Ancient Painting



Note: Images are sourced from Baidu search engine.

In the early years of the Mid-Ming Dynasty, he regained his personal freedom and became a slave of craftsmen, which stimulated the wisdom and creativity of craftsmen; Zheng He's ocean-going trade in the West provided a large amount of precious wood for furniture production, and under the impetus of social changes, the types and styles of furniture became more and more abundant, and the concept of complete sets of furniture has been formed. At the same time, furniture production processes are constantly improving and innovating.

Figure 7

Mortise And Tenon Joint



Note: Images are sourced from Baidu search engine.

To sum up, the theoretical basis for the study of furniture history in the Mid-Ming Dynasty includes historical background and cultural inheritance, documentary materials and physical materials, artistic style and aesthetic orientation, craft technology and material selection, as well as social changes and furniture development. These theoretical bases provide us with a comprehensive understanding of the ways and methods of Mid-Ming Dynasty furniture.

1.3.2 Theory of innovative ideas

As a product of multidisciplinary, modern furniture design theory integrates the research results of art, engineering, humanities and natural sciences to form a theoretical system with the balance of function and aesthetics as the core. As the basis of modern furniture design, functionalist theory emphasizes that "form obeys function", that is, the primary goal of furniture design is to meet the actual needs of users, and its form should serve function, rather than adding superfluous design for the sake of decoration.

Figure 8

Bauhaus Chair

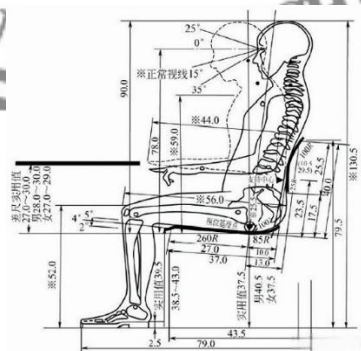


Note: Images are sourced from Baidu search engine.

Represented by the Bauhaus, this theory makes furniture both functional and aesthetically pleasing through simple geometric forms and modular design. On this basis, the theory of ergonomics further enriches functionalism. Through the study of human scale, movement and comfort, furniture designers are able to accurately calculate the parameters of the product, such as the height of the chair, the angle of inclination of the seat and the curvature of the backrest, to ensure optimal comfort and health (Pheasant & Haslegrave, Bodyspace, 2005). The introduction of ergonomics not only improves the use experience of furniture, but also reduces the health risks associated with improper design.

Figure 9

Ergonomics



Note: Images are sourced from Baidu search engine.

Modern furniture design emphasizes practicality while also paying attention to the emotional connection with the user, which is the core of emotional design theory. Designers convey emotional messages through forms, colors and materials, making furniture not only functional items, but also carriers to express personal taste and attitude to life. For example, a wooden chair may enhance the user's sense of psychological pleasure because of its texture and touch, which enhances the user's psychological pleasure (Norman, Emotional Design, 2004).

The researchers hope to produce products with a wide range of cultural adaptations while retaining traditional characteristics while incorporating cultural elements from different regions. Combining the possibilities of international modern design with the traditional line aesthetics of the East and the modern simplicity of the West, a multicultural product design style is formed.

Aesthetics and style theory play an important role in modern furniture design, helping designers to focus on the visual appeal and cultural expression of the product while focusing on the product's function. For example, the minimalist style emphasizes deconstruction and simplicity, less is more, while the postmodern style tends to deconstruct and innovate, encouraging design that breaks the traditional rules (Venturi, Complexity and Contradiction in Architecture, 1966). Through these theories, modern product design not only maintains the essence of traditional craftsmanship, but also incorporates contemporary technology and aesthetic innovations, becoming an indispensable work of art in life. Modern product design theory is a systematic and complex body of knowledge that integrates functionality, sustainability, humanistic care and technological innovation to meet the ever-changing needs of human life. These theories are not only applicable to current furniture design, but also provide rich ideas and directions for innovative design concepts in other directions in the future, injecting more convenience and beauty into modern life.

1.3.3 Expert scoring of new products and satisfaction survey of new products

In this new product design, there are three experts who provide guidance on new product culture innovation, new product design and new product structure:

Cai Shangwei is a professor at Sichuan University, a doctoral supervisor and a postdoctoral supervisor. China's "2009 Cultural Industry Person of the Year". He is currently the director of the Cultural Industry Research Center of Sichuan University and the director of the "Beautiful China" Research Institute of Sichuan University.

Wu Mingzhong, municipal intangible cultural heritage project: representative inheritor of Mid-Ming-style furniture making skills. Three experts answered. Most of the monographs related to some Mid-Ming Dynasty materials and research content in

the papers are general histories, complete books, and dictionaries.

Wang Jiayi, associate professor, national second-class manual carpentry technician, director of Sichuan Furniture Repair and Protection Institute of Sichuan International Advertising Vocational College, consultant of Chengdu Modern Furniture Research Institute, deputy director of the Furnishing Art Branch of Sichuan Civil Engineering and Architecture Society.

New product satisfaction surveys are based on group sample data.

1.4 Scope

Taking the mobile phone holder as the design object, inheriting the tradition in a broad sense, and exploring the modern creative design products with the characteristics of Mid-Ming-style furniture cultural capital. Considering that Mid-Ming-style furniture is known for its simplicity and elegance, exquisite craftsmanship and strong literati atmosphere, and its design concept is deeply influenced by Confucian culture and literati culture, the target market of the product is positioned as an age-appropriate group who pay attention to traditional culture. With the country's emphasis on the inheritance of traditional culture and artistic aesthetic education, research believe that creative design products with cultural heritage will be favored by consumers, therefore, research chose the carrier of mobile phone holder, from the structural design, material selection, decorative elements, etc., the traditional design concept and life aesthetics of the Mid-Ming Dynasty and modern design concept and contemporary aesthetics collided with each other, and designed a creative mobile phone holder design product with this idea. Integrating the design elements of Mid-Ming-style furniture into modern products, people can not only meet the functional needs in daily use, but also get inspiration from the aesthetics of Mid-Ming-style furniture, so that Mid-Ming-style furniture culture can radiate new vitality in modern life in a new form, promote the inheritance and innovation of China's excellent traditional culture, and let more young people love and even fall in love with traditional culture.

To this end, a questionnaire survey was conducted on the target group to understand the user's aesthetic preference and cognition of the cultural capital of Mid-Ming-style furniture, collect the experience and feelings of the target group on the use of existing products, find the potential needs and deficiencies of the target group for the design content, and tap the available creative design elements in a targeted manner, so as to provide solid theoretical and practical support for creative home design.

1.4.1

In the process of exploring the market demand for furniture in ancient China, the researchers consulted a large number of primary and secondary documents, and collected information extensively through questionnaires. The results of the study

clearly show the bottlenecks in the design of mobile phone holder products on the current market: many design concepts are the same or lack of innovation and unique creative expression; The styling and decorative elements of some products have not kept pace with the times. In order to break this dilemma, the researchers take respect for traditional culture as the core starting point, draw inspiration from classical modeling and craft aesthetics, and combine it with contemporary design concepts to build a new design idea that pays equal attention to inheritance and innovation, giving modern product design more vitality and cultural depth.

During the information-gathering phase, the research team carefully divided the group of information providers:

- 1: The target customer group, including traditional culture lovers, whose needs and preferences provide direction for design.
- 2: Specific data providers, through purposeful sampling, select professionals and historical researchers with a deep understanding of Ming cultural capital and design concepts.

The data collection tools included well-designed questionnaires and vivid and concrete feedback through in-depth exchanges in the field. At the same time, the research team read relevant books, academic articles and online resources extensively, and referred to historical research results, which laid a solid theoretical foundation for the formation of design ideas.

Through a questionnaire survey, this study explores the various factors consumers prioritize when purchasing smartphone stands that blend Ming-style furniture design with modern design cultural capital, as well as their attitudes toward the overall satisfaction and sustainability performance of such products. The study employs percentage analysis to systematically classify, organize, and statistically summarize the collected questionnaires, aiming to identify consumers' focus on design style, material application, cultural connotations, and price positioning, as well as their feedback on the overall user experience and environmental attributes of the products. Based on the survey results, the researchers further analyzed consumers' emphasis on the aesthetic features, material quality, cultural value, and price expectations of such fusion-designed products, and summarized the respondents' overall evaluations of the finished products' comfort and environmental friendliness.

1.4.2 Design scope

In terms of design, referring to the classic elements of Mid-Ming-style furniture, research have studied from many aspects such as modeling, decoration and materials. In terms of modeling, research pay attention to the beauty of ancient lines and overall symmetry, and select a representative square and circle combination structure

to reflect the unique harmonious beauty of Mid-Ming-style furniture. Mid-Ming-style furniture has both simple and dignified temperament and exquisite craftsmanship. The backrests of the circle chair and the official hat chair are either arced or hat-shaped, showing a complete and solemn cultural image; The lampshade line adopts a concave and convex alternating foot shape, which enriches the details and avoids bumps; The door posts are elegantly curved into the overall straight line layout, which strengthens the structure and increases the visual rhythm; The door post pays more attention to the load-bearing mechanics, so that the large table and the large case are stable and solid. They provide inspiration for modern design and cultural creation, integrating the traditional spirit into contemporary, furniture, spaces and artworks through symbolism and simplicity, showing the timeless charm and innovative potential of Chinese aesthetics.

In doing so, for example, the rounded lines of the back of the chair as an iconic motif, the lines of the lampshade into scroll-like decorative lace, or the elegant arch of the doorposts combined with modern materials and design language, create the ideal space for a fusion of the old and the new. In terms of decorative elements, techniques such as carving, hollowing, and engraving are used frequently, and the patterns are mainly botanical patterns (such as plum, orchid, bamboo, chrysanthemum, etc.) and symbolic moire and relief patterns. To appeal to younger users, traditional patterns have also been moderately simplified or anthropomorphic, making them more approachable and modern. In terms of color selection, the dark colors commonly used in Mid-Ming Dynasty furniture (such as rosewood, mahogany, etc.) are retained as the main body, and an appropriate amount of light colors are integrated as embellishments, which increases the visual hierarchy of modern design concepts. Finally, a series of modern mobile phone holder products that incorporate the aesthetic elements of the Mid-Ming Dynasty were designed, bringing consumers a dual experience of practicality and culture.

1.4.3 Population and sample size

The samples were divided into 2 groups:

The first sample group is the main customer group, which is composed of the core user groups who have a strong interest or demand for ancient Chinese furniture culture and traditional culture, including office workers, students and civil servants, traditional furniture collectors, traditional culture lovers, etc.

The second sample group is for data providers and consists of industry professionals and researchers with specialized knowledge.

1.4.4 Sample area range

Region:

Since Chengdu is a representative area of strong traditional culture and modern trend development, the research object also covers online consumers, and samples are obtained through e-commerce platforms, social media and other channels, which reflects the digital consumption trend, which ensures the breadth and depth of research, reflects the diversity of market demand, and provides a scientific basis for the satisfaction survey of design innovation.

1.4.5 Research variables

In the design of this study, the following variables can be considered as the main variables that may be involved in this study

1: Demographic variables: age, gender, occupational/industry background, income level/spending power, education level.

2: Cognitive and attitudinal variables: the degree of interest or demand for traditional cultural products, the willingness to buy cultural innovation products, the understanding and recognition of traditional culture, the acceptance of product innovation and design, aesthetic and cultural values, the emphasis on the "cultural value" or "artistry" of creative products, the emphasis on practicality/functionality/modern compatibility, price and market perception, and the range of price acceptance.

3: Behavioral and demand-related variables: purchase or receipt behavior, frequency of purchase/pick-up, access to relevant product channels, sources of information and concerns, what are the main ways for respondents to obtain information about innovative products (exhibitions, social media, offline physical stores, professional magazines, etc.), future expectations and improvement needs, suggestions for improving products (shape, function, materials, price, etc.) for applications in modern use scenarios.

4: Specialization and industry perspective variables (mainly for specific data providers): professional field background, research field, years of experience or academic achievements, industry or academic evaluation, outlook on the development status of innovative product market, judging the balance between ancient cultural capital and modern product innovation, professional advice on market standardization

In summary, the study variables can be divided into three broad categories: population background variables (demographic characteristics, regional distribution, subgroup types, etc.). Attitudinal/cognitive variables (interest in innovative products, cultural values, price acceptance, perception of market trends, etc.). Behavioral demand variables (purchase/collection behavior, sources of information, suggestions for improvement, professional opinions, etc.).

Among them, the variable performance of different groups (primary customer group, secondary customer group, specific data provider) is different, and researchers can conduct horizontal or vertical comparative analysis for different subgroups. By refining and quantifying these variables one by one through questionnaires or interview outlines, research can more systematically understand the demand status of the antique furniture market, the psychological motivation of users and the views of professionals, and provide a more scientific and targeted basis for subsequent product design, marketing strategies and academic research.

1.5 Research Methodology

1.5.1 Field research

Visit Mid-Ming Dynasty furniture museums and research institutions, conduct in-depth interviews with museum staff and relevant experts, and obtain first-hand reliable data and information.

1.5.2 Review of historical documents

Through the online platform, the books published by the Ming Style Furniture Research Institute and its related electronic collections were carefully consulted, and the pictures and texts were used to ensure the accuracy and completeness of the literature.

1.5.3 Network Resource Reference

Many novel ideas, classic design cases and innovative thinking were extensively searched and excavated on the Internet, and systematic research and analysis were carried out in combination with the pictures taken during the field research.

1.5.4 Summary of the study

Based on the above research results and research ideas, the author conducted a comprehensive combing and summary, and finally integrated them into an important part of the paper

1.6 Terminology

Mid-Ming-style furniture: The furniture system formed by the Mid-Ming Dynasty has typical style characteristics such as simple lines, proportions, mortise and tenon structure and overall beauty.

Mortise and tenon structure: The core technology of traditional Chinese carpentry, wooden parts are connected by concave and convex tenons (mortise and tenon, mortise and tenon), and no metal nails or glue are used to stabilize the furniture.

Contour: The typical curved support or connecting parts in Mid-Ming-style furniture not only meet the mechanical requirements, but also have decorative beauty,

which is one of the important symbols to identify Mid-Ming-style furniture.

Toothed panels and Mid-Ming-style frames: common structural or decorative elements of Mid-Ming-style furniture, used for furniture support, decoration, etc., reflecting the traditional line beauty and craftsmanship value.

Lampshade line: also known as "candle line", is a kind of thin line (decorative line) common in ancient furniture and wood decoration, mostly used in the border of furniture, legs and feet or the turning point of the panel, adding elegance and refinement.

Stratified random sampling: A common sampling method in which the population is stratified based on age, occupation, income, cultural interests, and other aspects, and then a random sample is drawn within each stratum to ensure diversity and representativeness.

Intangible heritage: used to describe and safeguard all types of intangible cultural heritage, including traditional furniture-making techniques, emphasizing the transmission of skills, knowledge and social practices from generation to generation.

Modernism: a design trend that emphasizes simplicity, de-decoration and functionality, in line with the Bauhaus philosophy.

"Form follows function", one of the core principles of Bauhaus design, that form should serve functional needs rather than decoration.

1.7 Expected benefits

Through our products, research continues to draw on the design style of "fusion of modern and traditional", hoping to form a unique design language and at the same time establish an innovative image among the target group. Through innovation, research integrates the design language of Mid-Ming-style furniture (such as door posts, lampshade lines, mortise and tenon structures, etc.) into the design of modern mobile phone holder products, promote the modernization of traditional cultural expressions, stimulate the interest of the younger generation in traditional culture, and allow more people to participate in the purpose of protecting and appreciating traditional culture. Stimulate the interest of the younger generation in traditional culture, and let more people participate in the purpose of protecting and appreciating traditional culture. Locally specific wood or handicrafts can be selected for production, promoting the revival of the local traditional woodworking industry, optimizing processes and reducing waste by selecting sustainable materials (e.g. certified wood, eco-friendly paints, etc.).

CHAPTER 2

Literature review

What makes Mid-Ming-style furniture unique in the history of ancient and contemporary Chinese and contemporary design lies not only in the excellence of materials and craftsmanship, but also in the high balance between form, decoration and function. Whether it is the elegant backrest of the circle chair and the official hat chair, or the structural or decorative elements such as the lampshade line, door posts and firs, they all show the simplicity and elegance and exquisite craftsmanship unique to the "Ming style" at the same time on the visual and mechanical level. These elements were not only frequently applied and improved at that time, but also repeatedly mentioned and demonstrated in the research and collection of later generations, becoming the core foundation for us to explore and inherit the aesthetics of Mid-Ming-style furniture today.

2.1 History of Mid-Ming-style furniture

Mid-Ming Dynasty furniture is the peak in the history of ancient Chinese furniture and has extremely high artistic value. Although centuries have passed since the Mid-Ming Dynasty, the craftsmanship and design of Mid-Ming Dynasty furniture are still appreciated today. From a market perspective, ancient Chinese furniture has always been a popular collection in the collecting world. Collectors and investors at home and abroad rushed to buy ancient Chinese furniture. Rare, ancient, and well-crafted varieties of antique furniture often fetch high prices on the auction market. With the continuous development of China's economy, the market price of ancient Chinese furniture is also rising. Some masterpieces, such as Ming and Qing dynasty furniture, have become assets with great investment value. Antique furniture products and ancient design concept products are also becoming more and more popular. At the same time, the government has taken steps to protect the country's cultural heritage, including ancient furniture. Some precious ancient furniture is listed as a national cultural heritage and is protected by law. Chinese museums and cultural institutions often exhibit ancient furniture to promote traditional Chinese culture and furniture-making techniques. This helped to raise public awareness of ancient Chinese furniture. When it comes to ancient furniture restoration techniques, China has professional restorers who use traditional techniques and modern methods to restore and preserve ancient furniture. This helps to extend the life of the furniture and preserve its original value, while at the same time, bringing ancient techniques and art to the modern age by leveraging the expertise of the restorers and the finished restoration. While some traditional furniture making skills have been inherited and carried forward, schools and training institutions have opened relevant courses, relevant national institutions and organizations are committed to protecting their traditional production skills, and scholars at home and abroad have conducted in-depth research on the history, style and craftsmanship of ancient Chinese furniture to promote public understanding of this field. In today's design field, some

designers incorporate elements of traditional ancient furniture into modern design to create unique pieces that meet the needs of modern society, and schools offer such courses to encourage students to explore innovative ways to create new results and apply new methods in the new era.

Inheriting ancient Chinese furniture design skills and aesthetics is an important part of protecting and promoting traditional Chinese culture. Through the inheritance of traditional production techniques, aesthetic concepts and cultural values, as well as the innovation of modern design, ancient Chinese furniture can continue to play an important role in contemporary society. It is the earliest and most primitive furniture in ancient China. From the Xia, Shang, Zhou to Han Dynasty, the use of chairs has never been left in the living rooms of ancient China. The ancients sat on the ground, and the bed was used as a tool in the room, which in this case was mainly a mat; Later, there were screens, tables, desks and other furniture. The bed is derived from the couch that can be both lying and sitting. By the Shang, Zhou, Qin, Han, and Wei dynasties, there was little change, and stools and tables appeared, but they were not the mainstream; It was not until the Han Dynasty that the Hu bed was introduced to the Central Plains, and during the Northern and Southern Dynasties, high-type seats appeared one after another, and sitting on the feet began to be popularized. In the Tang Dynasty, the form of rest was still two forms in parallel, high tables, high chairs, high stools, etc., but sitting on the ground was still a daily habit for many people. From the Tang Dynasty to the Five Dynasties, the pursuit of luxury life became a fashion, and the furniture of the Five Dynasties developed to the initial perfection, and there were straight-backed chairs, desks, screens, beds, couches, piers and other furniture. From the mid-to-late century onwards, the Song Dynasty experienced rapid economic development and the cities prospered and strengthened. In the Song Dynasty, high-seat furniture was quite common, and high desks, high tables, and high tables also appeared, and sitting with their feet down became a fixed posture, and China's historical changes began from sitting. The Song Dynasty was a period of unprecedented development in the history of Chinese furniture, and it was also a period of unprecedented popularity of furniture. The furniture varieties of the Song Dynasty include beds, couches, tables, desks, stools, boxes, cabinets, etc., as well as special furniture such as piano tables and chess tables, and there are various forms of furniture.

The prosperity of the handicraft industry in the Mid-Ming Dynasty promoted the development of furniture. The number of craftsmen has increased compared to the previous generation, and the skills are highly skilled, and professional industry organizations for furniture design and manufacturing have emerged. After continuous change, evolution and development, Chinese furniture has entered a complete and mature period by the Mid-Ming Dynasty, forming a unique style, known as "Mid-Ming-style furniture". Mid-Ming-style furniture was mixed with the feelings of the literati,

and the literati participated in the design of the furniture, which was not possessed by the previous generation of furniture.

At the same time, the reason why Mid-Ming-style furniture is still highly respected by Chinese and foreign people for thousands of years is that it is a high degree of unity of science and art, and a perfect combination of functionality and aesthetics. In other words, Mid-Ming-style furniture has earned a reputation for its excellent selection of materials, rigorous craftsmanship, versatility of practical functions and comfort, and superb artistic skills. Therefore, it can be said that it is also the result of integrating the advantages of all aspects of people's lives and transforming the material pursuit of comfort and the spiritual pursuit of aesthetics into design intentions. Judging from the existing large number of Mid-Ming-style furniture objects and historical records, Mid-Ming-style furniture is mostly made of rosewood, mahogany, wolfberry wood and other hardwoods or hardwoods such as nanmu, camphor wood, walnut and elm. Due to their soft colour, clear grain, hard texture and elasticity, they have a good influence on the structure and artistic effect of furniture. The reason why most of the Mid-Ming-style furniture is simple, upright and lightweight is because hardwood is very precious. In order to save wood, the cross-section made is generally small, which creates this effect. In addition, because the color of the wood itself has a natural grain beauty, most Mid-Ming-style furniture is rarely lacquered to fully display the grain and natural beauty of the wood itself, which also makes it look simple and elegant. The production process of Mid-Ming-style furniture is very rigorous and fine, and the structure is scientific and reasonable. Its production is round up and down, smooth and neat, seamless splicing, uniform line angles, and when determining the components, special attention is paid to its thickness and rivets, tenon and tenon use rationality, so it is strong and stable without glue, showing the superb skills of people at that time. The Mid-Ming-style furniture category suitable for various needs is also colorful. They meet people's practical requirements from all aspects, it is particularly worth mentioning that the craftsmen have a preliminary understanding and application of the so-called "ergonomics" today, in the production of furniture, special attention is paid to its length, width and height in line with the scale ratio of the human body, and its shape is also more suitable for people's use of functions, so as to give people a sense of "body comfort, heart pleasure". It gives people the aesthetic feeling of "comfortable body and happy heart". The artistic achievements of Mid-Ming-style furniture are obvious to all, its style is elegant and handsome, the use of simple and neat lines, there are different changes in the shape of the end and turn, resulting in a variety of rich modeling effects, its decorative ornamentation is by no means a snake to add to the snake, on the contrary, it plays the finishing touch of the artistic effect. Therefore, if the aesthetic style of the Mid-Ming Dynasty shows a trend of integration of art and art, art and life, then its performance in the Ming style furniture art reflects the improvement of the quality of

life of the Mid-Ming Dynasty people, they not only have to live for life, but also to live for enjoyment, in the design of their daily necessities, rather than compromise, but also to give full play to their wisdom. When designing daily necessities, they do not settle for the next best, but give full play to their ingenuity, unreservedly show their best results in craftsmanship and art, and pursue spiritual aesthetic enjoyment while pursuing material comfort.

2.2 The main components of the cultural capital of furniture design in the Mid-Ming Dynasty

Research on the process of Soviet-style furniture in the middle of the Mid-Ming Dynasty Mid-Ming Dynasty furniture can be divided into four categories according to its function. 1. Table and coffee table 2. Bed: Bedding that only has a bed without any equipment is called a "sofa". It is also sometimes called a "bed" or "crib". The "bed" with fences at the back, left and right is called the "rooster bed"; A "bed" with pillars, a fence between the pillars, and pillars supporting the roof is called a "ceiling bed". 3. Chairs and stools include different types of chairs: this type of furniture is either mainly used as a display unit, or mainly as a storage unit, or as both a unit and a fixture. It is furniture that uses horizontal panels to divide a space into multiple levels, including bookshelves and shelves. 4. screens; The main form of Mid-Ming-style furniture, which is characterized by various shapes, is frame design, and its structural characteristics are mainly of two types: waisted and waistless. The waistless furniture adopts round legs and side feet, and the shape is calm and concise. The waist furniture adopts straight legs, square legs or drum legs or three curved legs, and the shape is strong and heavy. These two forms of expression give people a combination of virtual and real, calm and square visual experience, and successfully embody the beauty of modeling combining science and art.

The main image concept of Mid-Ming-style furniture: richness, freedom, metaphor, symbolism, etc., has also greatly improved the intrinsic taste of Mid-Ming-style furniture, symbolizing the perfect form, which has been significantly strengthened. For example, official hat chairs, knotted armchairs, wooden comb chairs, etc., are suitable for young people in their early 20s to 40s. This is mainly to satisfy people's quest for power, happiness and good hope, as well as the meaning of reunion and auspiciousness, and skillfully incorporate specific history, traditions, social values and ethics. Because of this, a table, a book, and a chair are endowed with and enhanced connotation and cultural temperament, so that the furniture goes far beyond its surface and conveys an immaterial spiritual atmosphere. Another characteristic of Mid-Ming-style furniture is the emphasis on the beauty of lines. It does not win with intricate pattern decoration, but pays attention to the design changes of the outer contour of the furniture, giving people a strong sense of line beauty. For example, the "S" shaped backrest conforms to the physiological structure of the human body and is unique.

Another manifestation of the line modeling of Mid-Ming-style furniture is the change and application of shape. Styling refers to the shaping of the edges of furniture. Through the different combinations and collocations of plane, convex, concave and yin and yang line proportions, it forms a kaleidoscopic geometric outline to achieve a unique decorative effect rich in artistic taste. This is consistent with the cultural and humanistic nature of modern design, as well as the pursuit and exploration of design symbols. Therefore, Mid-Ming-style furniture has had a profound impact on the new trend of Western modern art, modern art and even postmodern art. The decorative art techniques of Mid-Ming-style furniture are good at selecting and refining. They have reached unprecedented heights of design through carved wood grains, inlaid ornaments and auxiliary components. The carving themes of Mid-Ming-style furniture are very extensive, including lotus pattern, cloud pattern, phoenix pattern, dragon pattern, curly grass, flowers and birds, landscape, Ganoderma lucidum, religion, figures, animal patterns and other themes. The lines are smooth and the images are vivid. Engravings are mostly placed around dental plates, teeth, backings and furniture. Small carvings are often exquisitely crafted. They are exquisitely rare and the artistic effect is fascinating.

Mid-Ming Dynasty furniture, it has won the appreciation of the world for its beautiful shape, smooth lines, reasonable material structure, moderate proportion and size, as well as simple and generous style. After entering the Qing Dynasty, with the change of social atmosphere, the Soviet-style furniture industry began to develop in the direction of cumbersome and flashy. The Soviet-style furniture here mainly refers to the Soviet-style furniture of the Qing Dynasty. Soviet-style furniture is painted on the inside, the purpose is to avoid moisture in the wear belt, keep the wood from deforming, and also have the effect of hiding the ugliness. Ancient Chinese furniture is one of China's outstanding arts and crafts. It is not only a practical item in people's daily life, but also an ornament with appreciation, which has a long history and unique national characteristics.

China's ancient furniture can fully express the designer's thoughts and temperament, reflect the characteristics of the times and humanistic atmosphere, and have special cultural connotations. Because hard wood is hard to come by, Suzhou craftsmen often cherish wood as gold. Before making each piece of furniture, each piece of wood should be repeatedly observed, measured, and fine-tuned, so that the surface of the wood should be as neat and beautiful as possible. Never take things lightly without much thought. The decorative themes of Suzhou furniture are taken from the famous paintings of celebrities in the past dynasties. Pine, bamboo, plum, stone, flower, bird, landscape and various myths and legends. The second is the traditional pattern, such as "sea water cloud dragon, sea water river cliff, dragon play pearl, dragon and phoenix are auspicious" and so on. Broken branch flowers are also common, and most

of them are homophonic with auspicious words. Most of the local decorations use twigs and peonies. Its styling features follow the style of the Han Dynasty's tall feet. Its tables, stools, beds, tables, desks, cabinets and other types of furniture all reflect the pursuit of freedom and the yearning for peace, and its symbolic meaning permeates the connotation of the relationship between people. In the final analysis, hardwood and its exquisite shape, thick and simple, dignified and exquisite Mid-Ming-style furniture are civilized in the world. It should be said that Mid-Ming-style furniture proves the existing power of the source of people's lifestyle, as well as the essence of the spirit of the times embodied in the design. Nowadays, "simplicity" is the development trend of furniture style, and the Mid-Ming-style furniture decoration pattern with simplicity as the main feature also has a strong guiding significance for the formation of modern Chinese furniture style. Some people say that Western art is rational and full of humanistic and scientific artistic tendencies. And Chinese culture is very emotional, and Chinese art is art with symbolism and philosophy. It is also said that Chinese furniture is already the pinnacle of Chinese home design and cannot be surpassed. It is this art of symbols and symbols that makes many designers unable to jump out of the strange circle of "Mid-Ming-style furniture is Chinese style". Mid-Ming-style furniture inherited the Chu culture and was influenced by the Han culture, and its style spread to Western Europe and other places. Because it conforms to the basic human need for design, now looking at its form, research can see the symbolic meaning of its combination of culture, luggage and lifestyle. This symbolism translates into a design symbol with a unique form and spirit, which has brought many inspirations to future generations.

2.3 The exchange between Mid-Ming Dynasty furniture aesthetics and modern product design

Since the Stone Age, people have been polishing stones and making tools. Changing the productivity conditions of the time to meet the needs of today's applications is the original intention of the design. The term design represents the human act of making life better by transforming the material world. From the original stone tools with the main purpose of improving labor productivity to painted pottery, how to view the relationship between decoration and function is the unity of design and aesthetics that research need to complete. The Bauhaus, which had a huge influence on modern design, advocated the principle of function first. Under its influence, research can see completely decorative, function-oriented products in many modernist design pieces. However, the emergence of functionalism has its own specific socio-historical context. The Bauhaus arose after the Industrial Revolution, when machines were the main tools of production instead of handicrafts. However, due to the extensive production methods at that time, the aesthetic level of the products was not high. In terms of decoration, it was influenced by various retroism of industrial products,

which also brought a cumbersome and overly ornate style. Therefore, based on the current situation of product production in the society at that time, the design proposition of the Bauhaus emphasizing function came into being. However, after the modernist design trend represented by the Bauhaus, pop style and deconstructivism emerged, which tried to better unify decoration and function. By the middle of the Mid-Ming Dynasty, decoration and function were no longer a two-way street, but eventually merged into one. Whether it is aesthetics or other fields, or people's cultural life, they have begun to move towards a comprehensive stage of various forms, striving to use the most abundant techniques, the most appropriate means of expression, and the most appropriate forms to reflect the complex social reality and people's diverse aesthetic tastes at that time. Because the aesthetic objects of the Ming people are both extensive and diverse, both colorful and seemingly insipid throughout all fields of social life, rather than focusing only on one aspect, and the idea of pursuing the purity of literature and art in the past no longer exists, so the Ming people, whether it is pure art or folk art, whether it is architecture or craft, and even all corners of people's daily life involve aesthetic appreciation, which can be seen. The figure of Akito. Seeing this trend towards integration, it can be called an era of summary and maturity of furniture design aesthetics and cultural development.

With the development of modernization, people's requirements for quality of life are getting higher and higher, and the requirements for living environment are also getting higher and higher. Adhering to the design concept of "simple, practical and pure", the modernist design concept came into being, and has become one of the main design styles of modern living environment. However, although modernism focuses on functionality and practicality to a large extent, it lacks the imprint of history and culture, the expression of emotion and personality, which makes it different from the traditional classical cultural style of China.

The aesthetics of the Mid-Ming Dynasty is a model of ancient Chinese art, which played an extremely important role in Chinese history and endowed Chinese culture with extremely high value. The aesthetics of the Mid-Ming Dynasty emphasized the attention and respect for nature, the expression of emotions and artistic conceptions, and the improvement of aesthetic taste. His unique aesthetic ideas have penetrated into all aspects of traditional Chinese culture, including painting, calligraphy, poetry, opera, gardens and other fields, and have become an indispensable part of Chinese cultural tradition.

Modernism and Mid-Ming Dynasty aesthetics, two different design styles, have completely different aesthetic orientations and forms of expression. The collision of these two styles can result in a unique design aesthetic. The former focuses on the visual effect of "concise, bright and clean", while the latter focuses on the expression of

emotion and natural beauty, and draws on the inspiration of classical imagery to form an aesthetic style with more design depth. Modernist design ideas, which draw inspiration from the aesthetics of the Mid-Ming Dynasty, can be made more agile without losing simplicity. Taking architectural design as an example, the architecture of the Mid-Ming Dynasty pursued the concept of "the unity of nature and man", and the integration of architecture and environment vividly reflected the concept of natural beauty. If some elements of the Mid-Ming Dynasty are added to the modern architectural design, such as building materials, design patterns and colors, etc., the modern design style can be more natural and flexible.

The natural beauty and emotional beauty of Ming aesthetics gave modernism a deeper connotation, making modernism no longer bright and practical in a single sense. In the interior design, you can consider using natural imagery from Mid-Ming Dynasty flower and bird paintings, or decorating with antique furniture with rich charm. You can also pay attention to the overall aesthetic arrangement, so that each piece can echo each other and enhance the sensory level of the interior space. At the same time, the space setting and shaping various environmental atmospheres can be used to mobilize people's psychological feelings through the emotional support of Mid-Ming Dynasty aesthetics, so that people can have a sense of trust, fantasy and historical and cultural projection. The collision of modernism and Mid-Ming Dynasty aesthetics will break the single design model and make the modern and simple design concept more profoundly express the profound heritage of Chinese culture. At the same time, it emphasizes the all-round consideration of design from environment, function to cultural and historical value, which has a more humanized emotional connotation, and also meets the high-quality requirements of modern people for the home environment, so as to help us create a more humanized design.

2.4 The representative patterns of Mid-Ming-style furniture design and its application in modern design

From a chair point of view, the shape of the backrest of the hoop chair and the hood chair is very typical. The hoop chair gets its name from its "embrace" curved head, which integrates the backrest with the armrests, and the appearance is curved. This structure not only gives people a comfortable sense of leaning, but also visually brings a transparent, dignified and harmonious beauty. The circle has always been given a symbolic meaning of harmony and success in Chinese culture, so the circle chair is favored among the literati and doctors. The hat chair is named because its brain shape resembles an ancient official hat, and its backrest and armrests generally have obvious edges and corners, and the two sides of the backrest are slightly open, reflecting a dignified and upright temperament. Hat chairs and circle chairs attract users with simple lines, just the right amount of hollowing and reasonable proportions of the sitting surface, so they frequently appear in paintings and interior furnishings in the Ming and

Qing dynasties. Whether it is the Palace Museum, the Nanjing Museum or the Shanghai Museum, there are a considerable number of circle chairs and official hat chairs in the collection, which proves that they were widely circulated in the Mid-Ming Dynasty and beyond, and have the characteristics of exquisite shapes and rich varieties. Wang Shixiang in the "Ming Style Furniture Research" is to focus on the circle chair and the official hat chair, pointing out that they are the most representative and artistic types of chairs. Therefore, through the symbolic refinement of the shape of the backrest and the overall line, the core aesthetic connotation of Mid-Ming-style furniture can be directly captured. Focusing on the decoration and mud sealing technology commonly used in Mid-Ming-style furniture, the lamp grass line can best reflect the characteristics of "simple and extraordinary". The so-called lamp grass line is to use one or more concave and convex lines at the junction of the furniture panel or legs and feet to transition and decorate, and its shape is similar to the wick and is named. This kind of line is not as elaborate and ornate as the carving, but adds layers and ups and downs to the details, reflecting the wisdom of the craftsmen to "be simple and skillful". What's more, the line of the lamp grass is not only beautiful, but also plays a certain role in the corner position to prevent bumps, so that the furniture is more durable in use. At the same time, the light grass line is often located close to people's line of sight, which not only ensures the restrained elegance when viewing, but also allows people to appreciate the texture of the wood and the changes in the lines up close. Through the Mid-Ming-style furniture in the Palace Museum, Suzhou Museum, and overseas museums, it can be found that the lamp grass pattern is very common on the table case, chair edge, cabinet door edge, etc., and can even be said to be an "indispensable" decoration. It is like a herringbone flowing "ribbon", bringing a hint of jump in the overall squareness, thus forming the visual rhythm of Mid-Ming-style furniture.

In terms of supporting components, Mid-Ming-style furniture not only emphasizes "lightness and atmosphere", but also "solid and durable". This has formed a variety of doorpost structures, among which the pot pillars and doorposts are more recognizable. Doorposts refer to curved or arched cross-braces, which are mostly installed between the legs of tables and chairs. It can not only strengthen the stability of the furniture structure, so that the table top or chair surface will not shake, but also play a role in the visual effect of "straight in the curve". Most of the Mid-Ming-style furniture is known for its simple lines and sharp edges and corners, and the appearance of the contour shape breaks the pattern of "one board and one eye straight", forming a balance of "upper circle and lower circle", "straight as the bone, and curve as the rhyme". With the arc of the backrest of the circle chair or the official hat chair, the pot door column echoes the end of the overall design of the furniture like a wonderful brush, so that the work exudes a subtle and elegant atmosphere in the subtlety. From a mechanical point of view, the arch structure has good compressive resistance and stability; From an aesthetic point of

view, it is more like a miniature door or bridge, which "flexibly" divides the space, revealing an elegant and extremely human style. Through the court paintings of the Mid-Ming Dynasty and the actual furniture that has been handed down, it can be seen that the door posts are not the patent of individual craftsmen, but are widely used in the design of various tables, stools, and chairs. In Mr. Wang Shixiang's works, the doorpost is also frequently mentioned, highlighting its high frequency. Compared with the softness of the silhouette, Wang Zhu is more rugged and powerful, but there is no lack of subtlety. Wang Zhu refers to a kind of support that is thicker and more load-bearing than ordinary firs, and is mostly found on tables, tables, fangs and other utensils that are larger in volume or need to bear large weights. It usually comes in the form of thickened cross-braces or quadrangular diagonal braces between the legs, trying to further enhance the stability of the furniture with the natural advantages of wood and the combination of mortise and tenon joints. When the viewer admires the Mid-Ming-style furniture, if they see those slightly "thick" horizontal braces, they can judge that the furniture is likely to have the characteristics of a flap. Although the size prevails visually, the craftsmanship still follows the rigor of the mortise and tenon joint, striving for the harmony of form and function.

Nowadays, excavating the value of these elements is not only a retrospective of the historical and cultural connotation of Mid-Ming-style furniture, but also an inspiration for modern design. Abstracting the backrest arc of the circle chair and the official hat chair or the folded line of the official hat outline can obtain a highly visually recognizable pattern and symbol, which is used for graphic design and packaging design; It can also continue to carry forward the comfort brought by the backrest arc to the user in modern furniture, combined with ergonomic research, so that the "Chinese style" is compatible with the "modern sense". Chinese style is compatible with "modernity". The lines of the lampshade can be simplified to concave and convex lines, creating layers and decorative effects in porcelain, metal, and even cloth designs. The arched shape of the door post can be applied to the lamp holder, exhibition props or doorway design of the indoor space, implying stability and accessibility; The "load-bearing" concept of the door post can also be integrated into the building structure or home furnishing products, continuing the beauty and mechanical logic of the wooden mortise and tenon joint.

For cultural creativity and cross-border design, the greatest value of these bright elements lies in the fact that they can be replicated, simplified, and evolved. Derived from the ancient reflections on life, ritual, and natural philosophy, they are both functionally rational and aesthetically profound, and can be reborn in new materials and contemporary contexts. research can digitize and graphically transform it into a diversified symbol system that meets the needs of modern aesthetics, and then connect it with fashion, technology, art market, etc., to explore more application scenarios. In

this way, the symbolic essence of Mid-Ming-style furniture will not only be dusty exhibits in museums, nor just cases in academic research, but will penetrate into a broader public vision, so that more people can appreciate the beauty of the Orient where "shape, art, reason, and meaning" are blended.

Looking at the above elements, the shape of the backrest of the circle chair/official hat chair, the lines of the lampshade, the doorposts and the fir, they all have one thing in common: they have been formed and widely used in the Mid-Ming Dynasty, leaving a large amount of physical and documentary evidence that their occurrence is very frequent. Today, they are regarded as a symbol of classical Chinese design and an indispensable reference dimension for future generations to imitate, improve and innovate Ming style furniture. Through these details and parts, research can get a glimpse of the success code of Mid-Ming-style furniture: the change in simplicity, the gorgeousness in simplicity, the rigorous structure and softness, which cater to the aesthetic pursuit and lifestyle of the literati of the time and later generations, and inspire the design world to find a balance between function and appearance.

In the final analysis, it is these exquisite and ingenious "symbols" that constitute the overall pattern of Mid-Ming-style furniture that is gorgeous and aura. Their high frequency proves that they occupy an indispensable position in the aesthetic and use needs of the ancients; After years of vicissitudes, they can still show their charm in academic research, auction collections and even modern creative design, and also demonstrate the high artistic and cultural value of Mid-Ming-style furniture. Nowadays, only by constantly exploring, flexibly using, integrating its essence into new materials and new spaces, and making traditional symbols resonate with the needs of contemporary life, can research truly continue and carry forward this oriental design language with historical glory.

2.5 The modern Mid-Ming Dynasty furniture design culture capital

Ancient Chinese furniture, especially Mid-Ming-style furniture, is the most representative. The shape of Mid-Ming-style furniture is simple and stretched, supplemented by the ingenious use of mortise and tenon structure, which embodies the cultural spirit of "harmony between man and nature" and "advocating nature", and forms a high degree of artistry and practicality. Its unique aesthetic concept can still radiate new vitality in contemporary times, which not only provides a steady stream of inspiration for modern furniture design, but also has a far-reaching impact in the fields of cross-border design, cultural creativity, and interior decoration. However, for this precious heritage to survive in modern life, systematic and comprehensive protection and transmission are essential. The classic elements of Mid-Ming-style furniture, such as "door posts", "tooth plates", "open frames", etc., are highly recognizable design languages, which not only embody the wisdom and skills of traditional craftsmen, but

also have an important impact on the understanding and development of traditional beauty by contemporary people. It not only embodies the wisdom and skills of traditional craftsmen, but also has an important impact on the understanding and development of traditional aesthetics for contemporary people. Based on this, how to better study these typical symbols, embed them in modern design, and maintain the uniqueness of traditional culture while meeting the aesthetic and functional needs of modern people, has become an urgent problem to be solved.

2.5.1 The connotation and modern value of ancient furniture design aesthetics

2.5.1.1 Formal beauty and craft beauty

The appearance of Mid-Ming-style furniture is characterized by simple lines and harmonious proportions, and contains the design concept of "unity of nature and man" and "justice and peace". For example, the backrest and armrests of the chair are mostly curved, and the traditional mortise and tenon structure is used to connect the whole without a single nail or rivet. Curved supporting elements such as "door posts" not only meet the needs of structural mechanics, but also enrich the undulating changes of the furniture shape, bringing visual softness and movement. Nowadays, if people integrate these elements into the home environment, on the one hand, they can enhance the oriental charm of the space, and on the other hand, they can also improve the comfort and aesthetic height through the perfect combination of smooth lines and ergonomics.

2.5.1.2 The pursuit of humanistic spirit

Ancient furniture design not only pursues exquisite craftsmanship at the level of "creation", but also carries a wealth of Confucianism and aesthetic concepts at the level of "carrying the Tao". Many Mid-Ming-style furniture takes "nature" and "connotation" as the aesthetic pursuit, showing the connotation of going with the flow and less is more. For modern society, this kind of "degree" control and "simple with complex" design logic, can be used as our fast-paced life into the "slow thinking", "slow art", in the fast-paced life of the traditional culture of young designers are also gradually aware that the beauty of ancient furniture is not mechanical "imitation", but to use this as a source of inspiration, for the modern way of life to find a more profound, more meaningful expression.

2.5.1.3 Possibility of cross-border integration

At present, the "new Chinese" style is becoming more and more popular in the fields of interior design, landscape planning, and product packaging. People are increasingly interested in spaces and objects with a strong oriental culture without losing a modern feel. The use of symmetry, balance, white space and other elements in ancient furniture can be well grafted into the modern design context. Whether it is the decoration of public spaces or the patterns of cultural and creative products, research can

draw inspiration from the patterns, arcs, concave and convex details of Mid-Ming-style furniture to realize the recreation and extension of design aesthetics.

2.5.2 Typical symbols and their modern protection: the case of "contours".

Among the many typical elements of Mid-Ming-style furniture, the "fir zi" is often regarded as a representative structural and decorative symbol. It is a curved support or connecting member, named because of its resemblance to a "looped ear". Often found in furniture such as tables, chairs, stools, and shelf beds, this component is not only for mechanical support, but also for visual decoration and cultural symbolism. Integrating "Luo Guo style" into modern furniture and even architectural and product design can often take into account stability and line beauty, which is an effective combination of "tradition + modernity".

2.5.2.1 Motivation for modern protection

Maintain the integrity of traditional culture: As an important element of Mid-Ming-style furniture, profiles not only carry craftsmanship, but also represent a cultural symbol. If they are ignored or lost, it is difficult to fully present the artistic and historical value of the Mid-Ming-style furniture system.

Aesthetic and functional innovation: the curvature of the silhouette and the rationality of the structure meet the needs of contemporary people for "simple and elegant" design. Protecting and promoting this logo can inspire innovation in the field of modern design.

Enhance national self-confidence and international influence: In the era of globalization, the inheritance and application of traditional culture are related to cultural diversity and national pride. Through the systematic study and practical promotion of the profile, it will help to promote the unique oriental aesthetics in the international arena.

2.5.2.2 Current conservation and awareness campaigns

Transmission of intangible cultural heritage and skills training: Some regions have included Mid-Ming-style furniture making skills in the list of intangible cultural heritage, and have established inheritor systems or related training programs to ensure that relevant skills and knowledge are passed on from generation to generation. The method of making the compass column and its historical evolution have been passed down in production practice through the demonstration of craftsmanship and the way old craftsmen bring their apprentices.

Exhibitions and Museum Collections: Many museums have special exhibitions of Mid-Ming-style furniture, showcasing the shapes and craftsmanship of classical

furniture such as doorposts, complemented by digital displays or interactive experiences to help people gain insight into their structural role and aesthetics. At the same time, the furniture restoration work is carried out regularly to maintain the original appearance of Mid-Ming-style furniture.

Cross-border cooperation and business innovation: Many cultural and creative enterprises and high-end brands have launched limited-edition furniture or cross-border products, such as exquisite tables and chairs, cultural and creative ornaments, decorative elements, etc., with the help of the symbols of the doorposts of "Beidou Station", which not only meet the market demand, but also enhance the public's awareness and interest in traditional symbols in the commercialization and promotion.

2.5.3 Protection gaps and challenges

Although the above-mentioned protection measures continue the design language and cultural heritage of Mid-Ming-style furniture to a certain extent, there are still many limitations and challenges from a macro perspective.

2.5.3.1 Lack of public awareness and education

Despite the gradual rise of the "new Chinese" trend, there are still a considerable number of consumers who do not understand the specific characteristics, historical origins and production processes of Mid-Ming-style furniture, and only know "good-looking" or "Chinese-style". For example, technical terms such as "doorpost" are not familiar to the general public, and it is difficult to generate intuitive associations in daily life scenes. There is also relatively little introduction of traditional furniture cultural symbols in primary and secondary education and art courses, resulting in low popularity among the public.

2.5.3.2 Lack of professionals and heirs to crafts

The design and production of ancient furniture requires high manual skills and cultural literacy, especially in the mortise and tenon structure, decorative carving, etc., there are strict craft standards. However, due to the time-consuming, labor-intensive and limited returns of handicraft, young people are relatively low in pursuing a career in these traditional trades, resulting in a severe shortage of new generations of artisans. At the same time, it is also difficult to cultivate compound talents with interdisciplinary backgrounds (such as design, materials science, digitalization, etc.), which limits the depth and breadth of antique furniture protection and innovation.

2.5.3.3 Market homogenization and "pseudo-classical" phenomenon

At the commercial level, some companies or brands blindly follow the trend of "new Chinese style" or "reproduction of classical", but there are not many that can really strictly follow the traditional craftsmanship of Ming style furniture and deeply

understand the typical symbols. The market is full of uneven quality of "antique furniture", some products are even indiscriminate, the materials are inferior, the process is rough, the overall market image is lowered, and the public's perception of the value of classical furniture has been affected.

2.5.3.4 The system of laws and standards is not perfect

Although China has formulated relevant laws and regulations on the protection of cultural relics, there is still a lack of detailed industry standards or supervision for Mid-Ming-style furniture at the boundary of "cultural relics value and market value". Digital copyright or patent protection for classic elements such as compass columns has not been adequately taken into account to effectively curb counterfeiting and plagiarism.

2.5.4 Improvements and future prospects

In order to make Mid-Ming-style furniture and its typical symbols more effectively protected and continued in modern society, research should start to improve from the following aspects:

2.5.4.1 Strengthen mass education and awareness-raising campaigns

Integration into the education system: In the art and design courses of primary and secondary schools or universities, the content related to traditional Chinese furniture culture is consciously added, and students are guided to understand the structure and value of compass columns and other components through physical visits and hands-on practice.

New media multi-channel communication: With the help of short videos, social media, VR/AR display technology and other means, more people can intuitively understand "how to splice mortise and tenon joints" and "how to increase the beauty and mechanical support of the door post", and stimulate the public's curiosity and sense of identity.

2.5.4.2 An industrial model that combines protection and innovation

Create high-end customization and cultural and creative derivatives: While adhering to the essence of traditional craftsmanship, craftsmen are encouraged to cooperate with designers to apply elements such as compass columns to high-end home furnishing products that are both practical and collectible through modern materials and innovative concepts. At the same time, research will develop lightweight cultural and creative products, so that more consumers with lower thresholds can contact and own these traditional symbols.

Tailor-made, personalized service: In the face of increasingly diversified consumer demand, many young people hope that furniture can not only retain the classical charm,

but also adapt to the modern living space. Enterprises can establish an order-based production system and provide one-stop service from style design to installation and commissioning, which not only realizes the seamless connection between traditional elements and modern life, but also ensures the quality and uniqueness of each product.

2.5.4.3 Improve talent training and incentive mechanisms

School-enterprise cooperation and studios: Strengthen the cooperation between universities, museums, scientific research institutes and traditional craftsmen and related enterprises, and jointly organize workshops or special training projects, so that students can form a virtuous circle of theoretical learning and practical operation.

Subsidies for inheritors and craftsmen: The government or non-profit organizations can provide special funds to support outstanding craftsmen and inheritors, reduce their financial pressure, and allow them to focus more on the inheritance and innovation of skills; It is also possible to encourage young people who are willing to devote themselves to the research of ancient furniture conservation to conduct in-depth research through scholarships and project funds.

2.5.4.4 Formulate industry standards and copyright protection systems

Design and process standardization: formulate industry specifications involving materials, mortise and tenon structure, size ratio, surface treatment, etc., and implement a unified identification and certification system in the production and sales of antique furniture. Core symbols such as "goalposts" should also have clear criteria for use and evaluation.

Digital copyright and legal protection: With the rapid development of the Internet and digital economy, it is necessary to carry out patent application, copyright registration, blockchain traceability and other technical means in a timely manner to better protect the legitimate rights and interests of traditional symbols in modern commercial operation and prevent copycat and plagiarism.

2.5.4.5 Promote cross-border cooperation and global impact

International academic and cultural exchanges: Through platforms such as international furniture design exhibitions and cultural expos, Mid-Ming-style furniture symbols such as door stickers are promoted to the international market, which not only promotes cultural exchanges, but also expands greater development space for domestic brands and designers.

Multi-field cross-border experiments: Cooperate with fashion, film and television, digital technology, games and other fields, and try to integrate Mid-Ming-style furniture elements into scene layout, product design and digital artworks, giving traditional

symbols new forms of expression and communication paths.

Mid-Ming-style furniture and its typical symbols (such as door posts, columns, profiles, frames, etc.) are the concentrated embodiment of Chinese classical art and humanistic spirit, and there is still a long way to go to protect and innovate Mid-Ming-style furniture and its symbols. Only with the joint efforts of all parties, on the one hand, research will deepen technical and academic research to lay a solid foundation for the continuation and dissemination of traditional crafts; On the other hand, focusing on the market and social needs, through popularization and cross-border cooperation, the effective connection between traditional aesthetics and modern life is realized. In this way, in the dialogue between history and contemporary, let the classic symbols such as door leaf profiles last forever, and let the ancient Chinese furniture design aesthetics continue to shine on the world cultural stage.

2.6 Use the cultural capital of Mid-Ming Dynasty furniture design to innovate and design mobile phone holder products

At the beginning of the design, the overall structure of the mobile phone holder borrowed from the design language of the Bauhaus, emphasizing simplicity, function first, the use of geometric forms, respect for the material itself, focusing on ergonomics, removing part of the decoration, the pursuit of efficiency and beauty, and the design of the stand is based on the concept of "simplicity is better than complexity", and the two have a natural fit. The bracket design combines the modernist spirit of the Bauhaus of "form follows function" with the simplicity and elegance of Mid-Ming Dynasty furniture and traditional craftsmanship, realizing the dialogue between modernity and tradition.

The biggest challenge in the design was to retain the warm and elegant design language of Mid-Ming Dynasty furniture, while infusing it with the sharpness and modern craftsmanship of the Bauhaus. Through the use of colour, line and materials, the differences between the two styles are dissolved, creating a harmonious whole.

2.7 Research on the extraction and application of the main elements of furniture cultural capital in the Mid-Ming Dynasty

The structure of this stand is a combination of geometry and streamlines: the soft curves common to Mid-Ming-style furniture are used throughout, while the grip and support are more modern, using simple straight lines or square tubes, reflecting the Bauhaus's preference for geometric shapes. In keeping with the "metallic" of the Bauhaus, the exterior of the key stress points can be embellished with metallic accents or details, contrasting the beauty of traditional joints with modern craftsmanship. Contrast between warm wood and cold metal: If you choose solid wood (such as beech, oak, ash, etc.) or bamboo, you can use varnish or matte paint to emphasize the wood

grain, and match the strong texture of the metal support rod to form a visual impact of "cold and warm interweaving". Matte metal or matte lacquer: In order to convey the modern atmosphere of the Bauhaus, the local metal parts can be treated with a matte texture to avoid overly shiny plating effects and make the whole support texture softer.

Thinking from an ergonomic point of view and looking at the design with a caring eye, the adjustable tilt angle design puts functionality first and is very comfortable; The slightly curved overall bracket inherits the bright and comfortable characteristics of Mid-Ming-style furniture, and at the same time gets reasonable and stable support. Through the scientific measurement of human visual angles and usage angles, the bracket is designed to the right height and angle, so that the product is not only solemn and elegant, but also can meet the comfort needs of daily life or public scenes.

The main body is made of dense, beautifully grained woods such as beech and white oak, which is similar to the concept of high-quality hardwoods commonly used in Mid-Ming-style furniture, but is more adapted to the modern supply chain. Stainless steel, aluminum, or ferrous metal are used for the legs or support structures to ensure strength and durability, and to symbolize the Bauhaus' preference for industrial materials. Compared to the raw lacquer and hot wax methods common to traditional Mid-Ming-style furniture, modern technology or eco-friendly paints are easier to maintain and present a modern Bauhaus style.

Local structure extraction: In the local structure analysis, the researchers selected six typical Mid-Ming Dynasty furniture structure node samples, and carried out detailed research from the perspectives of modeling semantics, structural logic and functional support, respectively, and carried out detailed research on the Bawang Tree, Luo Guo Tree, seat armrests, base support system, and the connection device between the square stool and the bottom of the seat surface. Through the morphological refinement and analysis of the structural language, the respective design syntax is clarified, and the basic template is provided for parametric modeling.

Extraction of ornamental elements: In the study of decorative patterns of Mid-Ming Dynasty furniture, this paper selects six typical carving patterns for semantic analysis and morphological grammar refinement. Based on the image data, combined with its practical application on furniture components, the internal logic of Mid-Ming-style furniture carving in terms of formal composition, symbol meaning and structural language is summarized.

2.8 Research on traditional intangible cultural heritage handicrafts - taking Mid-Ming-style furniture as an example

The cultural resources contained in the furniture of the Mid-Ming Dynasty are one

of the important contents of the current cultural industry development. On the one hand, on the basis of protection and research, the modernization and redesign of Mid-Ming Dynasty furniture is conducive to the inheritance and innovation of traditional craft aesthetics; On the other hand, the development of cultural resources of Mid-Ming-style furniture can transform the spirit of craftsmanship and aesthetic value embodied in it into a source of inspiration for modern product design, realize the transformation of cultural value into economic value, and promote the development of cultural and creative industries. With the continuous revival of "Ming style" in modern home design, the cultural elements of Mid-Ming Dynasty furniture are becoming an important fulcrum to promote the industrialization of traditional culture. As a museum with a large collection of Mid-Ming Dynasty furniture objects and documents, it should give full play to its advantages of cultural dissemination and resource integration, and become the core position of the activation and innovative development of Mid-Ming Dynasty furniture cultural resources. On the basis of maintaining the original cultural appearance and craft spirit, the Mid-Ming Dynasty furniture elements are integrated into the contemporary design, which not only enriches the museum's display form and public service experience, but also injects new vitality into the traditional furniture culture, achieving a win-win situation of protection and development. This paper takes the development of innovative mobile phone holder products of furniture design cultural capital in the Mid-Ming Dynasty as the research object, analyzes the problems existing in the existing development model, and puts forward reasonable development strategies to help the development of cultural innovation industry.

CHAPTER 3

Research Methods

By analyzing the historical context of Mid-Ming-style furniture design, studying its modeling and cultural connotation, and combining modern aesthetic and functional needs, this paper classifies and analyzes the modeling characteristics of Mid-Ming-style furniture. Transform the perceptual cognition of Mid-Ming-style furniture into rational cognition, interpret the design concept and traditional skills and wisdom behind it, and interpret its inheritance value, so as to deeply control the extension of Mid-Ming-style furniture in modern product design, create a broader artistic space, and form innovative design products that integrate cultural value and practicality. The researchers elaborated on the methodology in three steps:

3.1.: Cultural capital and aesthetic research on furniture in the middle of the Mid-Ming Dynasty

3.2.: Design new products according to the cultural capital of furniture in the middle of the Mid-Ming Dynasty

3.3.: New product design satisfaction research

3.1 Research on the cultural capital and aesthetics of furniture in the middle of the Mid-Ming Dynasty

3.1.1: Population and Sample

Survey target: Consumers who are interested in the cultural heritage and cultural creative design of Mid-Ming-style furniture design and potential consumers of mobile phone holder products. The survey targets include individual consumers who have a demand for cultural innovation products, corporate customers (such as hotels, restaurants, coffee shops, etc.), and the public who are interested in the inheritance and innovation of ancient culture, and consumers who have higher requirements for environmentally friendly materials and innovative designs.

Sampling: Based on the number of valid samples of 100, the sample is determined by stratified sampling or other appropriate sampling methods to ensure the representativeness of the sample.

Age structure of the sample: According to the different life cycles of product consumers, the age can be divided into 4 categories:

1: 21-28 years old (young consumers): Aesthetic concepts are taking shape, and there is a high demand for novel design elements and innovative concepts. At this stage, consumers pay attention to design innovation and fashion elements, and have a strong purchase impulse.

2: 29-40 years old (middle-aged consumers): their own aesthetic concepts have been formed, and they are more inclined to design that combines tradition and modernity, and pay attention to practicality, applicability and design beauty in style.

3: 40-60 years old and above (mature consumers): have a strong interest in traditional culture, pay attention to cultural inheritance and quality.

4: Questionnaire answers under the age of 18 and over 60 years old are invalid samples and are not included in the statistics.

3.1.2 Research on questionnaires prior to the design of new products

In terms of survey area, research selected Chengdu, an important city in Sichuan Province, as the specific site for the survey. As the capital city of Sichuan Province, Chengdu has a profound cultural heritage and a large number of consumers and related practitioners, which is very suitable for in-depth market research on the innovative design of Mid-Ming-style furniture cultural capital. Chengdu has a relatively high concentration of producers, practitioners and consumers, which provides us with effective data support. research plan to adopt a stratified sampling approach and take 100 valid samples in Chengdu to ensure the representativeness and diversity of the samples. Stratified sampling based on factors such as age, gender, income, etc., can fully collect the opinions of different groups.

We use questionnaires as a research tool to systematically collect a variety of relevant information.

The content of the questionnaire includes: age, gender, occupation/industry background, income level/spending power, education level, interest or demand for traditional cultural products, willingness to purchase cultural innovative products, understanding and recognition of traditional culture, acceptance of innovative product design, aesthetic and cultural values, emphasis on the "cultural value" or "artistry" of creative products, emphasis on the practicality/functionality/modern compatibility of mobile phone holder products, price and market perception, etc.

The main information research want to know is: the scope of price acceptance, purchase or collection behavior, the frequency of purchase/collection, the contact situation of related product channels, information sources and concerns, the main ways for respondents to obtain information about innovative products (exhibitions, social media, offline physical stores, professional magazines, etc.), future expectations and improvement needs, and product improvement suggestions for modern use case applications (shape, function, material, price, etc.), so as to ensure accurate data from multiple perspectives in a more detailed way. In order to strike a balance between quantitative and qualitative research, the questionnaire uses a combination of closed-ended and open-ended questions.

At the same time, make sure that the questions are designed neutrally and avoid leading questions.

3.1.3 Create research tools

1: Collect information on the historical background, technological process, design elements, material selection and market trends of furniture design aesthetics in the Mid-Ming Dynasty, so as to provide theoretical basis and design basis for follow-up research. By consulting books, journal papers, museum documents and archives related to the aesthetics of Mid-Ming Dynasty furniture design, you can learn about the historical evolution and cultural connotation of Mid-Ming Dynasty furniture design.

2: The purpose of the Mid-Ming Dynasty furniture design questionnaire is to explore consumers' attitudes towards mobile phone holder products from the aspects of materials, technology, design aesthetics, practicality and price acceptance. Based on the information gathered in the first phase, research designed a preliminary questionnaire to ensure that the questions covered key areas such as historical and cultural background, material preferences, craftsmanship, design style, environmental awareness, practicality, and price.

3: Visit and investigate the museum and research institute of Mid-Ming Dynasty furniture design aesthetics, and interview relevant practitioners of Mid-Ming Dynasty furniture design.

4: Invite three experts in the field of design as informants to propose modifications to the questionnaire from the aspects of content, structure, operability, etc., to ensure the scientificity and effectiveness of the questionnaire. Experts were invited to score and evaluate the questionnaire from the aspects of the validity of the content, the pertinence of the questions, the clarity and logic of the language, and put forward specific suggestions for revision.

5: Optimize the content of the questionnaire according to the feedback of experts, ensure the scientificity, practicability and effectiveness of the questionnaire, and complete the production of the final version.

Adjust the question order, sentence formulation, answer options, and coverage of the questionnaire according to expert recommendations to ensure that each question effectively reflects the research objectives. After revision, it will be resubmitted to the expert for review to ensure that all adjustments are in line with the requirements of the study and that further refinements will be made in the details.

6: In the sample of Chengdu, Sichuan Province, China, 100 valid samples were selected as the sample group. Through the actual data collection of the questionnaire, research can understand the real attitudes and preferences of consumers

towards cultural and creative products. According to the stratified sampling method, the age groups were divided into three groups, representing different consumer groups. A reasonable proportion of participants of different ages, genders, and income levels is ensured, ensuring that the data are representative and extensive. Data collection is carried out online and offline (e-questionnaires, paper questionnaires, telephone interviews, etc.) to ensure that the questionnaire reaches the target group. The collected data were classified and coded, and a preliminary analysis of sample composition and data validity was carried out to exclude invalid questionnaires.

3.1.4 Data Collection

1. Before collecting data, the research objectives need to be clarified to ensure that the content and methods of the survey are in line with the research objectives. Understanding consumers' needs, preferences and expectations for innovative product design plays an important role in supporting product design, marketing and cultural heritage. Focus on consumer preference for materials, design style, functional requirements, whether they pay attention to environmental protection, price acceptance, etc.

2. The overall population of this study is consumers over the age of 21 and under the age of 60 in the consumer market related to innovative design in Sichuan Province and even the whole country, who have a demand or interest in related products. Taking into account time and resource considerations, the effective sample size was set at 100 to ensure the representativeness of the data. Stratified random sampling is employed, in which the population is stratified according to different characteristics (e.g., age, gender, income, etc.), and respondents are randomly selected from each strat. Stratified sampling helps ensure the representativeness of each group and reduces bias.

3. The questionnaire was developed by three experts and its validity was tested by the Consistency Index (IOC) with the project objectives.

4. Determine and revise the content of the questionnaire to understand the respondents' awareness and attitude towards the innovative products of mobile phone holders. The survey content includes consumers' preferences for bracket materials (such as mahogany, nanmu, huanghuali, etc.), design style (traditional style, modern style, etc.), and functional requirements (comfort, aesthetics, durability, etc.); Understand the importance consumers place on eco-friendly materials and sustainable design; Understand consumer expectations and acceptance of stent prices. Respondents were asked to choose the one from several options that best reflected their actual situation and were allowed to express their opinions freely.

5. Using the online survey platform Questionnaire Star, a questionnaire was designed and published to collect data on the target group.

6. Analyze the data collected by the research tools, classify, code and statistically process the questionnaire results, and provide data support for the follow-up research on furniture design in the Mid-Ming Dynasty.

3.1.5 Data analysis

This study systematically explores consumers' expectations of cultural innovative products and innovative product forms that reflect the aesthetics of the Mid-Ming Dynasty with mobile phone holders, the researchers conducted statistical analysis of the data, and conducted data analysis according to the following research steps.

The first step is to analyze the data of 100 valid samples, comprehensively analyze the variable factors, people's perception of cultural innovation products, people's purchase of cultural and creative products, the analysis of factors that attract people to buy cultural innovation products, and the expectation of mobile phone holder products designed under the aesthetics of the Mid-Ming Dynasty

The second step is to interview Chinese cultural innovation experts: Professor Cai Shangwei, Mid-Ming Dynasty furniture aesthetics research scholar: Wang Jiayi, Mid-Ming Dynasty furniture production expert: Wu Mingzhong, on the historical and cultural origins of Mid-Ming Dynasty furniture cultural capital, the technology used, decoration design, work raw materials, manufacturing methods and other issues were answered by experts, and then combined with the experts' answers and suggestions to provide design ideas and design methods for the follow-up mobile phone holder product design.

Preference for materials and key elements of innovative and modern fusion design. The collected questionnaire data was collated, classified and statistically analyzed using the percentage method to reveal consumer needs, preferences and behavioral trends in terms of aesthetics, functionality and environmental protection. By refining the core demand points of the combination of Mid-Ming-style furniture and modern design (such as material selection, design style, environmental awareness, etc.), it provides strong data support for optimizing product design, formulating marketing strategies, and improving consumer satisfaction.

3.2 Design new products according to the cultural capital of furniture in the middle of the Mid-Ming Dynasty

3.2.1 Population and Sample

Survey Respondents:

Cai Shangwei is a professor at Sichuan University, a doctoral supervisor and a postdoctoral supervisor. China's "2009 Cultural Industry Person of the Year". He is currently the director of the Cultural Industry Research Center of Sichuan University

and the director of the "Beautiful China" Research Institute of Sichuan University.

Wang Jiayi, associate professor, national second-class manual carpentry technician, director of Sichuan Furniture Repair and Protection Institute of Sichuan International Advertising Vocational College, consultant of Chengdu Modern Furniture Research Institute.

Wu Mingzhong, municipal intangible cultural heritage project: representative inheritor of Mid-Ming-style furniture making skills.

In the form of questionnaires and online interviews, experts answered questions about design ideas, design methods, historical and cultural origins, craftsmanship, decoration design, raw materials of works, manufacturing methods and other issues, and obtained answers and guidance to relevant questions.

3.2.2 Research tools

The researchers used the questionnaire of "Expert Survey on Innovative Design of Bracket Products under the Study of Furniture Cultural Capital in the Middle Mid-Ming Dynasty", which mainly involved the following aspects. The history of Ming style furniture design aesthetics, the creative process, challenges and skills, market demand and innovation strategies of traditional and modern design, so that research can have a deeper understanding of innovative design mobile phone holder products, look forward to the current market development of cultural innovative design products, judge the balance between Mid-Ming Dynasty furniture design aesthetics cultural capital and modern product innovation, and provide professional suggestions for market standardization.

The questionnaire reviews the cultural capital content of Mid-Ming-style furniture design, including the inheritance and evolution of Mid-Ming-style furniture design, discusses the historical origin of regional furniture design aesthetics, and compares the similarities and differences of furniture in other regions in terms of style, function and use scenarios. Analyze how the design aesthetics of Mid-Ming-style furniture reflect cultural characteristics through design, materials, and decorative patterns, including how they are used in family, social, and ceremonial settings. Experts can also discuss traditions that have survived the evolution of culture, as well as parts that have been overlooked or lost, and how to continue these traditions in modern design.

At the same time, it guides the creative process, challenges and techniques of combining the cultural capital of Mid-Ming Dynasty furniture with modern product design, and discusses how to achieve modern innovation while retaining classical aesthetics, structure and cultural connotation. For example, the use of color, the design of shapes, the choice of materials and the improvement of functions.

3.2.3 Create research tools

Design issues: striking a balance between aesthetics and practicality, using modern materials to design to highlight antiquity, addressing the tension between craftsmanship and mass production, and considering environmental protection and cost reduction.

The Problem of Craftsmanship and Innovation: Explore how to apply the traditional craftsmanship of Mid-Ming Dynasty furniture to modern production processes and combine them with new technological tools to improve the precision, durability and environmental friendliness of products. Learn more about the application and impact of modern tools, machinery, and intelligent production technologies in product making through site visits and technical demonstrations.

The question of market demand: Discuss the positioning of innovative product design in the domestic and international markets. By analyzing consumer preferences and behaviors, it is possible to understand their receptivity to innovative product designs, especially opportunities in emerging markets.

Problems with production:

Explore ways to improve production efficiency and optimize supply chain management through the introduction of new manufacturing technologies, and study how to maintain the uniqueness and quality of traditional processes in large-scale production. On the premise of inheriting excellent culture and craftsmanship, research focus on realizing the efficient and sustainable development of modern manufacturing.

To solve the above problem, research have divided the steps to create a research tool into the following 6 steps:

1. By consulting the research literature on furniture design in the Mid-Ming Dynasty, research can systematically understand the evolution of traditional crafts, material use, and design styles in the places where the subjects are investigated, as well as academic articles and local historical materials related to design. Field trips to the Mid-Ming Dynasty Furniture Design Museum, Folk Craft Exhibition, and Handicraft Market. Visit local design-related museums, folk craft exhibitions, and handicraft markets to grasp the current market's demand and consumer preferences for products that incorporate elements of Mid-Ming-style furniture. It pays attention to the inheritance and innovation of Mid-Ming-style furniture elements in modern product design, and provides sufficient theoretical basis and practical reference for follow-up research.

2. Design a product that combines Mid-Ming Dynasty furniture elements with modern design needs, and design the corresponding questionnaire According to the

information collected in the first step, draft a product plan that integrates the characteristics of Mid-Ming-style furniture (such as door posts, door posts, classic mortise and tenon joints, such as lampshade lines, bat patterns, ornaments and other high-frequency symbols, etc.) with modern design elements (such as ergonomics, functionalism and geometric aesthetics, the integration of art and industry, form obeys function, simplicity and innovation, rationality of materials and technology, etc.). During the preliminary design phase, consumer feedback on material selection, craftsmanship, functionality, aesthetic style, and price acceptance should be taken into account. The questionnaire should be set up with both closed-ended and open-ended questions to obtain rich quantitative and qualitative data to better understand the feasibility and potential needs of Mid-Ming-style furniture combined with modern product design.

3. 3 experts from KMITL are invited to evaluate the quality and effectiveness of the research tool through the Objective Alignment Program (IOC). The designed questionnaire and preliminary product concept will be presented to the three experts. They will review and score the questionnaire from multiple perspectives, including the purpose of the study, the target population, the logic and coherence of the questions, the accuracy of the language, etc. If the questionnaire is found to be deficient or ambiguous in some aspects, the experts will propose detailed revisions to ensure that the entire research process is scientific and systematic, as well as the credibility of the research results.

4. Optimize the questionnaire content and product concept according to expert feedback, and complete the final version. Combined with expert opinions, the questionnaire was comprehensively adjusted in terms of question sequence, language expression, answer format, coverage, etc. Further improve the feasibility of product concepts, the combination of cultural elements and modern functions, and the matching of materials and environmental protection needs. After confirming that each question can effectively reflect the research goal of "integration of Mid-Ming-style furniture and modern design", the revised survey tool will be submitted to the experts again for review to ensure that all modifications meet the research requirements, and further corrections will be made to the details.

5. Invite three experts with rich experience in the field of product design and cultural innovation to conduct questionnaires and online interviews, these experts should not only understand the connotation of Mid-Ming Dynasty furniture design, but also have insight into the needs of the modern market. Cultural heritage scholars with in-depth research on modern product design and culture, furniture designers who specialize in the structure and style of Mid-Ming Dynasty furniture, and market researchers who are familiar with bracket industry trends and consumer behavior are

invited. Ask them to critically evaluate the products of the booth in terms of cultural value, design innovation and market potential, and collect their feedback on the balance between heritage and innovation, market suitability and commercial competitiveness.

6. Determine the final design style of the product, ready to enter the sample production stage. Based on the feedback of the three experts in cultural inheritance, modern innovation, market demand, etc., the final adjustment is made to determine the overall design scheme of the product. Ensure the best balance of modeling, material selection, functional configuration and process details, so that it can not only carry the historical charm of Mid-Ming-style furniture, but also meet the diverse needs of modern consumers for comfort, practicality and aesthetics. After the overall control of the design elements, material selection and functional configuration, the final product solution can be determined, laying a solid foundation for subsequent sample production and further market validation.

3.2.4 Data Collection

3.2.4.1 According to the industry influence, professional level and experience of experts in the field of Mid-Ming Dynasty cultural research and product design, three representative experts will be selected. These three experts need to have outstanding contributions in different fields (e.g. designers, cultural researchers, craft experts, etc.) to ensure a diversity of perspectives.

3.2.4.2 The questionnaire is distributed to experts by email or online survey tool with detailed instructions for completion. The questionnaire was completed over a period of one week to ensure that there was enough time for reflection and feedback.

3.2.4.3 Once the questionnaire has been distributed, appropriate follow-up actions will be taken to ensure that the experts submit complete answers in a timely manner and answer any questions they may have asked during the filling process.

3.2.4.4 Analyze data using research tools.

3.2.5 Data analysis

This study uses questionnaire data to explore experts' analysis of design aesthetics, craftsmanship inheritance, material selection and cultural value enhancement strategies in innovative design products. Data analysis uses the percentage method, that is, the collected questionnaire data is collated, categorized, and statistically processed to reveal the preferences and behavioral trends of experts. The purpose of the analysis is to extract the key needs of experts for design content, such as design aesthetics, craft inheritance, material selection, and cultural value enhancement strategies, so as to provide data support for the design of design content.

3.3 New product design satisfaction research

3.3.1 Population and Sample

In this Fusion Furniture Design Survey, research divided the target sample into three main age groups: 21-28 years old, 29-40 years old, and 41-60 years old, so as to determine the population of the effective sample, aiming to more comprehensively represent the characteristics of different consumption levels and needs. Based on the relevant population data of Sichuan Province and the main target consumer groups of this design, research assume that the effective sample size is 100 people, and adopt a stratified sampling method to ensure a reasonable proportion of respondents of all ages. The survey subjects are mainly Chengdu residents, focusing on people who are engaged in or studying design-related majors, as well as those related to culture. Below is a detailed description of the typical characteristics and needs of each age group:

1. 21-32 years old (young consumers)

Stage characteristics: The aesthetic is taking shape, and there is a strong interest in new things.

Design preference: Tend to new design styles, easy to accept new ideas or cross-border elements.

Awareness of traditional culture: Although they are curious about traditional culture, they also value modern style or personalized expression.

2. 33-42 years old (social stability group)

Stage characteristics: the aesthetic concept is formed, the purchasing power of the things you like and the aesthetic pursuit is relatively high.

Design preference: pay attention to the functionality and aesthetics of the product, prefer simple and fashionable design or design that incorporates some traditional elements.

Consumer demand: more focus on product quality and cost-effectiveness, more openness to environmentally friendly materials and innovative processes.

3. 42-60 years old (family and career stability)

Stage characteristics: stable family and career, higher requirements for family environment and cultural taste.

Traditional cultural characteristics: give higher recognition to traditional culture and handicrafts, while paying attention to the cultural heritage and intrinsic value of products.

Design needs: Prefer high-quality, durable, and beautiful products, emphasizing

the value of aesthetic applications.

Using the above age-stratification approach can help us balance the interests and needs of different groups of people in our surveys, so as to obtain more comprehensive and objective consumer feedback. This not only provides more targeted data support for subsequent product design and marketing strategies, but also is more in line with the diversified characteristics of Sichuan's population in terms of cultural awareness and spending power.

3.3.2 Research tools

We used the "Consumer Satisfaction Survey on Innovative Design of Mobile Phone Holder Products" as a research tool to focus on the performance of the integration of cultural capital and modern style of Mid-Ming-style furniture design, covering material quality, craftsmanship, visual aesthetics, functionality and the characteristics of different groups of people. Through this survey, research hope to have a deeper understanding of the bracket products that incorporate Mid-Ming-style elements, and grasp the real evaluation and needs of consumers.

1. Material source and quality assessment

First, research need to understand how consumers perceive the overall properties of the material, such as hardness, corrosion resistance, and service life. This helps us determine whether the overall performance of the product in terms of materials and quality meets consumer expectations.

2. Process details and production process

We pay attention to the details of the product, which are produced by hand or mechanization, such as the structure, craftsmanship and the communication of classic elements. Consumer acceptance of the combination of traditional Ming crafts with contemporary technology, as well as the balance between innovation and mass production, were the main considerations for the study.

3. Design style and aesthetics

This section mainly discusses whether the bracket products that incorporate elements of the Mid-Ming Dynasty are in harmony with the modern living environment in terms of material matching, style fusion, line design and decorative style. research wanted to understand how consumers would approach this "traditional versary" style, whether they preferred a classic style with a distinctive character or a modern aesthetic that was simple and functional, and wanted to find a balance between the two.

4. Comfort and daily use experience

Consumers' perception of the comfort of the ergonomic structure of the stent product, as well as whether it is simple and convenient to use in daily life, are important indicators to measure the practicability of the product.

5. Demographic factors and analysis of variance

We will also evaluate whether there are significant differences in consumer satisfaction with the stent product based on different dimensions such as age, gender, income, and occupation. Through the statistical analysis of demographic factors, research can further explore the areas that need to be optimized or adjusted in terms of pricing strategy, style adaptability, marketing direction, etc., so as to provide a more accurate reference for subsequent development and promotion.

3.3.3 Create research tools

Researchers create a research tool in 5 steps:

1: According to the designed mobile phone holder products, construct the "Consumer Satisfaction Questionnaire for the Innovative Design of Mobile Phone Holders". Before designing the questionnaire, the mobile phone holder product itself (including function, appearance, material, user experience, etc.) should be deeply analyzed and evaluated, and the characteristics of the product in terms of market positioning, aesthetic style, and use scenarios should be clarified. The questionnaire should be designed according to the actual needs of the target consumer group and the actual needs of the target consumer group. Combined with the actual needs and expectations of the target consumer group, some research hypotheses are put forward in order to more accurately explore the overall satisfaction of consumers with the product. The main purpose of the survey is to evaluate consumer perceptions in terms of user experience, design, functional utility, material quality and price acceptance. On the basis of these preliminary analyses, a preliminary framework for the satisfaction questionnaire was developed, covering core dimensions such as product functionality, design, and quality.

2: Invite three KMITL experts to revise the content, structure and operability of the questionnaire, and submit it to three KMITL experts for professional evaluation after the initial completion. Experts will score and evaluate the questionnaire from the aspects of the validity of the survey content, the pertinence of the question setting, the clarity of the language and the overall logic, and put forward detailed suggestions for revision. This can effectively ensure the scientificity and practicability of the questionnaire and provide reliable tool support for follow-up research.

3: Optimize the questionnaire based on expert feedback and complete the final version. Combined with the opinions and scores of the three experts, the structure, question sequence, language expression, answer options, coverage and other aspects of

the questionnaire were systematically adjusted to ensure that each question could accurately reflect the purpose of the study. The optimized questionnaire was submitted to the experts again for review to confirm that all the changes were in line with the research requirements, and the necessary improvements were made to the details, and finally a version of the questionnaire that could be implemented was formed.

4: Online survey implementation and questionnaire release, after the questionnaire was finalized, research selected a number of mainstream online questionnaire platforms to carry out formal research with the help of their rich questionnaire design tools and data analysis functions. The link to the questionnaire is pushed to the target consumer group through WeChat, email and related social media channels, so that the respondents can fill in the questionnaire at any time and improve the questionnaire recovery rate and data coverage.

5: The final version of the questionnaire After all the review procedures are completed, the final content of the "Consumer Satisfaction Survey on the Innovative Design of Mobile Phone Holders" is officially determined. The questionnaire usually includes the following parts: basic information of the respondent (such as age, occupation, income level, etc.); satisfaction with the product design (around metrics such as functionality, appearance, material quality, price range, and personal preferences); Open-ended questions (used to collect specific suggestions and opinions from respondents for product design improvements).

In order to improve the efficiency of data collection and collation, research chose online channels to publish and collect questionnaires centrally. After the survey, research will systematically summarize, statistically analyze and visualize the collected effective questionnaire data, so as to provide a complete and detailed reference basis for the subsequent writing of the research report and the proposal of improvement plans.

3.3.4 Data Collection

1. Publish online questionnaires through professional platforms such as Questionnaire Star, and take technical measures to prevent duplicate filling

In order to ensure the accuracy and uniqueness of the survey data, research use professional platforms such as SurveyStar for online publishing, and enable the corresponding anti-fraud and anti-multiple submission functions.

2. Data collection is expected to be completed within two weeks, and online data will be screened to ensure data accuracy.

During the survey collection period, research use the survey platform's filtering tool to automatically exclude duplicate, invalid or incomplete responses to improve the

validity and credibility of the data.

3. Analyze the data collected by the research tool

At the end of the collection period, the selected valid data will be systematically sorted out and statistically analyzed, with the aim of mining the practical information behind the questionnaire and supporting the writing of follow-up studies or reports.

3.3.5 Data analysis

Using a questionnaire survey, this study explores the many factors that consumers value when purchasing mobile phone holders that combine Mid-Ming-style furniture design and modern design cultural capital, as well as their attitudes towards the overall satisfaction and sustainability performance of such products. The percentage analysis method was used to systematically sort, classify and statistically summarize the collected questionnaires to discover consumers' concerns about design style, material application, cultural connotation and price positioning, as well as feedback on the overall use experience and environmental attributes of the product. Based on the survey results, the researchers further analyzed the importance consumers place on the appearance characteristics, material quality, cultural value, and price expectations of such fusion products, and summarized the respondents' overall evaluation of the comfort and environmental friendliness of the finished product.

Before the survey, the researchers read relevant academic literature and theoretical foundations, and referred to a variety of research materials to clarify the core concerns of the respondents. The "Consumer Satisfaction Questionnaire on Innovative Design of Mobile Phone Holders" used in this study took Chengdu residents as the survey area and consumers in the region as the survey object, aiming to explore whether cultural and creative design can effectively respond to the pain points and improvement needs raised by researchers. In order to form a practical report, the investigators analyzed and summarized the questionnaire data after completing the initial data collection. In this stage, the previous literature research and results were systematically sorted out and summarized.

In order to better grasp the actual opinions of consumers, the questionnaire was distributed and collected through a variety of channels, and the questionnaire design covered multiple indicators such as design aesthetics, material durability, traditional cultural value, product price range, etc., supplemented by consumers' overall satisfaction with the chair and subjective evaluation of its environmental characteristics. After that, the effective part of the questionnaire will be processed, and a certain scoring system and statistical standards will be adopted, aiming to accurately measure the degree of consumers' recognition of the integration of Mid-Ming-style furniture design cultural capital and modern aesthetics, and provide an important reference for follow-

up research and product improvement.

The scoring criteria and survey procedures used in this study are as follows:

4.51-5.00 means very satisfied

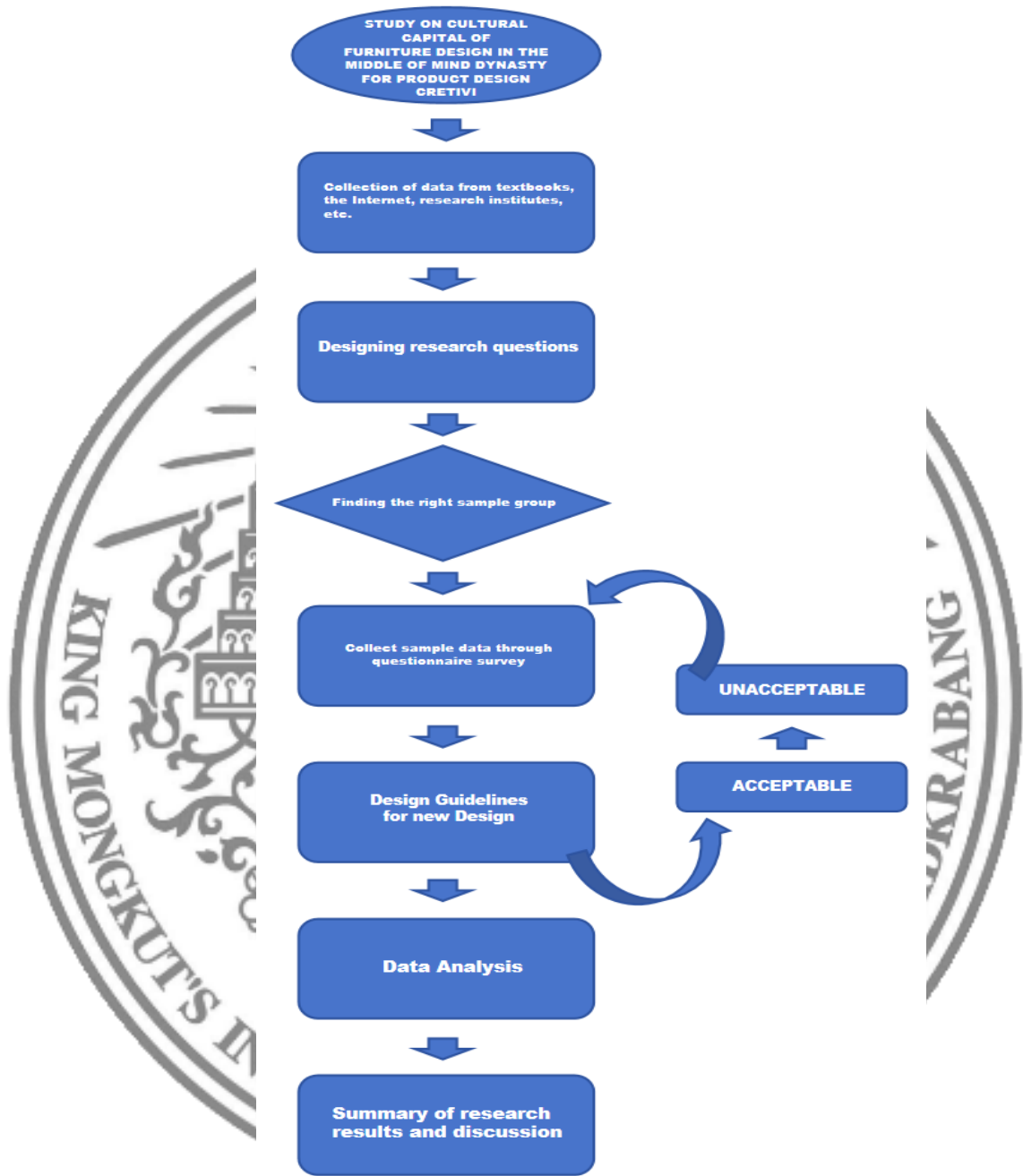
3.51-4.50 indicates basic satisfaction

2.51-3.50 indicates moderate satisfaction

1.51-2.50 indicates low satisfaction.

1.00-1.50 means the least satisfied





Note: Image created by researchers

CHAPTER 4

Experimental Results

Research article on furniture cultural capital in the middle of the Mid-Ming Dynasty for the design of new products, and designed cultural and creative products for mobile phone holders. The design study integrates a variety of factors, including relevant literature and research, as well as interviews and evaluations. On the basis of cultural and creative product design, the following design guidelines are summarized:

4.1 The historical, cultural, cultural and creative design of Mid-Ming Dynasty furniture design aesthetics, as well as representative frame, structure, ornamentation and other elements are analyzed and obtained.

4.2 Analysis of mobile phone holder products using the representative frame, structure, ornamentation and other elements of Mid-Ming Dynasty furniture design aesthetics.

4.3 Mid-Ming Dynasty furniture design aesthetics, cultural and creative product satisfaction evaluation and analysis results.

4.1 Analysis results of the historical, cultural and cultural creative design of furniture design aesthetics in the Mid-Ming Dynasty

4.1.1 Shanghai Museum Ming and Qing Furniture Museum visits and expert interviews

The research team conducted in-depth discussions through interviews, and combined with relevant documents and museum archives to systematically analyze the modeling logic and technical evolution of mobile phone holders in the Mid-Ming Dynasty.

Figure 11

Shanghai Museum



Note: Photo taken by researchers

Figure 12

The Ming and Qing Dynasty Home Gallery at the Shanghai Museum



Note: Photo taken by researchers

The researchers extracted the basic morphological characteristics of the new mobile phone holder from the Mid-Ming Dynasty furniture, focusing on its performance in structural structure, proportional rhythm and decorative language. The complexity of the structural form and the conditional change of the decorative pattern together create the rich diversity of the form of the mobile phone holder. The richness of this formal language is precisely the advantage of both aesthetic value and practical wisdom. The researchers interviewed three design experts, which provided strong support for the innovative design of mobile phone holder products in the Mid-Ming Dynasty design aesthetics.

Figure 13

Museum Exhibit



Note: Photo taken by researchers

Figure 14

Museum exhibit



Note: Photo taken by researchers

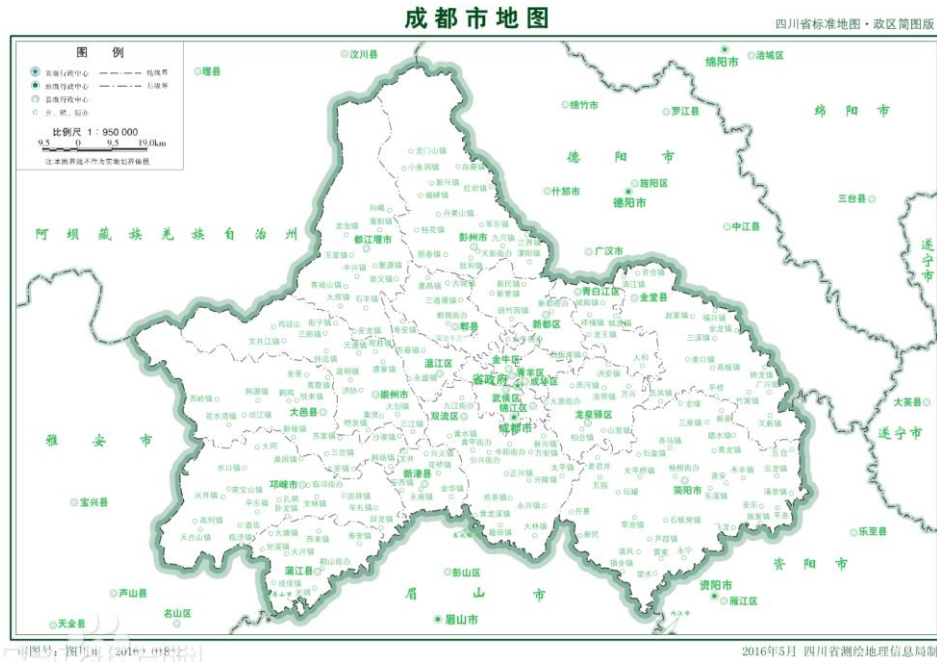
At the same time, in Chengdu, Sichuan Province, a questionnaire was launched on the consumer demand for furniture design aesthetics and cultural and creative products in the Mid-Ming Dynasty as a design reference.

4.1.2 Design analysis is carried out according to the questionnaire on the consumption demand of furniture design aesthetics and cultural and creative products in the Mid-Ming Dynasty

Chengdu City, referred to as "Rong", also known as Rongcheng and Jincheng, is a prefecture-level city, provincial capital, sub-provincial city and megacity under the jurisdiction of Sichuan Province, located in southwest China, the western part of the Sichuan Basin, and the eastern edge of the Qinghai-Tibet Plateau, with a total area of 14,335 square kilometers, and the common language is Southwest Mandarin. As of March 2025, Chengdu has 12 districts, 3 counties and 5 county-level cities. By the end of 2024, Chengdu has a permanent population of 21.474 million, with an urbanization

rate of 80.8%.

Figure 15
Map for Chengdu



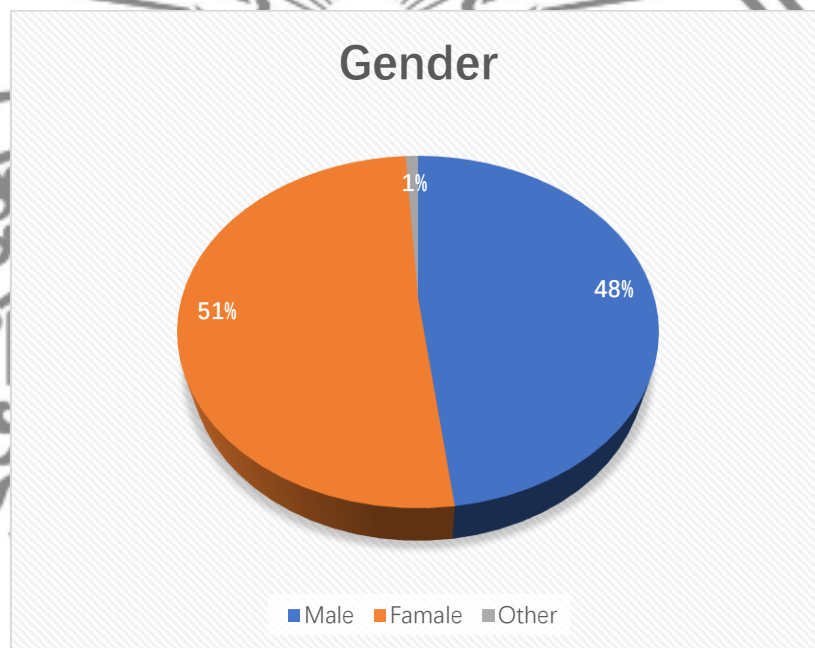
Note: Image from Baidu search engine

Therefore, the researchers used Chengdu as the survey area of the questionnaire population. As the capital city of Sichuan Province, Chengdu has a profound cultural heritage and a large number of consumers and related practitioners, which is very suitable for in-depth market research on the innovative design of Mid-Ming-style furniture cultural capital. Chengdu has a relatively high concentration of producers, practitioners and consumers, which provides us with effective data support. research plan to adopt a stratified sampling approach and take 100 valid samples in Chengdu to ensure the representativeness and diversity of the samples. Stratified sampling based on factors such as age, gender, income, etc., can fully collect the opinions of different groups.

We use questionnaires as a research tool to systematically collect a variety of relevant information. The content of the questionnaire includes: age, gender, occupation/industry background, income level/spending power, education level, interest or demand for traditional cultural products, willingness to purchase cultural

innovative products, understanding and recognition of traditional culture, acceptance of innovative product design, aesthetic and cultural values, emphasis on the "cultural value" or "artistry" of creative products, emphasis on the practicality/functionality/modern compatibility of mobile phone holder products, price and market perception, etc.

Figure 16
Gender Data Images

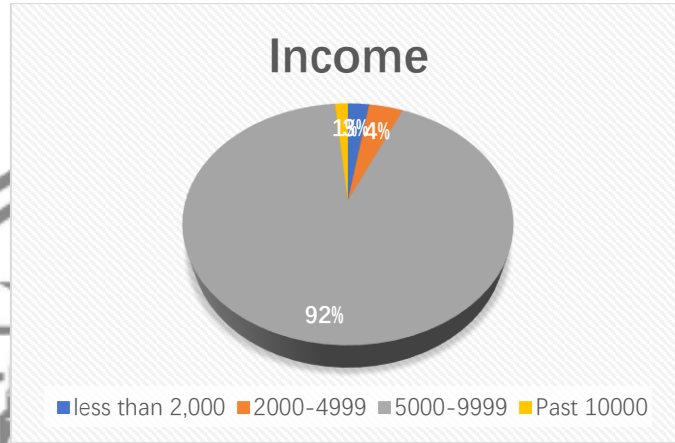


Note: Image drawn by researchers

The survey results show that the gender ratio of the sample is 51% female, 48% male, and other 1%, and the sample data is relatively balanced, which is helpful for the objective results of the questionnaire.

Figure 17

Residents Income Data Image

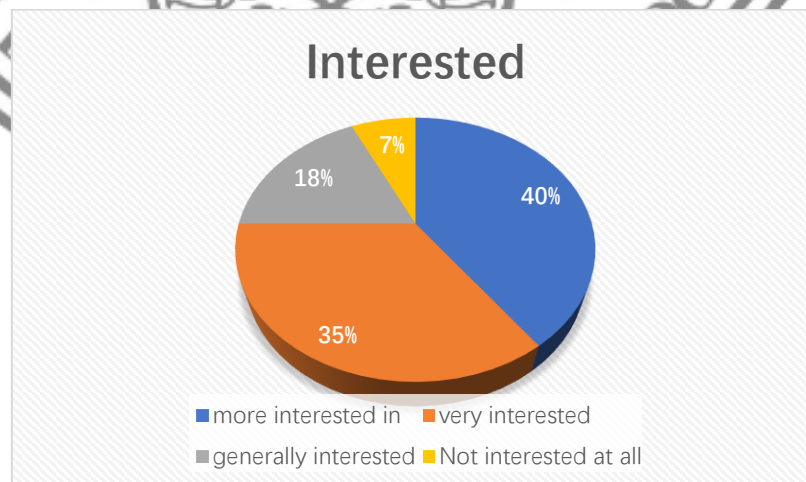


Note: Image drawn by researchers

According to the survey results, the majority of respondents have a monthly disposable income of 5,000–9,999 yuan, accounting for 73%; 12% for more than 10,000 yuan; 8% for 2000–4999 yuan; 2% are less than 2,000 yuan, and 5% are unwilling to disclose. From the perspective of income, the median income accounts for the majority, which plays a role in the side verification of the accuracy of the sample data of purchase behavior.

Figure 18

Interest Level Data Image



Note: Image drawn by researchers

The survey results show that the vast majority of respondents have a positive attitude towards traditional culture: 40% are "somewhat interested", 35% are "very interested", 18% are "generally interested", and only 7% are not interested or not interested at all.

Figure 19

Preference Data Image

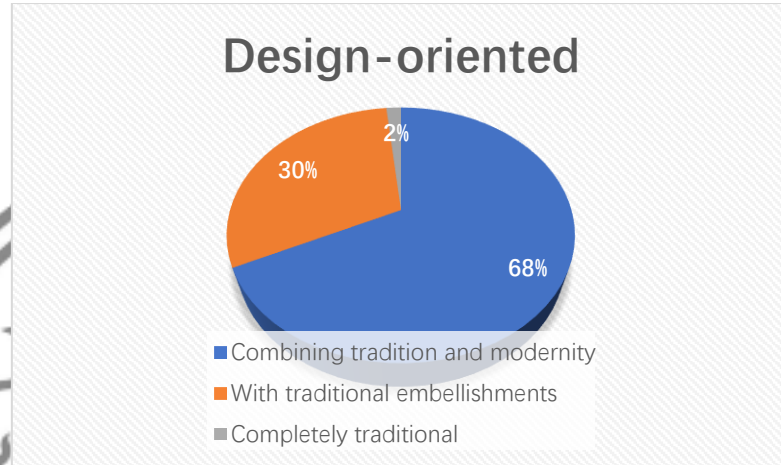


Note: Image drawn by researchers

At the same time, 81% of respondents said they "like" or "very like" products that blend traditional and modern, and only 4% said they "don't like" or "don't like it at all".

Figure 20

Design Preference Data.Image

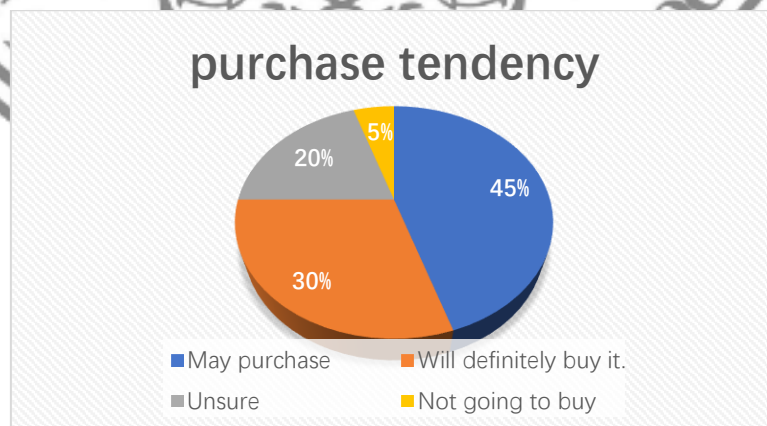


Note: Image drawn by researchers

According to the survey results, 58% of the respondents support the "combination of tradition and modernity", and 26% prefer "modern and traditional embellishment"; Only 3% chose "completely retro" or "completely modern", which is instructive for the direction of product design.

Figure 21

Purchase Intention Data Image



Note: Image drawn by researchers

The survey results show that 45% of the purchase propensity for Mid-Ming-style mobile phone holders said they would "probably buy", and 30% said they would definitely buy them. 20% "uncertain"; Only 5% said they would not buy.

4.1.3 Analysis of the design aesthetics of the Mid-Ming Dynasty furniture design aesthetics with representative frames, structures and ornaments

According to the previous theoretical framework of Mid-Ming Dynasty furniture design aesthetics, combined with modern design concepts, the practical exploration is carried out around the research theme of "New Product Design under Mid-Ming Dynasty Furniture Design Aesthetics", and the design language of the typical framework of Mid-Ming Dynasty furniture is analyzed in the chart, so that the results can better serve the new product design. Find goals and principles at the same time, and extend the results to the design methodology.

Mid-Ming Dynasty furniture is known for its simplicity and elegance, rigorous structure, harmonious proportions and exquisite craftsmanship, and is the pinnacle representative of Chinese classical furniture aesthetics. The design language of the overall framework is reflected in the following aspects:

1. Aesthetics: Mid-Ming Dynasty furniture pays attention to the smoothness of lines and the simplicity of structure, and the shape is mostly combined with straight lines and soft curves to highlight the harmonious beauty of the whole. This aesthetic concept of pursuing "purity, beauty, and elegance" reflects the cultural pursuit under the Confucian etiquette system.

2. Mortise and tenon structure: The mortise and tenon process not only ensures the stability of the structure, but also reflects the craftsman's exquisite grasp of the material and structure, which is the embodiment of the concept of "no nails and no glue". There are many kinds of mortise and tenon structures, such as raglan tenons, dovetail tenons, lattice tenons, etc., each structure is created to solve specific mechanical needs, reflecting superb structural logic and process wisdom.

3. Decorative elements: decorative patterns are mostly geometric patterns, flowers, birds, insects and fish, auspicious totems, which not only have cultural symbols, but also do not dominate. The decoration pursues "decoration without decoration", pays attention to the harmony and unity with the overall structure of the furniture, and emphasizes the cultural expression of details.

Material selection: mainly hardwoods such as huanghuali and red sandalwood, and pursue the perfect display of natural wood grain and material texture. Pay attention to the "matching of materials and arts", pay attention to the texture and color of the wood itself, and present the harmony and unity of natural and artificial skills in the design.

In the paper, the researchers selected six representative Mid-Ming-style furniture pictures from each aspect of the overall structure, local structure, and pattern elements through online and offline sales of Mid-Ming Dynasty furniture and visits to the Mid-Ming Dynasty Furniture Museum, and abstractly extracted and deduced their shape, structure, proportion and other characteristics in combination with parametric design language.

Table 1

Overall structural evolution chart










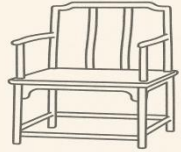


Name	Pictures of the real thing	Extract Elements	Structure extraction
Simple solid wood square table from the Mid-Ming Dynasty		Extraction of overall framework structure	
Simple square dining table from the Mid-Ming Dynasty		Extraction of overall framework structure	
Classic Mid-Ming Dynasty Horseback Chair		Extraction of overall framework structure	
Classic Mid-Ming Dynasty Hunchback Chair		Extraction of overall framework structure	

Table 1 (Continued)

Overall structural evolution chart

<p>Classic Mid-Ming Dynasty Grand Master Chair</p>		<p>Extraction of overall framework structure</p>	
<p>Classic Mid-Ming Dynasty Carved Wooden Stool</p>		<p>Extraction of overall framework structure</p>	

Note: table drawn by researchers

In the overall structural analysis, six kinds of furniture were selected: the strip table, the square table, the circle chair, the flower table, the official hat chair and the drum stool

The structure of the strip is embodied in the "elongated frame-linear support-valgus clubfoot", and its morphological grammar can be defined as a linear frame constituent unit, which is used for extended spatial arrangement. The square table is based on the semantic logic of "slotting - tooth plate decoration - four-column adduction", which is suitable for the construction mode of sitting in the center. The curved back of the circle chair is coherent and smooth with the rim, and the backrest is made of a whole piece of wood, which is a typical representative of "curved surface forming-closed structure". The structure of the official hat chair is more rigid and regular, showing the combination of etiquette and prestige in the Mid-Ming Dynasty, and it is the expression of the grammar of "frame chimera - symmetry and closure". The drum stool is characterized by "hollowing-openwork-closed circle", which has the advantages of strong artistic decoration and wide spatial adaptability, and is a representative form with the potential of carving parameterization.

Table 2

Local structure evolution chart

Name	Pictures of the real thing	Extract Elements	Structure extraction
Local structure: stepped load-bearing support		Extraction of local structural frameworks	
Local structure: Classic support structure		Extraction of local structural frameworks	
Local structure: BaWang's thorn		Extraction of local structural frameworks	
Local structure: Different forms of the BaWang		Extraction of local structural frameworks	
Local structure: supported by classical mechanics		Extraction of local structural frameworks	
Local structure: Details of bottom structure		Extraction of local structural frameworks	

Note: table drawn by researchers

In the local structural analysis, the researchers selected six typical Mid-Ming

Dynasty furniture structure node samples, and carried out detailed research from the perspectives of modeling semantics, structural logic and functional support, respectively, and carried out detailed research on the Bawang fir, Luo Guo fac, seat armrests, base support system, square stool and seat bottom connection device. Through the morphological refinement and analysis of the structural language, the respective design syntax is clarified, and the basic template is provided for parametric modeling. The first picture shows the corner treatment of the Mid-Ming Dynasty article, and the junction between the side wipe and the leg adopts the structure of "round turn-double shoulder" to form a visual and mechanical balance. The morphological syntax of the structure can be defined as "rounded corner transition + vertical undertaking", which is used in a linear extension spatial arrangement, emphasizing the coexistence of stability and softness. The second picture reflects the expression of the tooth plate in the square table structure, and the moire tooth strip is embedded in the inner side of the legs and feet, showing the grammatical logic of "saving edge grooves - decoration combined with support", which not only strengthens the horizontal stability, but also reflects the design concept of the integration of furniture decoration structure in the Mid-Ming Dynasty. The third figure focuses on the cheek support under the tabletop, and its "S-shaped involution" curve plays a connecting role on the one hand, and takes into account the decorative effect on the other, which is a structural example of "transition support-component linkage". Its syntax is defined as "diagonal support + dragon-shaped decoration", which is suitable for dynamic modeling research of the connecting nodes of tables and chairs. The fourth figure shows the supporting structure at the bottom of the chair furniture, which is connected with the bottom plate of the seat surface by diagonal bracing wood to form a structural system of "diagonal brace-embedding-bottom plate grille", which enhances the load-bearing performance of the seat surface and improves the overall stability, which conforms to the semantic characteristics of "cross bracket-grid support". The fifth figure shows the middle section structure of the square stool, with its hard lines, closed frame, and the middle convex part of the horizontal stool, which belongs to the grammatical logic of "closed structure-local reinforcement", which is suitable for modular design of the combined chair and stool system. The sixth figure is a cross-sectional view of the bottom structure in the upturned state of the seat, which clearly shows the connection between the X-shaped cross brace and the central round tenon, forming the structural syntax of "cross cross-center positioning-diagonal stability". This design achieves the maximum tension distribution of the structure and provides a solution for the high-strength load-bearing needs, which is a representative of the mechanical wisdom of furniture in the Mid-Ming Dynasty.

Table 3

Chart of the Evolution of Ornamental Patterns

Name	Pictures of the real thing	The main frame	Structure extraction
Classic pattern: ingot-shaped pattern		Extraction and reconstruction of pattern lines	
Classic pattern: continuous copper coin pattern		Extraction and reconstruction of pattern lines	
Classic pattern: simple auspicious cloud pattern		Extraction and reconstruction of pattern lines	
Classic pattern: Single-sided auspicious cloud pattern		Extraction and reconstruction of pattern lines	
Classic pattern: openwork Tang grass pattern		Extraction and reconstruction of pattern lines	
Classic pattern: continuous carved cloud pattern		Extraction and reconstruction of pattern lines	

Note: table drawn by researchers

In the study of decorative patterns of furniture in the Mid-Ming Dynasty, this

paper selects six typical carving patterns for semantic analysis and morphological grammar refinement. Based on the image data, combined with its practical application on furniture components, the internal logic of Mid-Ming-style furniture carving in terms of formal composition, symbol meaning and structural language is summarized.

The first picture shows a typical moire carving, with natural curves and a symmetrical composition of double vortices. The pattern grammar can be defined as the composition law of "symmetrical vortex-central axis centering-edge convergence", which reflects the aesthetic appeal of Mid-Ming Dynasty furniture that emphasizes etiquette and harmony.

The second picture shows an openwork screen component with a continuous circular pattern combined with auspicious symbols such as bats and ruyi. This form exhibits the characteristics of "repeating unit-ring structure-hollow staggering", and is an ideal pattern system for partitioning and visual guidance.

The third picture shows diagonally symmetrical hollow square components, which are mostly seen in local areas such as backrests and door centers, emphasizing the "center of gravity concentration - four-way expansion" of the space. The basic syntax is "center symmetry - rotating corners - hollow filling".

The fourth picture shows a unit pattern commonly used for tooth plate decoration, with a spiral shape embedded with beads, which is very dynamic and layered. Structurally, it is a semantic unit of "single-arm rotation - in-center of the circle - curve reversal", which is a carving language fragment that can adjust the proportion, density and undulation intensity, which is suitable for parameter expression design intensity.

The fifth picture is a typical style in the decorative parts of Mid-Ming-style furniture seats, which adopts the combination of "central axis symmetry + plant curly grass pattern" to form a continuous and delicate visual sense. This type belongs to the grammar of "horizontal extension-symmetrical filling-plant deformation", and is often used for the decoration of small and medium-sized utensils such as sideboards and incense tables.

The sixth picture shows the high-relief expression of the moire background panel, which is expressed in the form of "cascading undulations-depth staggering-flow surface distribution", simulating the churning trend of the sea of clouds. In digital design, it can be translated as a decorative template of "surface array-curvature gradient-density controllable", which is suitable for integration with modern texturing systems.

4.2 Analysis of mobile phone holder products using the representative frame, structure, ornamentation and other elements of Mid-Ming Dynasty furniture design aesthetics.

4.2.1

Based on the aesthetic characteristics of Mid-Ming Dynasty furniture, the following design objectives and principles are established in the development of new products:

It retains the core aesthetic characteristics of Mid-Ming-style furniture, especially the elegance of proportions and lines, introduces modern functional elements to meet the needs of contemporary lifestyle and ergonomics, integrates traditional mortise and tenon structure with modern design concepts, selects natural high-quality and sustainable materials in terms of materials, and emphasizes the concept of ecological design. Emphasize the connection between cultural inheritance and user emotion, and enhance the user's sense of identity with traditional culture.

The design ideas come from the furniture design aesthetics of the Mid-Ming Dynasty and the cultural capital of the Mid-Ming Dynasty furniture design aesthetics. Functional optimization for modern requirements. Maintain the classic structure, clean lines, and use simplified mortise and tenon joints in the structure to make installation easier.

In terms of design details, the sharp corners are slightly chamfered to show the warmth of the details, and the metal adjustable knob is added to enhance the convenience of modern use.

The material is made of solid wood with hard texture, mild color and roundness, taking into account the Ming style connotation and modern high-end feeling.

For modern use, the adjustable backrest panel is designed to increase the comfort of use and be more ergonomic. The structure maintains the Mid-Ming-style "square in the circle", and the shape is strictly neat.

The base and back panel are hollowed out to enhance the visual level, while the hollow engraving simplifies the Ruyi pattern to convey auspicious meaning.

The whole is treated with natural wood wax oil to retain the natural color and natural texture of the wood, and the bottom of the base is designed with non-slip foot pads to adapt to different placement environments and increase humanized design considerations.

In terms of the overall aesthetic value, through the integration of traditional forms and modern functions, the mobile phone holder not only has aesthetic attributes, but

also is more practical, meeting the needs of modern entertainment, office and other multiple scenarios. The aesthetics of Mid-Ming Dynasty furniture design not only have historical and cultural value, but also have the application potential of contemporary product design. Through the intervention of modern design methods, Mid-Ming-style furniture elements can be combined with the needs of contemporary life to achieve both functional and aesthetic optimization.

In order to test the effectiveness of the design, the new product was subjected to in-depth expert interviews and questionnaire scoring surveys, and then modified according to expert opinions.

4.2.2 Innovative ideas for the design and development of cultural products

4.2.2.1 Overall framework design ideas

The design of the three components is based on the folding structure form of "rear support-front support", drawing on the combined shape of "several types of cases" and "back chairs" in Mid-Ming Dynasty furniture, emphasizing the composition of "rectangular frame + three-sided support", which has good structural stability and portability. The angle of the bracket is controlled by a metal knob to realize the multi-level adjustment of the angle of use, and the introduction of this modern mechanism, with the traditional "fulcrum-diagonal brace" logic, is the fusion expression of traditional craftsmanship and modern ergonomics. The overall outline maintains the "concise and backbone" aesthetic pursued by Mid-Ming-style furniture, that is, the lines are straight, the shape is symmetrical, and the proportion is combined, highlighting the overall sense of order and structural rationality.

4.2.2.2 Local structural and functional detail design

The design of some components focuses on the Mid-Ming-style craftsmanship spirit of "showing ingenuity in details", and the following aspects are particularly prominent, supporting the shaft nodes: through the combination of metal knobs and wooden structures, the modern hinge structure is embedded in the traditional frame, symbolizing the dialogue between "mortise and tenon" and "machinery". The round knob forms a flexible contrast with the overall square shape to enhance the visual tension. The structure of the front rod supporting the mobile phone: the first and second models adopt the shape of a round rod, echoing the valgus lines of the armrests of the circle chair, emphasizing "power in the curve"; The third section is changed to the in-frame panel type, reflecting the "drum line" processing method of the incense panel, and the overall is thicker and more stable. Base stability: All three designs are thickened under the bottom frame, supplemented by horizontal frame decorative relief, so that the overall center of gravity is shifted downward, and stability and safety are improved without increasing volume.

4.2.2.3 Transformation and parametric generation of decorative patterns

The first one extracts the typical "composition and extraction of double wishful back lines" to form a symbol, with a symmetrical overall curve and a strong sense of spatial rhythm, presenting a visual experience of "flow + hierarchy".

Figure 22

Design Model Rendering 1



Note: Image drawn by the author, rendered by AI.

The second is to extract the "Ruyi Cloud Head Continuous Pattern", whose inward whirlwind structure comes from the tooth strip decoration language between the flower table and the backrest of the armrest, which has excellent light and shadow expression in small and medium-scale spaces

Figure 23

Design Model Rendering 2



Note: Image drawn by the author, rendered by AI.

The third section arranges the "cloud shoulder symbol" in four directions, pursuing the aesthetic logic of "combining virtual and real, and symmetrical center". The embedding method of the pattern is mainly "hollow openwork", with modern CNC cutting or laser engraving technology, which not only improves the processing efficiency, but also strengthens the decoration.

Figure 24

Design Model Rendering 3



Note: Image drawn by the author, rendered by AI.

Researchers hope that the product is not only concerned about the integration of shape and function, but also focuses on the modern interpretation and emotional connection of traditional furniture culture, and the design language reflects the concept of "ancient but not old", which not only carries the elegant charm of Mid-Ming Dynasty furniture, but also adapts to the aesthetics and usage habits of contemporary people, emphasizing the dual value of "practical function + cultural expression", and provides an effective path for the daily use of traditional elements and the aesthetics of life.

4.2.3 Experts evaluate the development of the product

Based on expert feedback, the questionnaire content and product concept are optimized, and the final version of the new product design is completed.

According to the expert opinions of KMITL, the questionnaire was comprehensively adjusted in terms of question sequence, language expression, answer format, conceptual feasibility, combination of cultural elements and modern functions, and matching coverage of materials and environmental protection needs And passed ioc certification.

Three experts, together with six practitioners in the field of design, have industry influence, professionalism and experience in the field of Mid-Ming Dynasty cultural research and product design, ensuring a diversity of views and a high degree of professionalism in the profession.

Table 4

Expert Rating Table




Model Number	Model1		Model2		Model3	
Model Display						
Product Questions	\bar{X}	S.D	\bar{X}	S.D	\bar{X}	S.D
1.How well does the Chinese mobile phone stand reflect the design language of Mid-Ming-style furniture?	4.33	0.58	4.39	0.47	4.33	0.58

Table 4 (Continued)*Expert Rating Table*

2.How effectively do the decorative elements convey the aesthetic imagery of Mid-Ming-style furniture?	4	0	4.27	0.56	4.24	1
3.How well does the design embody the “contrast between solid and void” aesthetic concept of 4.Mid-Ming-style furniture, particularly in terms of spatial negative space and proportions?	3.67	1.15	4.68	0.74	4.73	0.47
4.How well are the decorative patterns coordinated with the overall structure in terms of stylistic unity?	4	1	4.66	0.45	4.14	0.82
5.How clearly does the support structure reflect a transformation or simulation of the mortise-and-tenon joinery logic typical of Mid-Ming-style furniture?	4.33	0.58	4	0.49	3.97	0.82
6.How feasible is the form and structure in terms of practical craftsmanship and manufacturing processes?	4.33	1.15	4.29	0.33	4.68	0.71
7.How well does the design preserve the spirit of craftsmanship associated with Mid-Ming-style furniture under modern material and production conditions?	3.33	0.58	4.37	0.37	3.91	0.47
8.How reasonable and stable is the product’s mechanical structure in terms of component connection and assembly?	4.33	0.58	4.13	0.66	3.82	0.82
9.How successfully does the design translate traditional craftsmanship concepts into a modern product context?	4.33	0.58	4.49	0.71	3.88	1
10.How effectively does the product express Mid-Ming-style furniture aesthetics in a contemporary form?	3.67	0.58	4.53	0.58	4.14	0.82

Table 4 (Continued)*Expert Rating Table*

11.How much does the design demonstrate inappropriate use of traditional cultural elements, such as cultural appropriation or excessive symbolism?	5	0	4.51	0.66	4.05	0.71
12.How well does the design serve as a symbolic cultural product, such as a “cultural IP carrier” or representative of cultural and creative design?	3.33	0.58	4.61	0.72	4.12	0.47
13.How adaptable is the design to mass production and cost-effective manufacturing?	4.67	0.58	4.39	0.34	4.06	0.82
14.How appealing is the product to a broad consumer base while maintaining cultural depth?	4.33	1.15	4.22	0.67	3.97	0.47
15.How suitable is the product for applications in fields such as intangible cultural heritage education, exhibitions, gifting, or office supplies?	3.67	0.58	4.78	0.82	3.72	0.71
Average Score	4.09	0.64	4.42	0.57	4.12	0.70
Overall Ranking	3		1		2	

Note: table drawn by researchers

Experts evaluate the development of the product and summarize:

As can be seen from Chart4, the results of the evaluation and analysis of the development assessment scores of the three experts and the eight practitioners are as follows:

Model (2) embodies the design language of Mid-Ming-style furniture to the greatest extent.

The decorative elements of model (2) convey the aesthetic imagery of Mid-Ming-style furniture to the greatest extent.

The extent to which the design of model (3) embodies the aesthetic concept of "real and virtual contrast" of Mid-Ming-style furniture.

Model (2) is best coordinated in terms of stylistic unity between the decoration and the overall structure.

Model (1) reflects the transformation or simulation of the typical mortise and tenon structure logic of Mid-Ming-style furniture to the greatest extent.

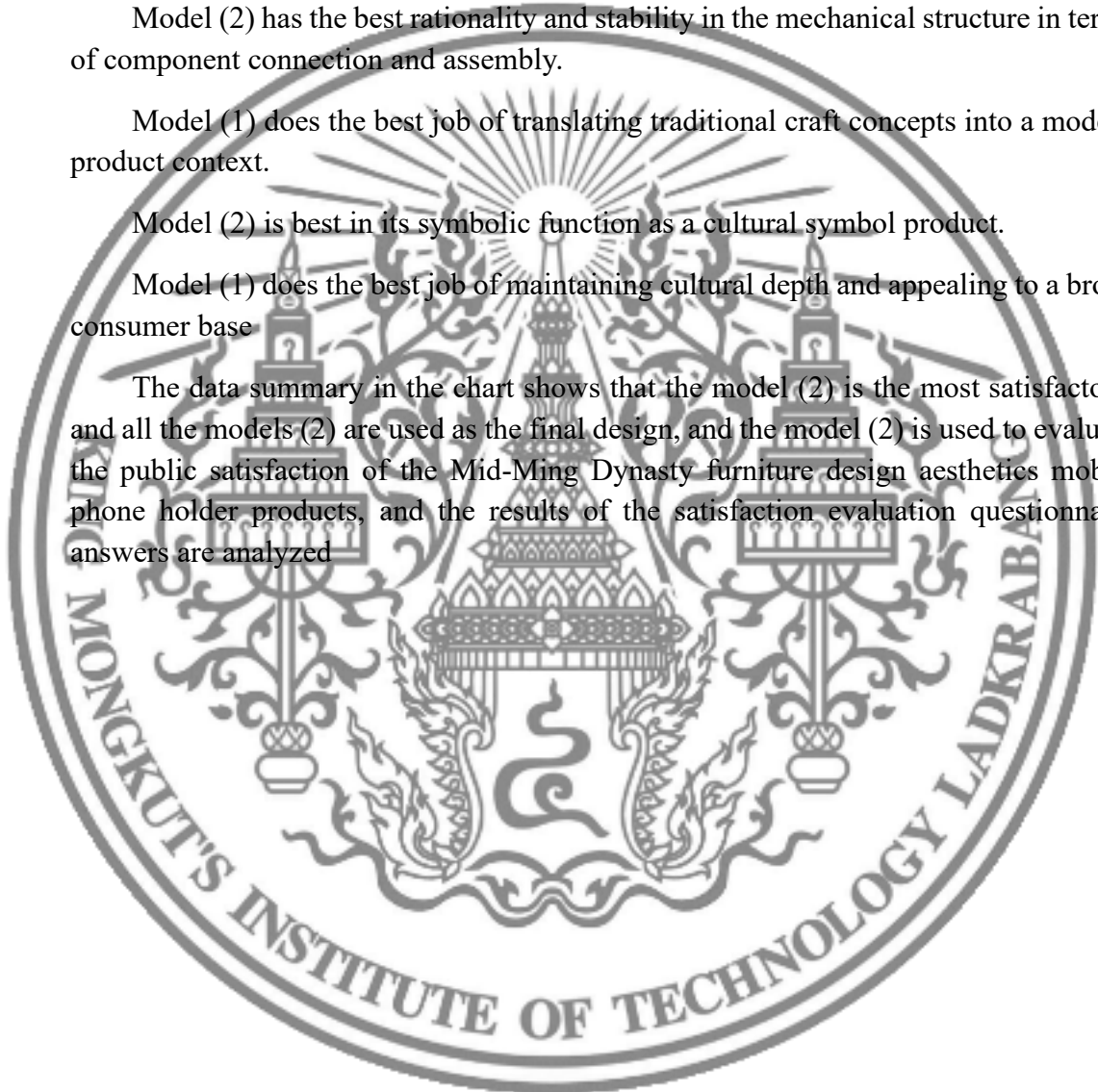
Model (2) has the best rationality and stability in the mechanical structure in terms of component connection and assembly.

Model (1) does the best job of translating traditional craft concepts into a modern product context.

Model (2) is best in its symbolic function as a cultural symbol product.

Model (1) does the best job of maintaining cultural depth and appealing to a broad consumer base

The data summary in the chart shows that the model (2) is the most satisfactory, and all the models (2) are used as the final design, and the model (2) is used to evaluate the public satisfaction of the Mid-Ming Dynasty furniture design aesthetics mobile phone holder products, and the results of the satisfaction evaluation questionnaire answers are analyzed



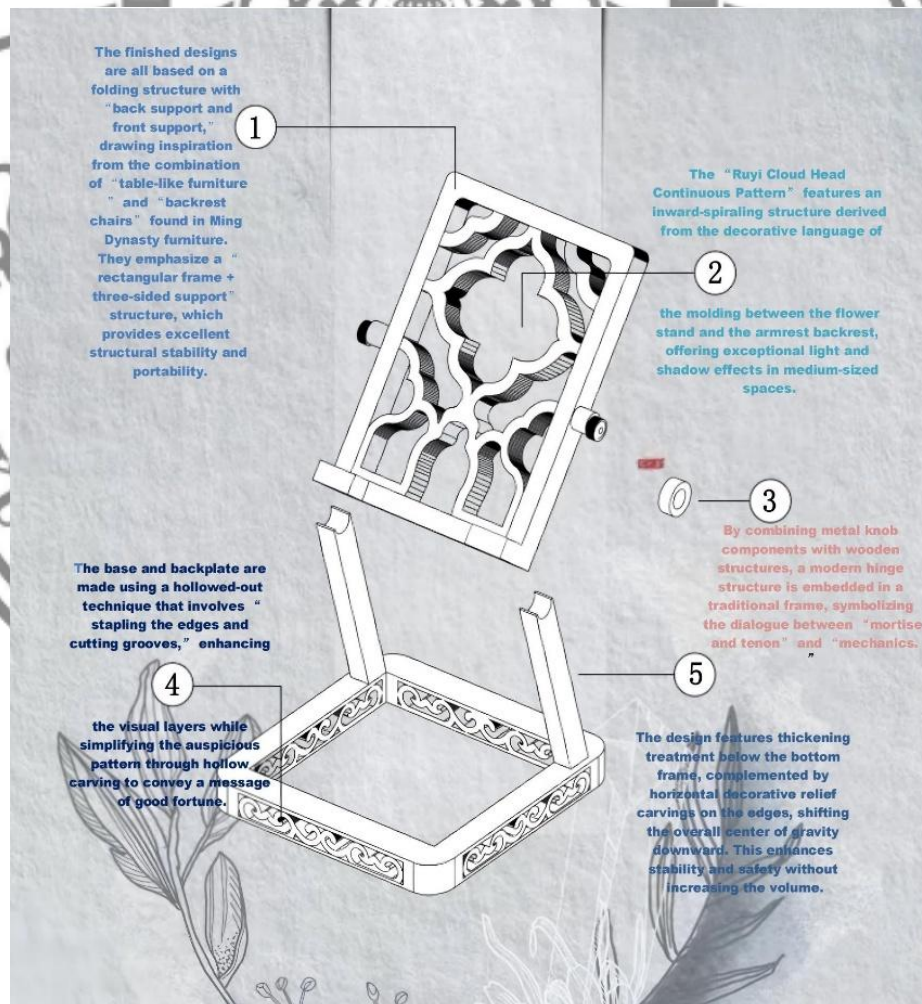
4.2.4 Model display

Based on the final opinions of the three experts, modifications were made to arrive at the final design:

1. Remove the decorative back panel at the bottom
2. Simplify the lines to emphasize a modern and minimalist style
3. Remove the unnecessary cutouts on the base

Figure 25

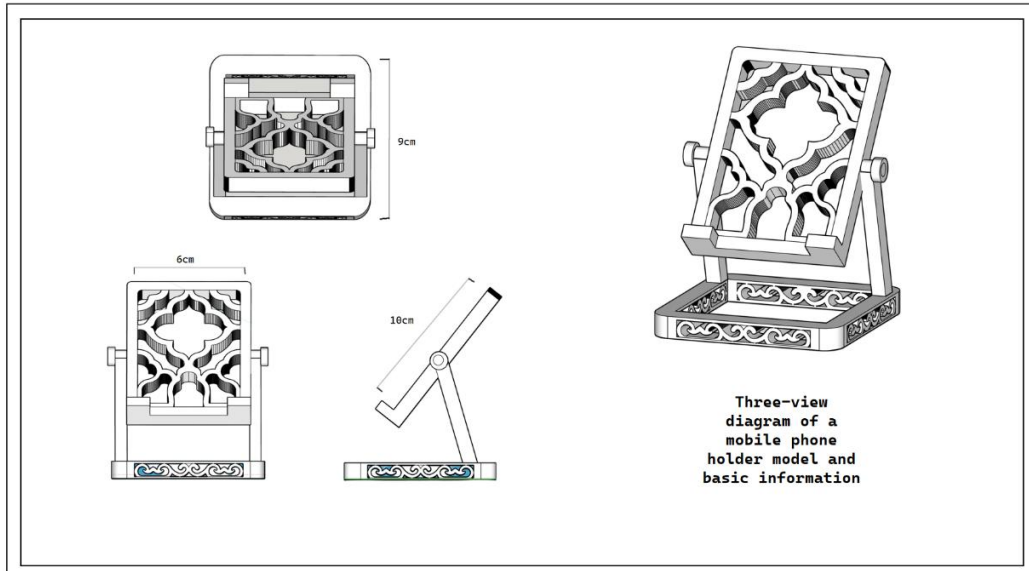
Final Design Drawing



Note: Image drawn by researchers

Figure 26

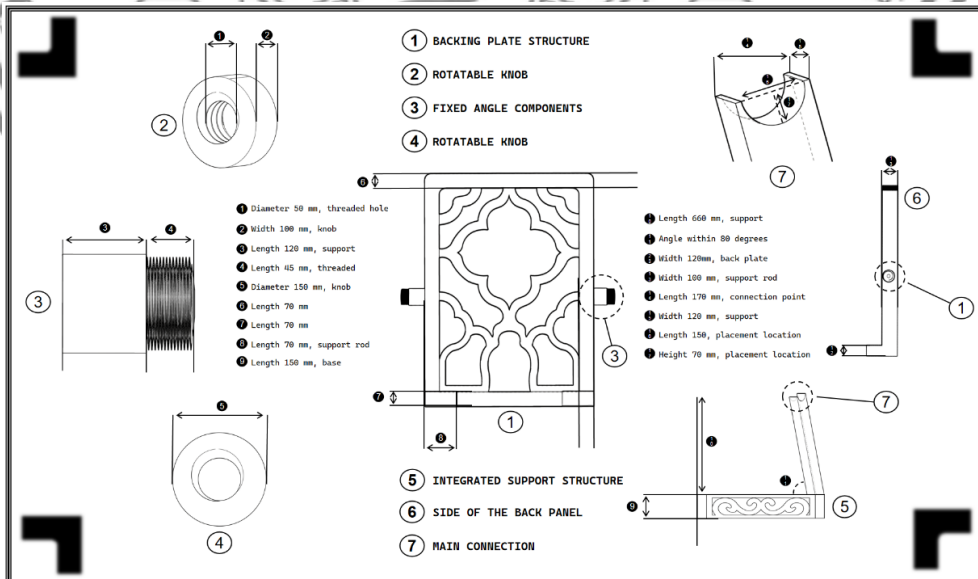
Three-View Drawing Of A Mobile Phone Holder



Note: Image drawn by researchers

Figure 27

Mobile Phone Holder Detail Image



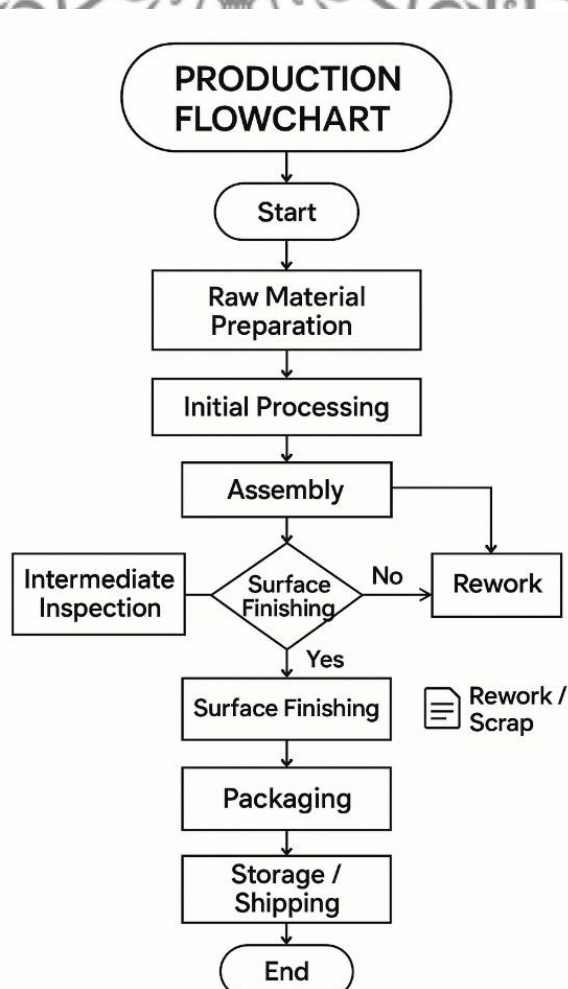
Note: Image drawn by researchers

4.2.5 Product production flow chart

Researchers designed a production flow chart based on industrial production standards, starting with “raw material preparation,” followed by “preliminary processing,” “assembly,” “intermediate inspection,” and “surface treatment.” Quality control checks are conducted at each critical stage, and if any product fails to meet standards, it is sent to “rework” or “scrap” for further processing. The entire production process is completed through the ‘packaging’ and “warehousing/shipping” stages, demonstrating a standardized, orderly, and controllable manufacturing process.

Figure 28

Production Flow Chart



Note: Image drawn by researchers

4.3 Mid-Ming Dynasty furniture design aesthetics hand product satisfaction evaluation and analysis results

4.3.1 Analysis of stent product satisfaction evaluation results

Table 5

Consumer Satisfaction Survey Score Sheet

Question	\bar{X}	S D
The overall design is simple and clear	4.51	0.92
The design reflects symmetrical beauty	4.57	0.72
The use of negative space is appropriate	4.51	0.91
The top decoration reflects Mid-Ming-style furniture	4.64	0.69
Aesthetic and cultural appropriateness of decorative elements	4.64	0.62
Reflects mortise-and-tenon structure logic or aesthetics	4.52	0.97
Structural stability	4.57	0.76
Structural practicality	4.53	0.89
Convenience and practicality in daily use	4.65	0.64
Dual functionality as decoration and accessory	4.48	0.99
Ergonomic design	4.55	0.84
Material combination is reasonable and aesthetic	4.5	0.9

Note: Image drawn by researchers

According to Chart 5:

A total of 100 valid samples were collected in this questionnaire, covering basic information such as gender, age, occupation, education and monthly disposable income. In terms of gender distribution, 48% of the respondents were male, 51% were female, and 1% chose "other", which is a relatively balanced gender ratio. In terms of age, respondents aged 29-40 accounted for the highest proportion, reaching 40%; followed by 21-28 year olds, accounting for 35%; The 41-60 age group accounted for 25%, indicating that the survey was mainly in the young and middle-aged group.

In the occupational composition, office workers occupy a dominant position, accounting for 52%; freelancers followed with 18%; 15% are employed in the education/cultural sector; Only 5% of students are students, and another 10% are from other occupational categories, indicating that the sample group is mainly from the stable employment group with certain social and consumption power. In terms of academic qualifications, 56% of respondents have a bachelor's degree, 20% have a master's degree or above, 15% have a college degree, and only 6% have a high school degree or less, reflecting the overall high education level of the respondents.

In terms of disposable income, the vast majority of people (73%) have a monthly income of 5,000-9,999 yuan. 12% of the respondents have a monthly income of more than 10,000 yuan; 8% between 2000 and 4999 yuan; Only 2% of respondents have a monthly income of less than 2,000 yuan, and another 5% are unwilling to disclose their income. This indicates that the interviewed sample has strong consumption potential and provides a valuable market basis for product design evaluation.

In the evaluation of the design details of the mobile phone holder, the overall feedback from users is positive. In terms of the simplicity and brightness of the overall design (Question 6), an average score of 4.51 was obtained, indicating that users generally recognized its visual cleanliness, while the expression of symmetrical beauty (Question 7) scored even higher, with an average of 4.57, indicating that the design was well received in terms of formal beauty. The use of "white space" (Question 8) was also considered appropriate, with an average score of 4.51.

In terms of the integration of cultural elements, users rated the top decoration as borrowing from the Ming style of furniture (Question 9), with an average score of 4.64, indicating that the design successfully evoked the cognition of traditional culture, and correspondingly, the aesthetics and cultural suitability of decorative elements (Question 10) also received the same high score (4.64), indicating that the product has achieved a good balance between cultural expression and visual effect.

The structural evaluation showed the integration of function and form: the embodiment of the mortise and tenon structure (question 11) had an average score of

4.52, indicating that users agreed with the logic and beauty of the structure, and the stability of the structure (question 12) had a higher score of 4.57, reflecting its functional reliability. The practicality of the structure (Question 13) also performed well (4.53), further supporting its ease of use on a daily basis.

Convenience in daily use (Question 14) scored the highest at 4.65, indicating that the product is highly compliant with the daily needs of users. The dual function of being an ornament and a practical accessory (Question 15) also scored 4.48 points, reflecting its ability to balance aesthetics and function.

In terms of ergonomic design (Question 16), the average score is 4.55, indicating that the product is properly designed in terms of comfort of use. Finally, the rationality and aesthetics of material matching (Question 17) were evaluated as 4.50, which was also highly recognized, reflecting the professionalism and aesthetics of material selection.

The satisfaction survey of Mid-Ming Dynasty furniture cultural capital design mobile phone holder products covers five dimensions: appearance design, cultural elements, structural performance, ergonomics and material aesthetics. Overall, the user's evaluation of the mobile phone holder shows a high positive trend, with an average score of more than 4.48 points for all items, showing that the design has been widely recognized in many aspects.

In the visual design and aesthetic dimensions, such as "the overall design is concise and bright", "symmetrical beauty embodiment" and "white space use", the average score is higher than 4.5, reflecting the high consistency and professionalism of the product in modern aesthetics and formal composition.

In terms of cultural integration, such as "whether the top decoration draws on the style of Mid-Ming-style furniture" and "the aesthetics and cultural suitability of decorative elements", both questions scored 4.64, reaching the highest level in this evaluation, indicating that the implantation of traditional cultural symbols is deeply loved by users, and also enhances the cultural recognition and value identity of the design. In terms of structural design (covering mortise and tenon logic, stability, and practicability), it also received an average evaluation of more than 4.5 points, indicating that users believe that the product not only has the expressive power of traditional structural language, but also has good use function and durability.

In terms of user experience and functionality, such as "convenience of daily use" and "ergonomic design", it received high scores of 4.65 and 4.55 respectively, reflecting the excellent performance of the product in terms of ease of use and comfort, and is a model of the integration of function and design.

Finally, in terms of material aesthetics and rationality, users also gave an average score of 4.5, indicating that the material selection and appearance coordination have been fully recognized.

The Mid-Ming Dynasty furniture cultural capital mobile phone holder has excellent performance in all dimensions of aesthetics, culture, function and material, especially in terms of cultural imagery and practicality, and has a good market acceptance foundation and product design reference value.



CHAPTER 5

Conclusions

The chapter is divided into four parts: Summary of Research Findings, Summary of Research Findings, Discussion and Conclusions.

5.1 Research Results

5.1.1 Summary of research on the history and design value of furniture cultural capital in the Mid-Ming Dynasty

Furniture in the middle of the Mid-Ming Dynasty is the pinnacle of ancient Chinese furniture art, and its cultural capital contains profound historical inheritance and aesthetic wisdom. Through a systematic analysis of its origin background, design concept and cultural connotation, this paper confirms that the core values of Mid-Ming Dynasty furniture are reflected in the following aspects: first, the aesthetic concept pursues the unity of nature and man, elegant and concise literati style, highlighting the spirit of "less is more"; Second, in terms of process technology, hardwood materials with mortise and tenon structure and exquisite texture, such as huanghuali and red sandalwood, reflect superb craftsman skills; The third is the cultural symbolic level, whose furniture shapes and decorative patterns contain auspicious meanings and the spirit of Confucian etiquette, which is a comprehensive embodiment of ancient social identity and cultural taste. These factors together constitute the cultural capital foundation of Mid-Ming-style furniture, which lays a theoretical basis for subsequent design research and creative transformation.

5.1.2 Summary of design practice of Mid-Ming-style furniture cultural elements in modern products

In this study, the representative symbols of Mid-Ming-style furniture were translated and applied to modern design, and classic elements such as lampshade lines, backrests and backrests of circle chairs, door post structures and mortise and tenon joints were selected to carry out systematic product development practices in combination with modern functional requirements and aesthetic trends. The design follows the modernist principle of "form obeys function", integrates ergonomic and portable and practical design considerations, pays attention to the stability of the structure and the cultural expression of decoration, and achieves the harmony and unity of traditional culture and modern product language.

In terms of color matching and material selection, referring to the dark-toned wood grain and high-quality metal texture used in Mid-Ming-style furniture, the transplantation of visual semantics and the reconstruction of modern materials are carried out, and the product achieves a balance between form, function and cultural narrative. The final design products not only have a clear cultural identity and artistic appeal, but also meet the needs of modern consumers for convenience and

personalization.

5.1.3 Summary of user evaluation results of Mid-Ming-style furniture cultural and creative products

In order to evaluate the social acceptance and market potential of design results, this study conducted a satisfaction study through a combination of expert evaluation and questionnaire survey, and the sample included design teachers and students, traditional culture lovers and ordinary consumers.

The results showed:

In the dimension of "product aesthetics and cultural expression", the average score is 88.2 points, and users generally believe that the product has a strong oriental cultural atmosphere and aesthetic rhythm;

In the dimension of "structural design and user experience", the average score is 85.9 points, and users recognize it as simple and creative in shape, easy to operate, and stable in structure;

In the dimension of "cultural value and identity", the average score was 86.7 points, and respondents said that the product effectively evokes emotional identification with traditional culture and enhances interest in traditional art.

From the perspective of overall satisfaction, the product is highly praised by the target user group, especially among the young people, which reflects a high cultural acceptance and consumer interest.

5.2 Research Discussion

This study verifies the translation value and communication potential of traditional cultural elements in modern design. The cultural symbols of Mid-Ming-style furniture are not only highly recognizable, but also can effectively integrate modern product needs through the simplification and reorganization of visual symbols, and realize the dual expression of function and culture. However, the study also found that the design transformation of Mid-Ming-style furniture cultural capital still faces several problems:

1. There are still integration barriers between the abstraction of traditional elements and modern design language, and it is necessary to further strengthen the matching between the symbolic logic and user cognition of design transformation.

2. Due to its complexity and cost, some processes are difficult to popularize in modern industrial production, and need to be improved by relying on modern technical means.

3. Consumers' cognition of traditional cultural products is uneven, and it is necessary to enhance users' cultural understanding and emotional participation through education, exhibition, communication and other means.

The following issues are faced in other aspects of society:

1. The issue of preserving the integrity of traditional culture: As an essential

element of Ming-style furniture, profiles not only embody craftsmanship but also serve as cultural symbols. If they are neglected or lost, the artistic and historical value of the Ming-style furniture system cannot be fully realized.

2. The issue of intangible cultural heritage transmission and skill training: While some regions have included Ming-style furniture making techniques in their lists of intangible cultural heritage and established systems for inheritors or relevant training programs to ensure the transmission of related skills and knowledge across generations, the production methods and historical evolution of compass columns are passed down through craft demonstrations and apprenticeships under master craftsmen in production practices. However, the efficiency of this approach is not particularly notable.

3. Cross-sector collaboration and commercial innovation issues: Many cultural and creative enterprises and high-end brands have leveraged the symbolic elements of the “Beidou Station” door columns to launch limited-edition furniture or cross-sector products, such as exquisite chairs and tables, cultural and creative ornaments, and decorative elements. These products not only meet market demand but also enhance the public's awareness and interest in traditional symbols through commercial promotion. However, they have not effectively popularized Ming Dynasty traditional design on a deeper level.

4. Consumer awareness issues Despite the rising popularity of the “New Chinese-style” trend, a significant portion of consumers remain unaware of the specific characteristics, historical origins, and craftsmanship of Ming-style furniture, knowing only that it is ‘beautiful’ or “Chinese-style.” For example, professional terms like “door pillar” are unfamiliar to the general public, making it difficult to establish intuitive associations in everyday contexts. The introduction of traditional furniture cultural symbols in primary and secondary school education and art courses is also relatively limited, resulting in low public awareness.

5. Lack of professional personnel and craftsmanship successors: The design and production of ancient furniture require high levels of manual skill and cultural literacy, particularly in areas such as mortise-and-tenon joints and decorative carving, which have strict craftsmanship standards. However, due to the time-consuming and labor-intensive nature of manual production and limited returns, young people have relatively little interest in pursuing these traditional industries, resulting in a severe shortage of new-generation craftsmen. Additionally, the cultivation of interdisciplinary talent (such as design, materials science, and digital technology) is challenging, limiting the depth and breadth of antique furniture conservation and innovation.

6. Market homogenization and the “pseudo-classical” phenomenon: In the commercial sector, some companies or brands blindly follow trends like “New Chinese-

style” or “recreating classical styles,” but few truly adhere to the traditional craftsmanship of Ming-style furniture or deeply understand its iconic symbols. The market is flooded with “antique-style furniture” of varying quality, some of which are substandard, using inferior materials and crude craftsmanship, which undermines the overall market image and affects the public's perception of the value of classical furniture.

7. Incomplete legal and standards framework: Although China has established relevant laws and regulations for cultural relic protection, there are still no detailed industry standards or regulatory frameworks for Ming-style furniture, which lies at the intersection of “cultural relic value” and “market value.” Digital copyright or patent protection for classic elements such as door columns has not been given sufficient attention, making it difficult to effectively curb counterfeiting and plagiarism.

5.3 Application Recommendations

5.3.1 Promote the innovative use of cultural capital in a wider range of product categories

In the future, the extended design of Mid-Ming-style furniture elements can be widely carried out in the fields of home, office, digital accessories, gift packaging and other products, and realize the large-scale dissemination of cultural symbols in combination with life scenes and consumer needs.

5.3.2 Establish a cross-sector cooperation mechanism

Promote the collaboration between inheritors of traditional crafts and modern designers and material engineers, form a multi-collaborative platform of design + technology + technology, and explore the modern application paradigm of traditional furniture elements.

5.3.3 Promote cultural education and user cognition

Integrate Mid-Ming-style furniture aesthetics education into the promotion of universities, exhibition halls and platforms, and enhance the public's perception and sense of identity with traditional crafts and aesthetics through lectures, experience workshops, online interactions and other forms.

5.3.4 Optimize production mode and cost control

The introduction of digital modeling, modular production and green materials and other modern means to make traditional design symbols realize the feasibility of large-scale production, and enhance the market competitiveness of cultural products.

5.3.5 Establish a brand and market communication mechanism

Through IP image construction, social media marketing, cultural and creative markets and other means, the brand communication path of Mid-Ming-style furniture cultural and creative products is established to enhance the social influence and commercial value of traditional cultural elements.

5.4 Future Research Directions

Future research can be further expanded to the following directions:

Deepen the research on the digital expression of Mid-Ming-style furniture cultural capital, such as realizing immersive experiential communication through virtual reality (VR) and augmented reality (AR) technology;

Construct a design methodology system for the translation of cultural symbols, and form a design paradigm with operability and theoretical value.

explore the communication strategy and cultural adaptation path of cultural and creative products in the international market, and promote the "going out" of traditional Chinese culture;

To study the influence of user cognitive psychology and consumption behavior on the acceptance of cultural and creative product design, so as to provide an accurate basis for design strategy.

To sum up, this study is based on the integration of Mid-Ming-style furniture cultural capital and modern design, and puts forward systematic theoretical discussion and practical suggestions from the perspectives of design concept, application path, and user evaluation. In the future, research should continue to deepen the creative transformation of traditional cultural elements, promote the organic combination of China's excellent traditional crafts and modern life needs, and achieve a win-win situation of cultural inheritance and innovative development.



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APPENDIX A

Questionnaire

Objective 1: Consumer Pre-Launch Survey For New Product Design

1. Your Gender:

- A. Male
- B. Female
- C. Other

2. Your Age:

- A. Under 18
- B. 21–28
- C. 29–40
- D. 41–60
- E. 60 Or Older

3. Your Occupation:

- A. Student
- B. Office Worker
- C. Freelancer
- D. Education/Culture
- E. Other _____

4. Your Highest Level Of Education:


- A. High School Or Below
- B. Associate Degree
- C. Bachelor's Degree
- D. Master's Degree Or Above
- E. Other

5. Your Monthly Disposable Income (In RMB):

- A. Less Than 2,000 RMB
- B. 2,000–4,999 RMB
- C. 5,000–9,999 RMB
- D. Over 10,000 RMB
- E. Prefer Not To Disclose

6. How Interested Are You In Traditional Culture (E.G., Chinese Furniture, Artifacts, Aesthetics)?

- A. Not At All Interested
- B. Slightly Interested
- C. Generally Interested
- D. Quite Interested

- 
- E. Very Interested
7. Do You Like Products That Combine Traditional Elements With Modern Lifestyles?
- A. Not At All
 - B. Dislike
 - C. Average
 - D. Like
 - E. Very Much Like
 - G. Xindu District
8. Are You Familiar With The Traditional Cultural Element Of “Mid-Ming-style Furniture Design Aesthetics”?
- A. Never Heard Of It
 - B. Heard Of It But Not Familiar With It
 - C. Slightly Familiar
 - D. Fairly Familiar
 - E. Very Familiar
9. Do You Think It Is Meaningful To Incorporate Traditional Cultural Design Elements (Such As Mortise And Tenon Joints, Cloud-Shaped Brackets, And Floral Legs) Into Daily Necessities?
- A. Not Meaningful
 - B. Not Very Meaningful
 - C. Average
 - D. Meaningful
 - E. Very Meaningful
10. In Your Opinion, The Modern Design Of Traditional Cultural Elements Should Lean More Toward:
- A. Completely Retro
 - B. Retaining Traditional Shapes Extensively
 - C. A Blend Of Traditional And Modern
 - D. Modern With Traditional Accents
 - E. Completely Modern
11. How Many Times A Year Do You Typically Purchase Cultural And Creative Products (E.G., Museum Souvenirs, Design Objects, Handicrafts)?
- A. Never
 - B. 1–2 Times
 - C. 3–5 Times
 - D. 6 Or More Times
 - E. Not Sure

12. What Factors Do You Value Most When Purchasing Cultural And Creative Products (Multiple Selections Allowed)?

- A. Appearance Design
- B. Practical Functionality
- C. Cultural Significance
- D. Brand Or Origin
- E. Price Or Uniqueness

13. Would You Be Willing To Pay A Higher Price For Products That Combine Traditional Cultural Elements With Practical Functionality?

- A. Not At All
- B. Not Very Willing
- C. Depends On The Situation
- D. Somewhat Willing
- E. Very Willing

14. If There Were A Smartphone Stand With Mid-Ming-style Furniture Design Combined With Modern Lifestyle Needs, Would You Be Willing To Try Purchasing It?

- A. Not At All
- B. Probably Not
- C. Undecided
- D. Might Be
- E. Definitely

15. In Which Scenarios Would You Like To See Cultural And Creative Products? (Multiple Selections Allowed):

- A. Office Desk/Study Desk
- B. Home Decor
- C. Gifts For Others
- D. Learning/Work Tools
- E. Exhibitions Or Collections

16. Which District Do You Live In?

- A. Jinjiang District
- B. Wuhou District
- C. Qingyang District
- D. High-Tech Zone
- E. Chenghua District
- F. Longquanyi District

Objective 3: Consumer Satisfaction Survey on Mobile Phone Stand

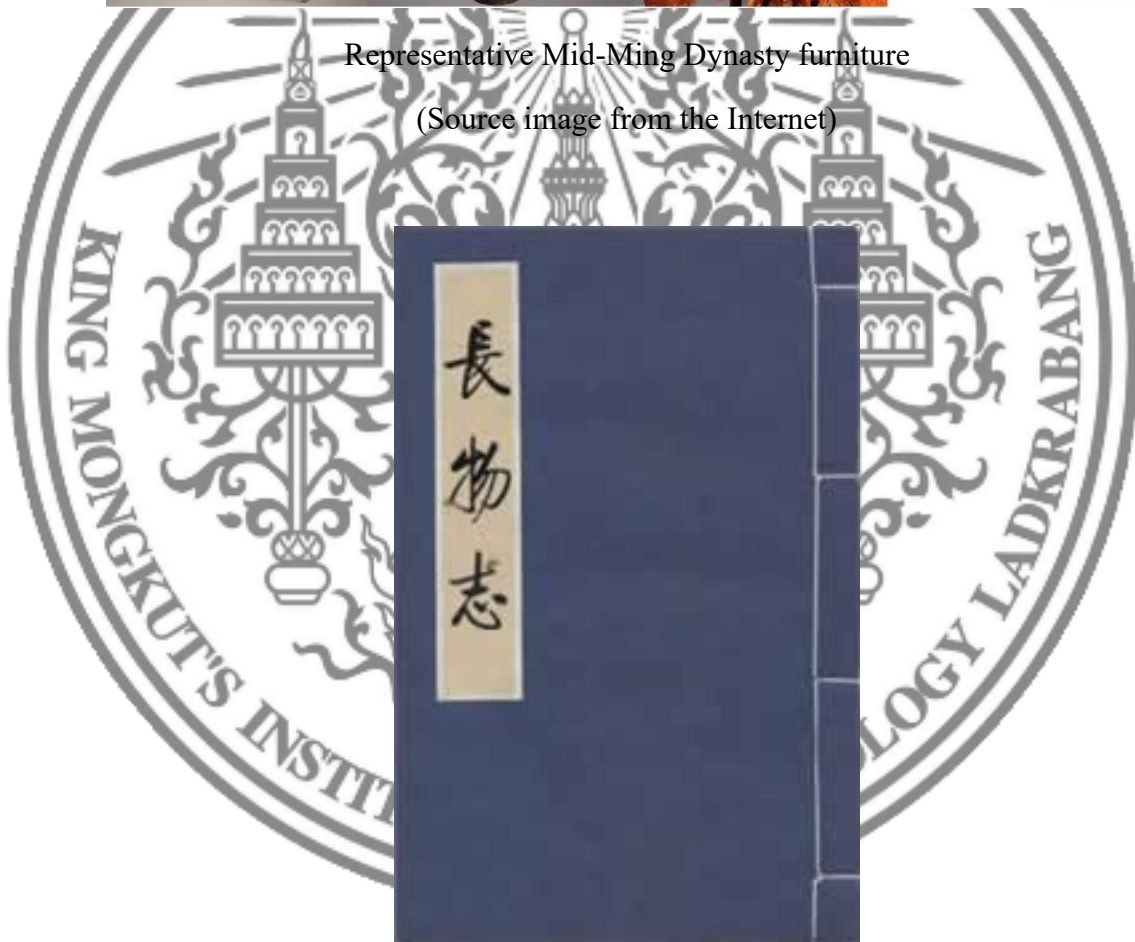
Products

1. What is your gender
2. What is your age
3. What is your occupation?
4. What is your highest level of education
5. What is your average monthly disposable income (in RMB)?
6. How simple and clean do you find the overall design of this phone stand
7. How well does this stand reflect a sense of symmetry?
8. How appropriate is the use of "white space" in the design?
9. How successfully does the decorative element at the top draw inspiration from Mid-Ming-style furniture
10. How aesthetically pleasing and culturally appropriate are the decorative elements of this product
11. How well does the structure of this phone stand reflect the logic or beauty of mortise-and-tenon joints?
12. How sturdy and solid is the structural design of this phone stand?
13. How practical is the structure of the phone stand?
14. How convenient and practical is this product for everyday use as a phone stand?
15. How well does this stand serve as both a decorative item and a practical accessory?
16. How ergonomic do you find this design?
17. How reasonable and aesthetically pleasing is the material combination of the stand?

APPENDIX B
List Of Picture



Representative Mid-Ming Dynasty furniture
 (Source image from the Internet)



Chinese ancient books recording Mid-Ming Dynasty furniture
 (Source image from the Internet)



Imperial furniture of the Mid-Ming Dynasty

(Source image from the Internet)



Traditional precious woods

(Source image from the Internet)



Conference on the Preservation of Mid-Ming Dynasty Culture
(Source image from the Internet)



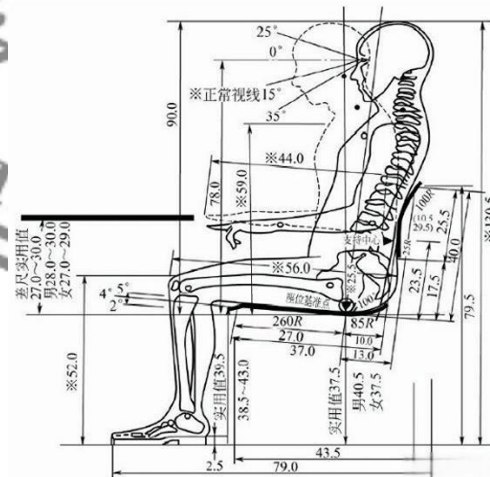
Chinese ancient painting
(Source image from the Internet)



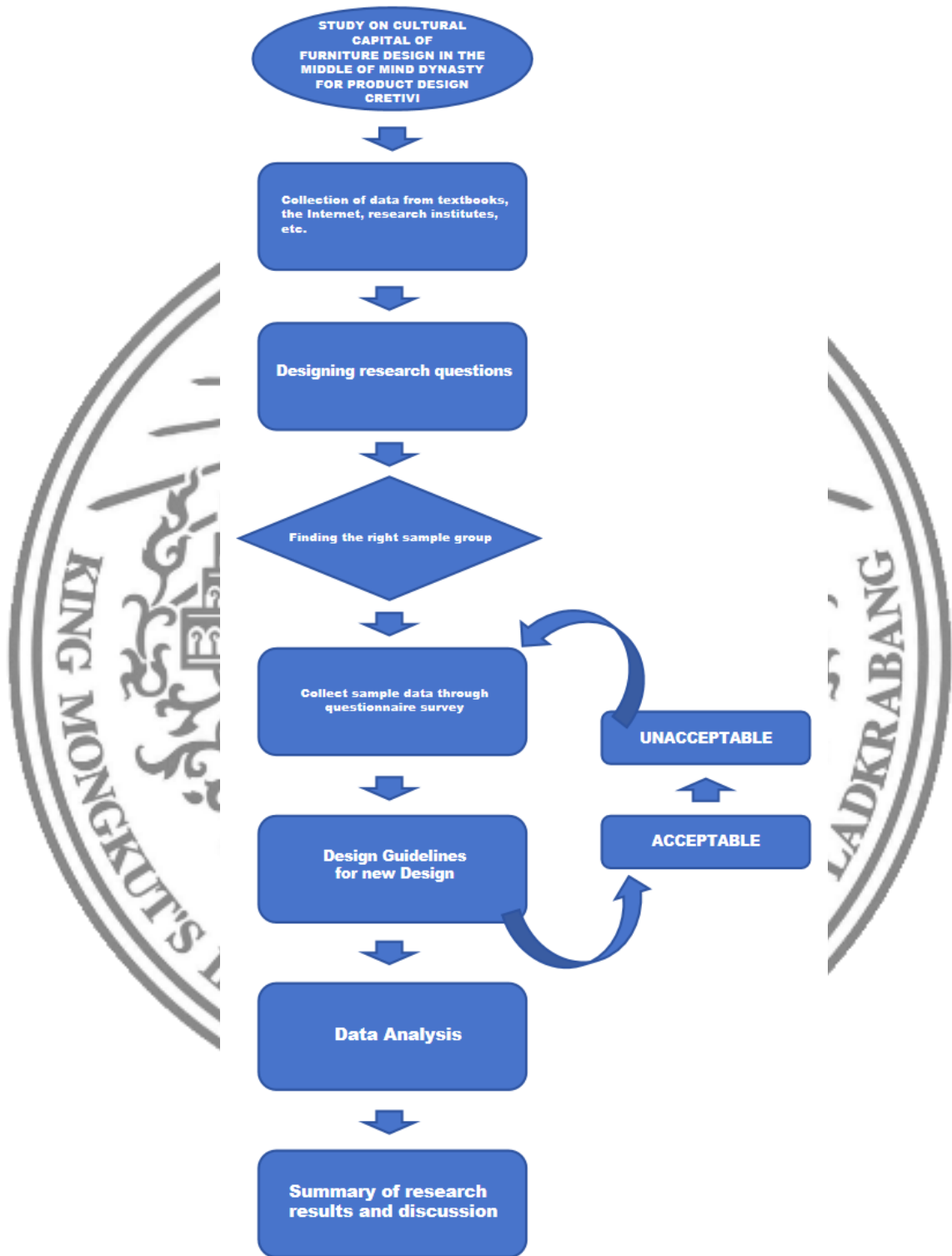
Mortise and tenon joint
 (Source image from the Internet)



Bauhaus chair
 (Source image from the Internet)



Ergonomics
 (Source image from the Internet)



Research Flowchart
 (Source image from Author)



Shanghai Museum

(Source image from Author)



The Ming and Qing Dynasty Home Gallery at the Shanghai Museum

(Source image from Author)



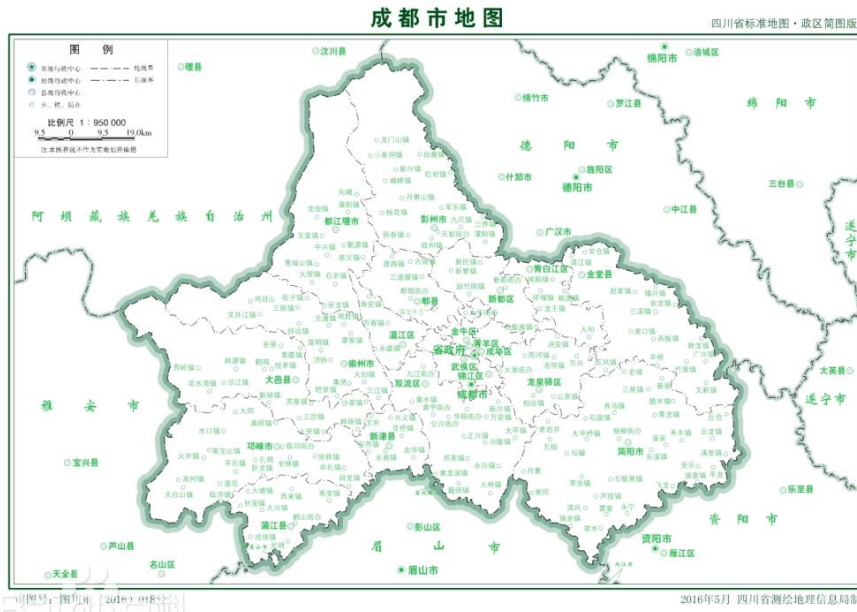
Museum exhibit

(Source image from Author)



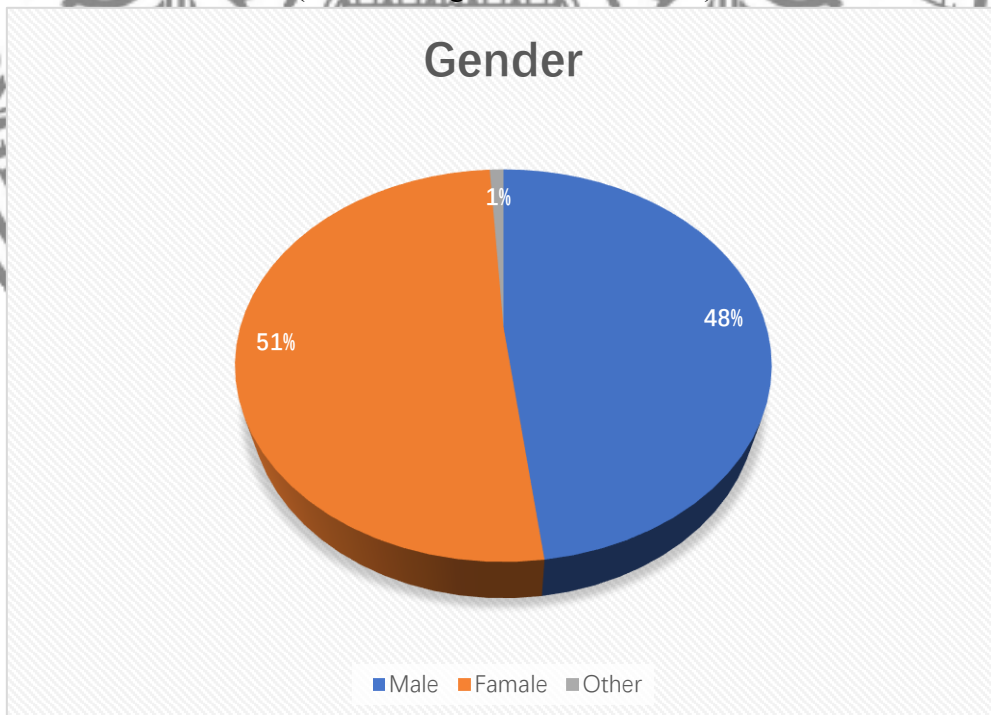
Museum exhibit

(Source image from Author)



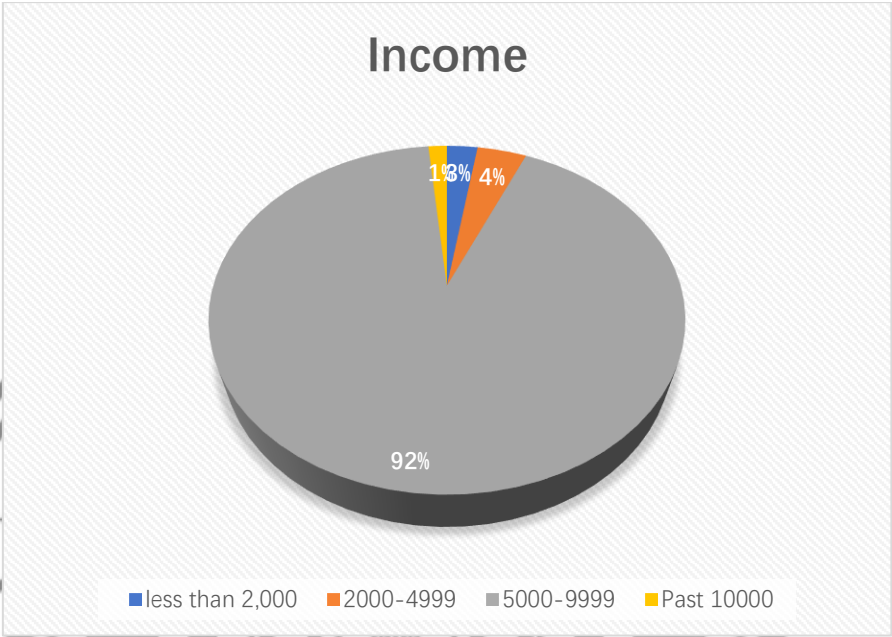
Map for Chengdu

(Source image from the Internet)

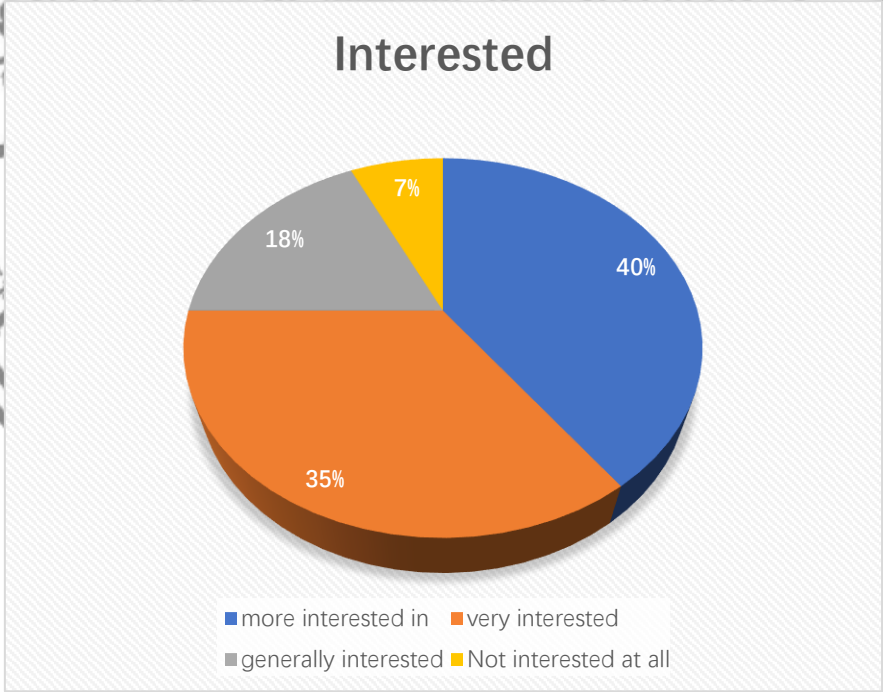


Pie Chart

(Source image from Author)



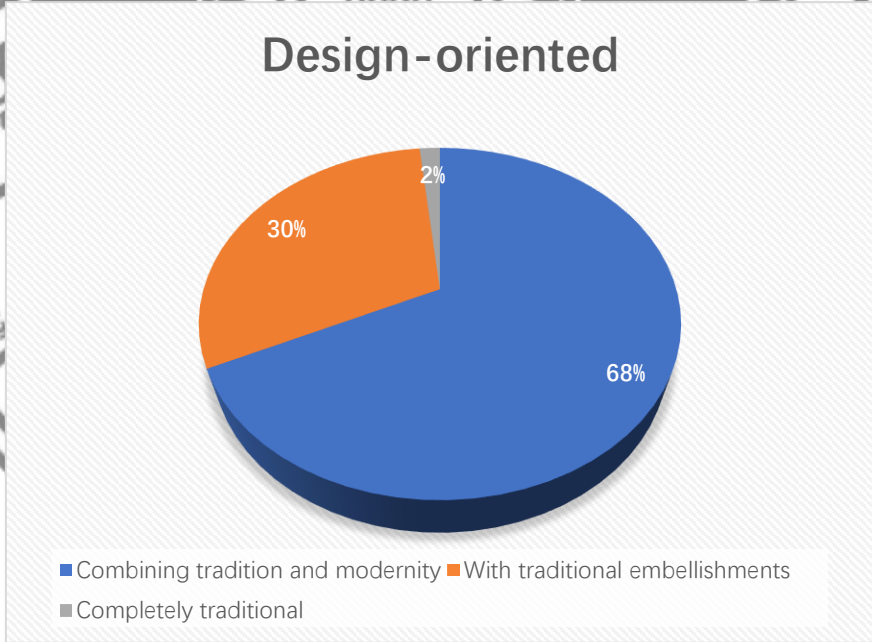
Pie Chart
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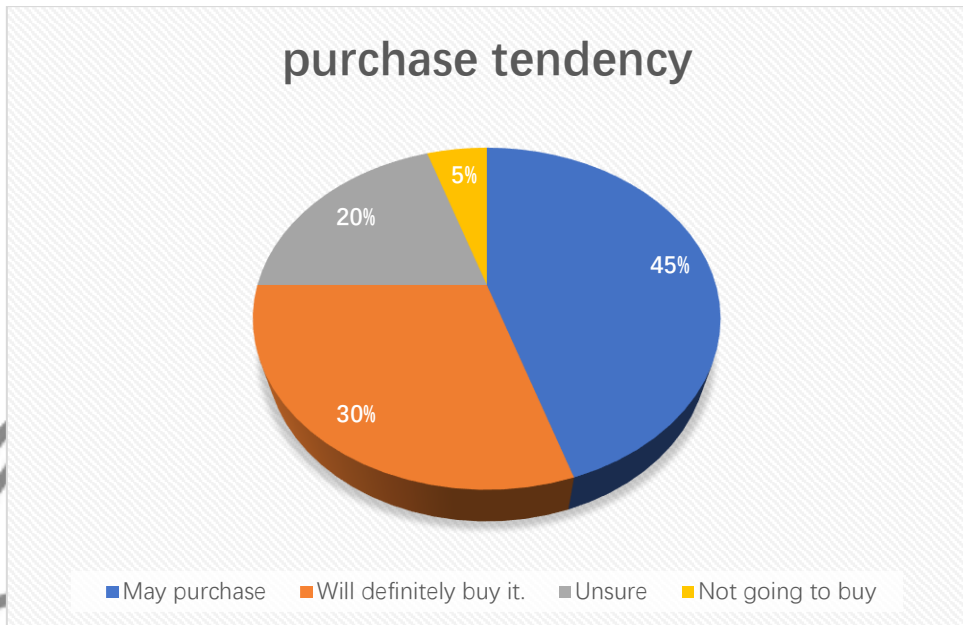
Pie Chart
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Pie Chart
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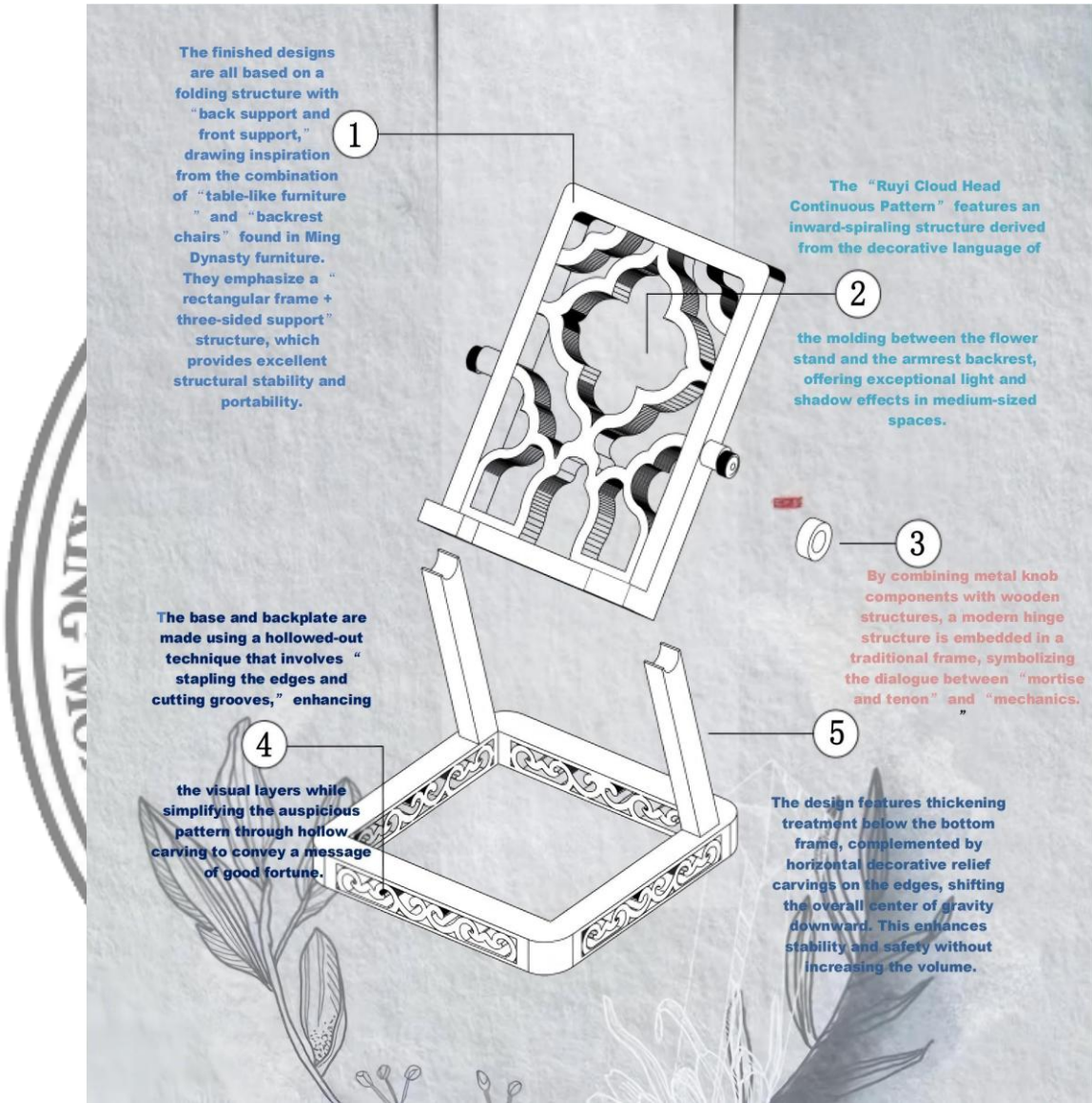
Design model rendering
(Source image from Author)



Design model rendering2
(Source image from Author)

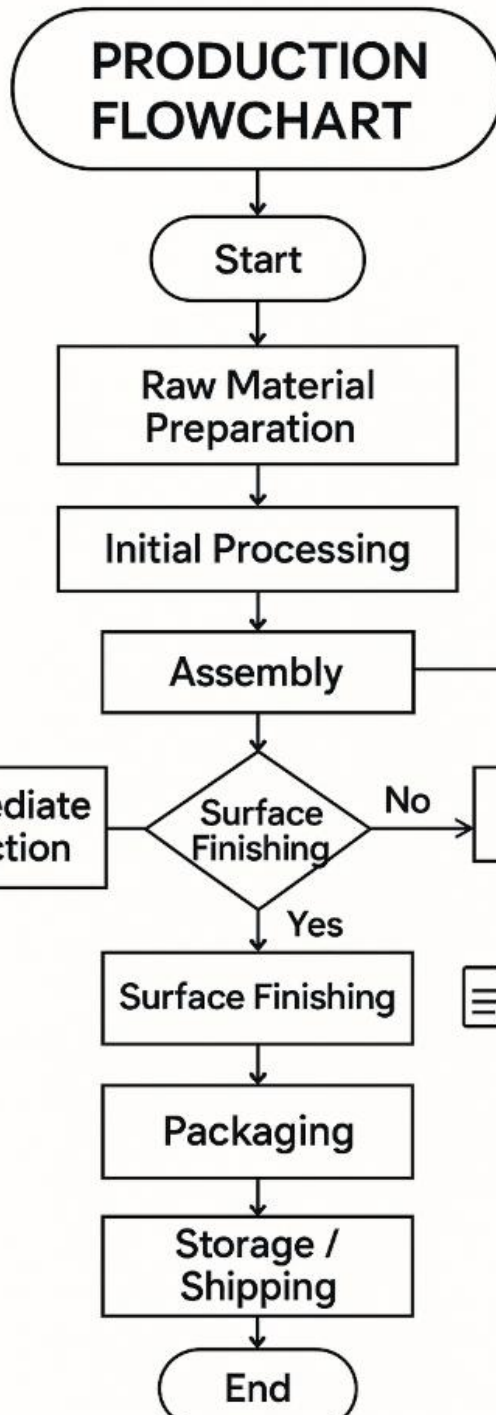


Design model rendering3
(Source image from Author)

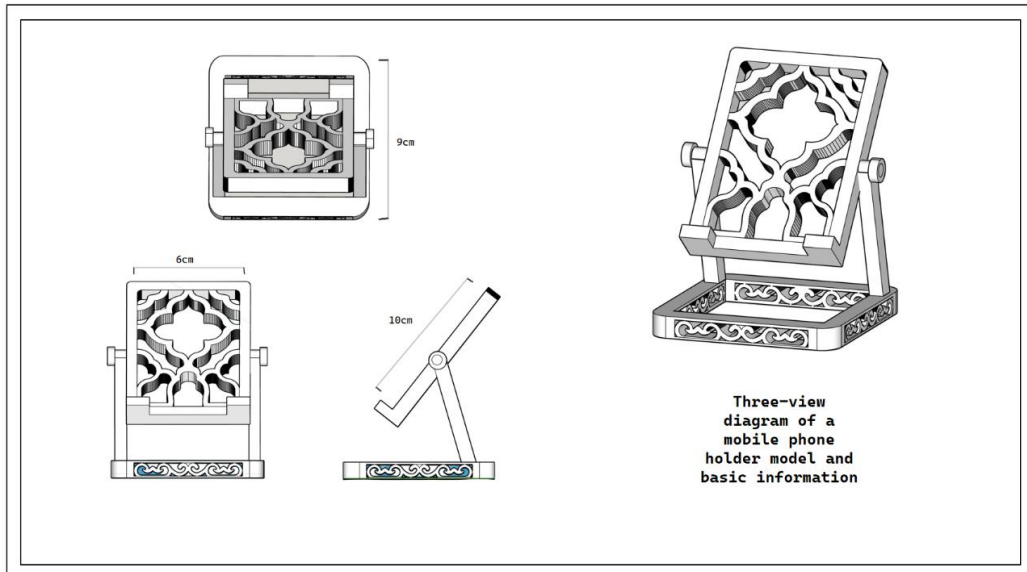


final design drawing

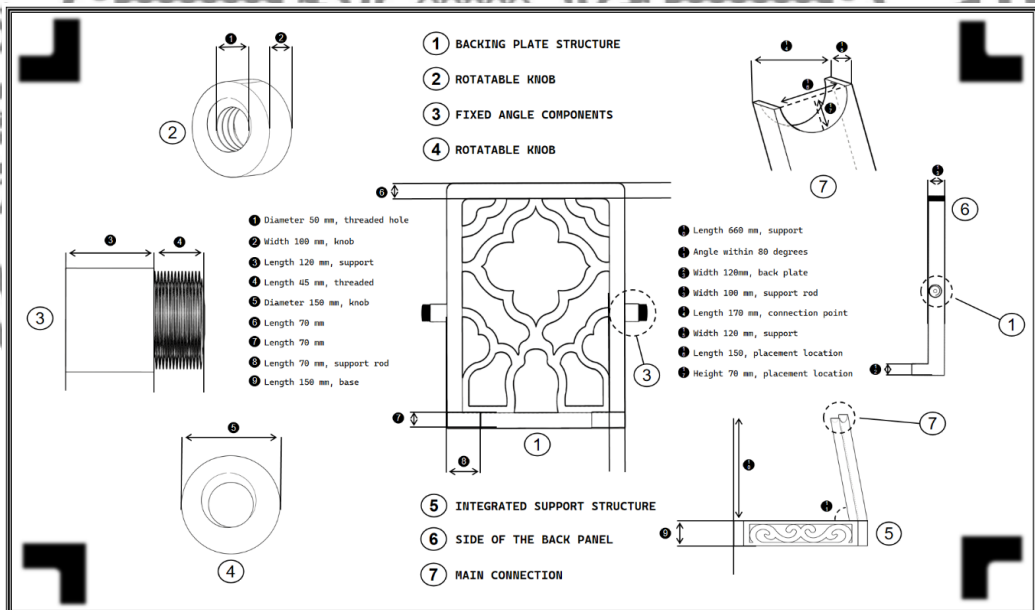
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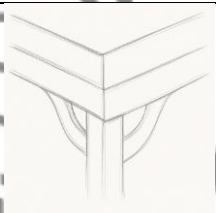








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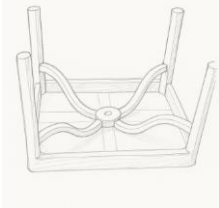
APPENDIX C
List Of Table

Name	Pictures of the real thing	Extract Elements	Structure extraction
Simple solid wood square table from the Mid-Ming Dynasty		Extraction of overall framework structure	
Simple square dining table from the Mid-Ming Dynasty		Extraction of overall framework structure	
Classic Mid-Ming Dynasty Horseback Chair		Extraction of overall framework structure	
Classic Mid-Ming Dynasty Hunchback Chair		Extraction of overall framework structure	
Classic Mid-Ming Dynasty Grand Master Chair		Extraction of overall framework structure	



Classic Mid-Ming Dynasty Carved Wooden Stool		Extraction of overall framework structure	
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(From the author)

Name	Pictures of the real thing	Extract Elements	Structure extraction
Local structure: stepped load-bearing support		Extraction of local structural frameworks	
Local structure: Classic support structure		Extraction of local structural frameworks	
Local structure: BaWang's thorn		Extraction of local structural frameworks	
Local structure: Different forms of the BaWang		Extraction of local structural frameworks	
Local structure: supported by classical mechanics		Extraction of local structural frameworks	


<p>Local structure: Details of bottom structure</p>		<p>Extraction of local structural frameworks</p>	
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(From the author)

Name	Pictures of the real thing	The main frame	Structure extraction
<p>Classic pattern: ingot-shaped pattern</p>		<p>Extraction and reconstruction of pattern lines</p>	
<p>Classic pattern: continuous copper coin pattern</p>		<p>Extraction and reconstruction of pattern lines</p>	
<p>Classic pattern: simple auspicious cloud pattern</p>		<p>Extraction and reconstruction of pattern lines</p>	
<p>Classic pattern: Single-sided auspicious cloud pattern</p>		<p>Extraction and reconstruction of pattern lines</p>	
<p>Classic pattern: openwork Tang grass pattern</p>		<p>Extraction and reconstruction of pattern lines</p>	

Classic pattern: continuous carved cloud pattern		Extraction and reconstruction of pattern lines	
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(From the author)

Model Number	Model1		Model2		Model3	
Model Display						
Product Questions	- X	S.D	- X	S.D	- X	S.D
1.How well does the Chinese mobile phone stand reflect the design language of Mid-Ming-style furniture?	4.33	0.58	4.39	0.47	4.33	0.58
2.How effectively do the decorative elements convey the aesthetic imagery of Mid-Ming-style furniture?	4	0	4.27	0.56	4.24	1
3.How well does the design embody the “contrast between solid and void” aesthetic concept of 4.Mid-Ming-style furniture, particularly in terms of spatial negative space and proportions?	3.67	1.15	4.68	0.74	4.73	0.47
4.How well are the decorative patterns coordinated with the overall structure in terms of stylistic unity?	4	1	4.66	0.45	4.14	0.82
5.How clearly does the support structure reflect a transformation or simulation of the mortise-and-tenon joinery logic typical of Mid-Ming-style furniture?	4.33	0.58	4	0.49	3.97	0.82

6.How feasible is the form and structure in terms of practical craftsmanship and manufacturing processes?	4.33	1.15	4.29	0.33	4.68	0.71
7.How well does the design preserve the spirit of craftsmanship associated with Mid-Ming-style furniture under modern material and production conditions?	3.33	0.58	4.37	0.37	3.91	0.47
8.How reasonable and stable is the product's mechanical structure in terms of component connection and assembly?	4.33	0.58	4.13	0.66	3.82	0.82
9.How successfully does the design translate traditional craftsmanship concepts into a modern product context?	4.33	0.58	4.49	0.71	3.88	1
10.How effectively does the product express Mid-Ming-style furniture aesthetics in a contemporary form?	3.67	0.58	4.53	0.58	4.14	0.82
11.How much does the design demonstrate inappropriate use of traditional cultural elements, such as cultural appropriation or excessive symbolism?	5	0	4.51	0.66	4.05	0.71
12.How well does the design serve as a symbolic cultural product, such as a "cultural IP carrier" or representative of cultural and creative design?	3.33	0.58	4.61	0.72	4.12	0.47
13.How adaptable is the design to mass production and cost-effective manufacturing?	4.67	0.58	4.39	0.34	4.06	0.82
14.How appealing is the product to a broad consumer base while maintaining cultural depth?	4.33	1.15	4.22	0.67	3.97	0.47
15.How suitable is the product for applications in fields such as intangible cultural heritage education, exhibitions, gifting, or office supplies?	3.67	0.58	4.78	0.82	3.72	0.71
Average Score	4.09	0.64	4.42	0.57	4.12	0.70
Overall Ranking	3		1		2	

(From the author)

Question	\bar{X}	S D
The overall design is simple and clear	4.51	0.92
The design reflects symmetrical beauty	4.57	0.72
The use of negative space is appropriate	4.51	0.91
The top decoration reflects Mid-Ming-style furniture	4.64	0.69
Aesthetic and cultural appropriateness of decorative elements	4.64	0.62
Reflects mortise-and-tenon structure logic or aesthetics	4.52	0.97
Structural stability	4.57	0.76
Structural practicality	4.53	0.89
Convenience and practicality in daily use	4.65	0.64
Dual functionality as decoration and accessory	4.48	0.99
Ergonomic design	4.55	0.84
Material combination is reasonable and aesthetic	4.5	0.9

Chart 1 Consumer Satisfaction Survey Score Sheet

(From the author)

Appendix D Expert Lists



No. 7004 / 26

School of Industrial Education and Technology
King Mongkut's Institute of Technology Ladkrabang
Ladkrabang, Bangkok 10520, Thailand

June 4 , 2025

Dear Dr. Cai Shangwei, Professor of Communication Studies and Director of the Cultural Industry Research Center,

Mr. Haoming He, student ID 67036001, a master's degree student in the Master of Science in Industrial Education Program in Technology of Industrial Design at King Mongkut's Institute of Technology Ladkrabang, is conducting research for the thesis titled "STUDY ON THE CULTURAL CAPITAL OF MID-MING DYNASTY FURNITURE FOR NEW PRODUCT DESIGN" with Assoc. Prof. Dr. Chaturong Louhapensang as the advisor.

The School of Industrial Education and Technology kindly invites you to serve as an Honorary Expert in support of Mr. Haoming He during the thesis preparation process. Your expertise and guidance would be highly valuable in helping the student enhance the quality and relevance of the research.

We respectfully submit this request for your consideration and sincerely hope for your kind cooperation. We deeply appreciate your assistance in this matter.

Yours Sincerely,

(Associate Professor Dr.Thiyaporn

Kantathanawat)

Assistant Dean for Graduate Studies and
Research Acting on behalf of the Dean

2025/06/04 Time 14:08:36 Non-FKI Server Sign-LN
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Academic Affairs and Research, Academic Support Division
Tel. +66 8 0605 3207
Email: academic_siet@kmitl.ac.th



No. 7004 / 25

School of Industrial Education and Technology
King Mongkut's Institute of Technology Ladkrabang
Ladkrabang, Bangkok 10520, Thailand

June 4 , 2025

Dear Dr. Wang Jiayi, Associate Professor of Furniture Design,

Mr. Haoming He, student ID 67036001, a master's degree student in the Master of Science in Industrial Education Program in Technology of Industrial Design at King Mongkut's Institute of Technology Ladkrabang, is conducting research for the thesis titled "STUDY ON THE CULTURAL CAPITAL OF MID-MING DYNASTY FURNITURE FOR NEW PRODUCT DESIGN" with Assoc. Prof. Dr. Chaturong Louhapensang as the advisor.

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Yours Sincerely,

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Kantathanawat)

Assistant Dean for Graduate Studies and
Research Acting on behalf of the Dean

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No. 7004 / 27

School of Industrial Education and Technology
King Mongkut's Institute of Technology Ladkrabang
Ladkrabang, Bangkok 10520, Thailand

June 4 , 2025

Dear Mr. Wu Mingzhong, Master Craftsman of Ming-style Furniture,

Mr. Haoming He, student ID 67036001, a master's degree student in the Master of Science in Industrial Education Program in Technology of Industrial Design at King Mongkut's Institute of Technology Ladkrabang, is conducting research for the thesis titled "STUDY ON THE CULTURAL CAPITAL OF MID-MING DYNASTY FURNITURE FOR NEW PRODUCT DESIGN" with Assoc. Prof. Dr. Chaturong Louhapensang as the advisor.

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We respectfully submit this request for your consideration and sincerely hope for your kind cooperation. We deeply appreciate your assistance in this matter.

Yours Sincerely,

(Associate Professor Dr.Thiyaporn

Kantathanawat)

Assistant Dean for Graduate Studies and

Research Acting on behalf of the Dean

2025/06/04 Time 14:09:07 Non-PKI Server Sign-LN

Signature Code : NAA4A-EQANg-A3AEY-AQvBD

Academic Affairs and Research, Academic Support Division

Tel. +66 8 0605 3207

Email: academic_siet@kmitl.ac.th



No. 7004 / 24

School of Industrial Education and Technology
King Mongkut's Institute of Technology Ladkrabang
Ladkrabang, Bangkok 10520, Thailand

June 4 , 2025

Dear Dr. Cai Shangwei, Professor of Communication Studies and Director of the Cultural Industry Research Center,

Mr. Haoming He, student ID 67036001, a master's degree student in the Master of Science in Industrial Education Program in Technology of Industrial Design at King Mongkut's Institute of Technology Ladkrabang, is conducting research for the thesis titled "STUDY ON THE CULTURAL CAPITAL OF MID-MING DYNASTY FURNITURE FOR NEW PRODUCT DESIGN" with Assoc. Prof. Dr. Chaturong Louhapensang as the advisor.

The School of Industrial Education and Technology kindly requests your kind assistance in supporting Mr. Haoming He during the thesis preparation process. Your expertise and guidance would be highly valuable in helping the student enhance the quality and relevance of the research.

We respectfully submit this request for your consideration and sincerely hope for your kind cooperation. We deeply appreciate your assistance in this matter.

Yours Sincerely,

(Associate Professor Dr. Thiyaporn
Kantathanawat)

Assistant Dean for Graduate Studies and
Research Acting on behalf of the Dean

2025/06/04 Time: 14:07:34 Non-PKI Server Sign-LN
Signature Code : RgAxA-DIARQ-BGADI-AOQA1

Academic Affairs and Research, Academic Support Division
Tel. +66 8 0605 3207
Email: academic_siet@kmitl.ac.th



No. 7004 / 22

School of Industrial Education and Technology
King Mongkut's Institute of Technology Ladkrabang
Ladkrabang, Bangkok 10520, Thailand

June 4 , 2025

Dear Dr. Wang Jiayi, Associate Professor of Furniture Design,

Mr. Haoming He, student ID 67036001, a master's degree student in the Master of Science in Industrial Education Program in Technology of Industrial Design at King Mongkut's Institute of Technology Ladkrabang, is conducting research for the thesis titled "STUDY ON THE CULTURAL CAPITAL OF MID-MING DYNASTY FURNITURE FOR NEW PRODUCT DESIGN" with Assoc. Prof. Dr. Chaturong Louhapensang as the advisor.

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(Associate Professor Dr.Thiyaporn

Kantathanawat)

Assistant Dean for Graduate Studies and

Research Acting on behalf of the Dean

2025/06/04 Time 14:06:15 Non-PKI Server Sign-LN
Signature Code : QgAyA-DAARQ-BGADQ-AMQB0

Academic Affairs and Research, Academic Support Division
Tel. +66 8 0605 3207
Email: academic_siet@kmitl.ac.th



No. 7004 / 23

School of Industrial Education and Technology
King Mongkut's Institute of Technology Ladkrabang
Ladkrabang, Bangkok 10520, Thailand

June 4 , 2025

Dear Mr. Wu Mingzhong, Master Craftsman of Ming-style Furniture,

Mr. Haoming He, student ID 67036001, a master's degree student in the Master of Science in Industrial Education Program in Technology of Industrial Design at King Mongkut's Institute of Technology Ladkrabang, is conducting research for the thesis titled "STUDY ON THE CULTURAL CAPITAL OF MID-MING DYNASTY FURNITURE FOR NEW PRODUCT DESIGN" with Assoc. Prof. Dr. Chaturong Louhapensang as the advisor.

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(Associate Professor Dr.Thiyaporn
Kantathanawat)

Assistant Dean for Graduate Studies and
Research Acting on behalf of the Dean

2025/06/04 Time 14:06:47 Non-PKI Server Sign-LN
Signature Code : NQBEA-BIARQ-BEADA-AOgA4

Academic Affairs and Research, Academic Support Division
Tel. +66 8 0605 3207
Email: academic_siet@kmitl.ac.th



No. 7004 / 20

School of Industrial Education and Technology
King Mongkut's Institute of Technology Ladkrabang
Ladkrabang, Bangkok 10520, Thailand

June 4 , 2025

Dear Dr. Cai Shangwei, Professor of Communication Studies and Director of the Cultural Industry Research Center,

Encl.Questionnaire.pdf

Mr. Haoming He, student ID 67036001, a master's degree student in the Master of Science in Industrial Education Program in Technology of Industrial Design at King Mongkut's Institute of Technology Ladkrabang, is conducting research for the thesis titled "STUDY ON THE CULTURAL CAPITAL OF MID-MING DYNASTY FURNITURE FOR NEW PRODUCT DESIGN" with Assoc. Prof. Dr. Chaturong Louhapensang as the advisor.

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Yours Sincerely,

(Associate Professor Dr.Thiyaporn
Kantathanawat)

Assistant Dean for Graduate Studies and
Research Acting on behalf of the Dean

2025/06/04 Time 09:17:25 Non-PKI Server Sign=LN
Signature Code : MAAyA-DgARA-ASADM-AMgAz

Academic Affairs and Research, Academic Support Division
Tel. +66 8 0605 3207
Email: academic_siet@kmitl.ac.th



No. 7004 / 19

School of Industrial Education and Technology
King Mongkut's Institute of Technology Ladkrabang
Ladkrabang, Bangkok 10520, Thailand

June 4 , 2025

Dear Dr. Wang Jiayi, Associate Professor of Furniture Design,

Encl.Questionnaire.pdf

Mr. Haoming He, student ID 67036001, a master's degree student in the Master of Science in Industrial Education Program in Technology of Industrial Design at King Mongkut's Institute of Technology Ladkrabang, is conducting research for the thesis titled "STUDY ON THE CULTURAL CAPITAL OF MID-MING DYNASTY FURNITURE FOR NEW PRODUCT DESIGN" with Assoc. Prof. Dr. Chaturong Louhapensang as the advisor.

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Yours Sincerely,

(Associate Professor Dr.Thiyaporn
Kantathanawat)

Assistant Dean for Graduate Studies and
Research Acting on behalf of the Dean

2025/06/04 Time 09:16:55 Non-PKI Server Sign-LN
Signature Code : RQA1A-EYAQw-AIADg-AQQA4

Academic Affairs and Research, Academic Support Division
Tel. +66 8 0605 3207
Email: academic_siet@kmitl.ac.th



No. 7004 / 21

School of Industrial Education and Technology
King Mongkut's Institute of Technology Ladkrabang
Ladkrabang, Bangkok 10520, Thailand

June 4 , 2025

Dear Mr. Wu Mingzhong, Master Craftsman of Ming-style Furniture,

Encl.Questionnaire.pdf

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(Associate Professor Dr.Thiyaporn
Kantathanawat)

Assistant Dean for Graduate Studies and
Research Acting on behalf of the Dean

2025/06/04 Time 14:05:44 Non-PKI Server Sign-LN
Signature Code : QQAxA-DEANG-ASADM-ANwBB

Academic Affairs and Research, Academic Support Division
Tel. +66 8 0605 3207
Email: academic_siet@kmitl.ac.th

APPENDIX E

IOC

Index of Item-Objective Congruence, IOC

Researcher: HAOMING HE

Research topic: Study on the Cultural Capital of Mid-Ming Dynasty Furniture for New Product Design

Objective: A study of satisfaction with the new product design

Instrument Quality Check

Description For experts in instrument quality check

Criteria for instrument check Instrument check to be used in research according to experts' opinions use the following criteria:

+1 means that the statement or question is usable and appropriate for the content according to the research conceptual framework.

0 means that the statement or question is uncertain whether it is appropriate for the content according to the research conceptual framework.

-1 means that the statement or question is not consistent or not appropriate for the content according to the research conceptual framework.

In the case that experts have checked and given an evaluation of 0 or -1 for any statement or question, please kindly provide comments or suggestions for further improvement. It would be greatly appreciated.

Question	score			IOC	result
	-1	0	+1		
1. What is your gender?			✓		
2. What is your age?			✓		
3. What is your occupation?			✓		
4. What is your highest level of education?			✓		
5. What is your average monthly disposable income (in RMB)?			✓		
6. How simple and clean do you find the overall design of this phone stand?			✓		
7. How well does this stand reflect a sense of symmetry?			✓		
8. How appropriate is the use of "white space" in the design?			✓		
9. How successfully does the decorative element at the top draw inspiration from Ming-style furniture?			✓		
10. How aesthetically pleasing and culturally appropriate are the decorative elements of this product?			✓		

Index of Item-Objective Congruence, IOC

Researcher: HAOMING HE

Research topic: Study on the Cultural Capital of Mid-Ming Dynasty Furniture for New Product Design

Objective: Design a new product based on the cultural capital of mid-Ming furniture.

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Question	score			I O C	result
	-1	0	+1		
1.How well does the Chinese mobile phone stand reflect the design language of Ming-style furniture?			✓		
2.How effectively do the decorative elements convey the aesthetic imagery of Ming-style furniture?			✓		
3.How well does the design embody the "contrast between solid and void" aesthetic concept of 4.Ming-style furniture, particularly in terms of spatial negative space and proportions?			✓		
4.How well are the decorative patterns coordinated with the overall structure in terms of stylistic unity?			✓		
5.How clearly does the support structure reflect a transformation or simulation of the mortise-and-tenon joinery logic typical of Ming-style furniture?			✓		
6.How feasible is the form and structure in terms of practical craftsmanship and manufacturing processes?			✓		
7.How well does the design preserve the spirit of craftsmanship associated with Ming-style furniture under modern material and production conditions?			✓		



8. How reasonable and stable is the product's mechanical structure in terms of component connection and assembly?				✓	
9. How successfully does the design translate traditional craftsmanship concepts into a modern product context?				✓	
10. How effectively does the product express Ming-style furniture aesthetics in a contemporary form?				✓	
11. How much does the design demonstrate inappropriate use of traditional cultural elements, such as cultural appropriation or excessive symbolism?				✓	
12. How well does the design serve as a symbolic cultural product, such as a "cultural IP carrier" or representative of cultural and creative design?				✓	
13. How adaptable is the design to mass production and cost-effective manufacturing?				✓	
14. How appealing is the product to a broad consumer base while maintaining cultural depth?				✓	
15. How suitable is the product for applications in fields such as intangible cultural heritage education, exhibitions, gifting, or office supplies?				✓	

The primary subjects of this study are experts in design and the cultural industry. Their professional insight and extensive work experience will play a crucial role in how culture is designed and integrated.

Evaluator

Date ____/____/____

Index of Item-Objective Congruence, IOC

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Somchai Seriset.

Evaluator

Date ____/____/____

Index of Item-Objective Congruence, IOC

Researcher: HAOMING HE

Research topic: Study on the Cultural Capital of Mid-Ming Dynasty Furniture for New Product Design

Objective: A study of satisfaction with the new product design

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2. What is your age?			/		
3. What is your occupation?			/		
4. What is your highest level of education?			/		
5. What is your average monthly disposable income (in RMB)?			/		
6. How simple and clean do you find the overall design of this phone stand?			/		
7. How well does this stand reflect a sense of symmetry?			/		
8. How appropriate is the use of "white space" in the design?			/		
9. How successfully does the decorative element at the top draw inspiration from Ming-style furniture?			/		
10. How aesthetically pleasing and culturally appropriate are the decorative elements of this product?			/		

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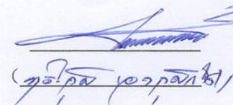
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8. How appropriate is the use of "white space" in the design?			/		
9. How successfully does the decorative element at the top draw inspiration from Ming-style furniture?			/		
10. How aesthetically pleasing and culturally appropriate are the decorative elements of this product?			/		

11. How well does the structure of this phone stand reflect the logic or beauty of mortise-and-tenon joints?			/		
12. How sturdy and solid is the structural design of this phone stand?			/		
13. How practical is the structure of the phone stand?			/		
14. How convenient and practical is this product for everyday use as a phone stand?			/		
15. How well does this stand serve as both a decorative item and a practical accessory?			/		
16. How ergonomic do you find this design?			/		
17. How reasonable and aesthetically pleasing is the material combination of the stand?			/		
18. How successfully does this design incorporate traditional cultural elements into a modern product?			/		
19. How well does this product achieve a fusion of traditional and modern elements?			/		
20. How much does this product contribute to promoting Ming-style furniture culture or sparking public interest?			/		
21. How would you rate the market potential of this product as a cultural and creative item?			/		

This study takes young and middle-aged people aged 21-60 in Chengdu City as the research object. Young and middle-aged people are economically independent, relatively stable, with molded aesthetic qualities and certain requirements for quality of life.



Evaluator

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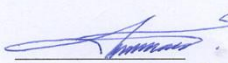
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			/		
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(78725 10010710)

Evaluator

Date ____/____/____



AUTHOR BIOGRAPHY

Name-Surname	Haoming He
Date of Birth	10.06.2000
Place of Birth	GuangAN City, SiCuan, China
Education	Bachelor
Current Address	Bangkok
Publication	DRLE
Award Received	No

