

EXPLORATION OF THE AESTHETIC VALUE OF DECORATIVE PATTERNS IN LINGNAN RESIDENTIAL BUILDINGS DURING THE MING AND QING DYNASTIES

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Abstract: The Ming and Qing dynasties was the golden age of Lingnan architecture development, and the architectural patterns of Lingnan folk houses showed rich diversity of natural motif pedigree, humanistic image cluster and comprehensive pattern. These patterns are a combination of plants, animals, geometric shapes and human figures, which not only have a high degree of artistry, but also contain profound symbolic significance. In terms of design concept, they realize the harmonious unity of formal beauty and functional beauty, the perfect blend of natural beauty and humanistic beauty, and the deep integration of regional characteristics and national culture, vividly demonstrating the Lingnan people's yearning for a better life and deep emotion for traditional culture, and providing historical reference for the concept of "remembering nostalgia" in contemporary urban and rural construction. To provide theoretical support for the inheritance of Lingnan architectural cultural heritage. Digging deeply into its cultural implication and exploring the way of integration with modern life will promote the innovative development of traditional aesthetics and modern design, contribute to the deep integration of cultural inheritance and modern design, and promote the inheritance and development of Lingnan architectural art in the new era.

Keywords: Ming and Qing dynasties; Patterns of Lingnan residential buildings; Aesthetic value; Cultural inheritance

1 INTRODUCTION

Architectural patterns, as an integral part of architectural culture, are not only the external manifestation of architectural decoration but also material carriers of regional culture, social concepts, and aesthetic consciousness. The Ming and Qing dynasties marked a golden age for Lingnan architecture. During this period, the Lingnan region experienced economic prosperity, cultural flourishing, and vigorous architectural development. An in-depth study of the aesthetic value of architectural patterns in Lingnan residential buildings during the Ming and Qing dynasties contributes to a comprehensive understanding of the historical and cultural context of the Lingnan region, offering valuable insights for contemporary architectural creation and cultural inheritance[1]. Furthermore, in the context of globalization, the deep exploration and research of local architectural culture holds significant importance for preserving cultural diversity and enhancing ethnic cultural identity.

2 THE GENERATIVE MECHANISM OF PATTERNS IN HISTORICAL CONTEXT

The architectural patterns of Lingnan residential buildings during the Ming and Qing dynasties bore witness to historical evolution and transformation. From the relatively simple geometric patterns of the early period to the increasingly complex decorative motifs of later times, these changes not only directly reflected the socio-economic development of the Lingnan region but also embodied shifts in aesthetic perceptions.

2.1 Geographical and Climatic Characteristics

Lingnan's hot and rainy climate directly influenced the structural forms and material selection of decorative patterns. For instance, the ice crack patterns of oyster shell windows in the Pearl River Delta served both ventilation and decorative functions. The Chaozhou anti-weathering ceramic mosaic technique utilized the reflective properties of ceramic tiles to create unique light and shadow effects during the rainy season. This "adaptation to natural conditions" creative thinking transformed environmental factors into intrinsic drivers of artistic innovation.

Lingnan's humid and hot climate necessitated that architectural pattern designs prioritize moisture resistance and ventilation. Lime sculpture and brick carvings were commonly used for exterior wall decorations due to their excellent thermal insulation and moisture-proof properties. Lime sculpture, with their unique material formulations and craftsmanship, remained stable in humid environments, effectively preventing wall damage. Brick carvings, through their special structures and materials, partially blocked heat from entering indoor spaces, providing cooling effects. For example, in many traditional Buildings in Guangzhou, Lime sculpture and brick carvings on exterior walls have remained intact through the ages, maintaining a relatively comfortable indoor environment, as shown in Figure 1.



Figure 1 Qingzhen Building and Main Hall of Foshan Ancestral Temple [2]

2.2 Multicultural Integration

Lingnan's unique cultural traditions profoundly influenced its architectural decorations. As an important component of Chinese historical culture, Lingnan culture inherited the essence of Central Plains culture while integrating local and overseas elements, forming a distinctive cultural tradition. During the Ming and Qing dynasties, Lingnan residential architectural patterns actively absorbed the stylized language of Central Plains architectural decoration and localized it. For example, the "Double Phoenixes Facing Peonies" ceramic mosaic pattern in the "Four-Point Gold" residences of Chaozhou adhered to the compositional principles of the Yingzao Fashi (Treatise on Architectural Methods) while incorporating ecological elements unique to Lingnan, such as the curved grass-tail patterns derived from banyan roots. The "Fisherman, Woodcutter, Farmer, and Scholar" Lime sculpture in the Chen Clan Ancestral Hall in Guangzhou harmonized realism and decoration through geometric patterns like radial rice ears. These examples demonstrate that Lingnan patterns innovated with regional characteristics while inheriting traditional Central Plains art.

The prosperity of the Maritime Silk Road facilitated cross-cultural exchanges and integration, profoundly impacting Lingnan residential architectural patterns and driving the localization of foreign crafts. For example, the cast-iron scrolling leaf window grilles of the Kaiping Watchtower transformed Baroque-style volutes into banana leaf forms. The Corinthian acanthus motifs on Chikan arcade columns were reinterpreted by local artisans into longan and lychee patterns. The enamel pigments introduced through the Thirteen Hongs trade significantly enhanced the color saturation of Cantonese Lime sculpture, forming an aesthetic characterized by "gorgeousness without vulgarity."

During the Ming and Qing dynasties, the rise of the clan system endowed architectural patterns with the function of maintaining familial ethics and hierarchical order. For instance, the Ming Dynasty "Five Relationships" woodcarving in the Shunde Bijiang Golden Tower symbolized the order between monarch and subject, father and son, husband and wife, brothers, and friends through phoenixes, cranes, mandarin ducks, wagtail birds, and orioles, aligning with the Kaogong Ji's (Artificers' Record) concept that "all crafts are the works of sages." Additionally, the "Two First-Class Scholars" brick carvings in Cantonese ancestral halls, combining crabs (jia) and reeds (lu) through homophonic symbolism, symbolizing the culture of imperial examinations in architectural space reflects the profound influence of ritual culture on architectural decorative patterns. Such patterns not only beautified the buildings, but also conveyed the importance that the society at that time attached to the order of the family and the achievements of the imperial examinations. The cultural function of Lingnan architectural decoration is not static, but is constantly developing and changing. With the development of the society, new cultural elements are continuously incorporated into the architectural decoration, making the Lingnan architectural decoration a mirror reflecting the social changes. This cultural continuity and innovation are an important reason for the vitality of Lingnan architectural decoration.

2.3 Socio-economic Impacts

During the Ming and Qing dynasties, Lingnan's economic development and unique geographical environment provided necessary conditions for the flourishing of architectural patterns. From the mid-Ming period, Lingnan's "single-port trade" system significantly advanced the maturation of craft systems like Foshan stoneware and Chaozhou woodcarving. According to the Foshan Zhongyi Township Records, during the Jiajing era, the stoneware industry employed over 10,000 workers, laying a solid foundation for the mass production of architectural decorations. Meanwhile, maritime trade introduced foreign materials such as Southeast Asian hardwoods and Persian glass, enriching the textural diversity of architectural decorations. For example, the Bogu patterns on the main ridge of wok-ear houses and the ice crack patterns of oyster shell windows exhibited diverse material effects due to these imported materials.

Commercial prosperity in the Pearl River Delta during the Ming and Qing dynasties spurred the emergence of auspicious patterns. The traditional Chinese domestic architecture patterns of this period were not only key elements in decorating the buildings, but also contained a wealth of commercial allegory and symbolism. These symbolic patterns reflected the aesthetic trends of the time and also conveyed the yearnings for a better future or future prospects. The commercial prosperity of the Pearl River Delta during the Ming and Qing dynasties spawned the emergence of numerous auspicious motifs. For example, dragon pattern, as a symbol of imperial power, represents power and wealth in commercial activities, and is often used to decorate store fronts or commercial buildings in order to attract customers and highlight the store's eminent status. The scene of "customers like clouds (meaning that there are many merchants as dense as clouds)" in the ceramic spine decoration of the Ancestral Temple in Foshan vividly demonstrates the pomp and circumstance of the activities of the merchant gangs, while the "Five Bats at the Door" tile layout (using the homophonic association of "bat" (fu) with "fortune") on wok ear houses implied the pursuit of wealth and blessings. This creative concept of using patterns to express auspicious meanings fully reflects the value orientation of civil society.

The architectural patterns of Ming and Qing Lingnan were products of geographical environment, clan systems, commercial development, and overseas trade [3]. Their artistic forms carried the genetic codes of Central Plains ritual culture while showcasing creative transformations of foreign elements, ultimately forming a regional aesthetic system characterized by "harmony in diversity."

3 TYPOLOGICAL ANALYSIS OF THE PATTERN SYSTEMS

3.1 Natural Mother Theme Genealogy

Lingnan folk houses architectural patterns are good at combining natural beauty with humanistic beauty in their creation. The plant motifs in Lingnan folk houses are extremely rich, covering a variety of common plants such as lotus, peony, pine and cypress, bamboo, plum blossom and so on. In the actual architectural decoration, these plant motifs are presented through a variety of techniques such as wood carving, stone carving, brick carving and color painting. For example, in the Yuyin Mountain House in Panyu, the wood carving decoration of the lotus flower is delicate, with the texture and form of the petals vividly showing the gracefulness of the lotus flower; And in the brick carvings of the Ancestral Temple in Foshan, the peonies are full of form and bright colors, and the rich and noble image of peonies is shown to the fullest through clever composition and exquisite carving skills. Different plant motifs have different forms, and each of them carries a specific symbolic meaning, adding natural vitality and artistic beauty to the building.

Animal patterns in Lingnan folk houses are equally colorful, with animal images such as dragons, phoenixes, lions, deer, cranes and bats appearing frequently. These animal patterns are vivid and realistic in modeling, showing unique charms through different postures and movements. For example, in the wood carving decoration of the Chen Ancestral Hall, the dragon pattern is robust, with a sinuous and coiled body, detailed carving of scales, and flowing whiskers, as if about to soar in the sky; while the phoenix pattern is elegant, with beautifully carved feathers, showing the beauty and nobility of the phoenix. Deer, harmonic "Lu (emolument)", symbolizing longevity and good fortune, often combined with other auspicious elements in architectural decoration, expressing people's expectations for a better life. Crane, often paired with pine, symbolizing longevity and elegance, in some garden buildings, the emergence of the crane pattern to create a secluded, elegant atmosphere.

Geometric patterns in Lingnan residential architecture include Hui pattern, ice crack pattern, Ruyi pattern and so on. With its continuous lines, Hui pattern forms a simple and rhythmic pattern; ice crack pattern imitates the texture of natural ice cracking, which seems to be irregular but contains the beauty of nature; Ruyi pattern looks like Ruyi, with smooth lines and beautiful modeling. These geometric patterns through a combination of different lines and shapes, in the architectural decoration present a colorful effect. In the Kaiping Watchtower architectural decoration, back to the pattern is often used for doors and windows of the border decoration, enhancing the sense of line and order of the building; ice crack pattern is widely used in some of the garden architecture of the design of the window lattice, creating a unique visual effect. Geometric patterns have unique symbolic meaning, such as the return pattern means auspicious and long, and its continuous lines symbolize endless life and longevity, reflecting people's hope for a better life for a long time. Symbolism for the geometric pattern gives a deeper cultural connotation, so that it is not only a kind of decorative elements in the architectural decorations, but also a carrier of people's emotional support[4].

3.2 Humanistic Imagery Cluster

The patterns of human figures in Lingnan architecture cover characters in myths and legends, historical figures, and characters in folk tales. These figure patterns vividly show rich character images through different shapes and expressions. For example, in the mural paintings of the Leizu Temple in Leizhou, the life story of Leizu Chen Wenyu is depicted, with lifelike characters and details of costumes and movements, showing the superior painting skills at that time. In the wood carving decoration of some ancient residential buildings, there is often images of characters from myths and legends, such as the scene of the Eight Immortals crossing the sea, and each character's demeanor and movements are distinctive.

The "deer and bamboo in the same spring (idiom, means deer play and eat bamboo in the spring sunshine, showing the vitality of nature)" stone carving, which is common on the walls of Hakka Dragon House, builds a symbolic system of "family and country together" through the homophonic metaphor of deer (Lu), bamboo (Zhu), and paulownia tree

(Tong). The Lime sculpture of "Fishing, Woodcutting, Plowing and Reading" in the Chen Clan Ancestral Hall in Guangzhou not only realistically reproduces the production scenes recorded in the Tian Gong Ka Shi, but also displays a unique modeling language through geometric patterns such as the hexagonal shape of fishing nets and the radiating shape of rice ears. The figure motifs also have profound symbolic meanings. The Eight Immortals pattern symbolizes longevity and good fortune. Each of them possesses unique magic treasures and magical powers, and is regarded as a deity capable of bringing auspiciousness and blessings, appearing in architectural decorations to express people's prayers for a long and healthy life, happiness and peace. Three Stars of Fortune and Longevity Patterns symbolize good fortune, official fortune and longevity. The images of the three stars usually appear in the main halls or important positions of the buildings, signifying a happy and contented family, a smooth career and prolonged longevity, reflecting people's pursuit of and aspiration for a happy life.

3.3 Composite Patterns

Composite patterns in Lingnan architecture combine a variety of elements such as plants, animals, and geometry to create a complex and varied decorative effect. These composite patterns often blend different elements to complement each other through skillful composition and design. For example, in the architectural decoration of Dongguan Ke Yuan, there are patterns that combine plum blossoms, magpies and geometric lines to form a unique picture. The lofty and unyielding character of plum blossoms, the auspiciousness of magpies and the sense of order of geometric lines reflect each other, showing a unique artistic charm. The comprehensive pattern conveys richer symbolism through the combination of different elements. "Deer and crane in the same spring (idiom, means Deer and cranes play and feed in the spring sunshine, showing the vitality of nature)" pattern combines the symbolism of deer and crane, with the deer symbolizing longevity and good fortune and the crane symbolizing longevity and elegance. The pattern signifies the revival of all living things, full of vitality, and expresses people's desire for a better life and their love for nature.

In addition, there is the paradigm of East meets West, Kaiping Watchtower scroll pattern iron window, in the Rococo scroll on the basis of the integration of the Lingnan banana leaf form; Chikan Riding House Column head of the Corinthian acanthus pattern, after being transformed by local craftsmen, it presents styles of local plants such as longan and lychee. This cultural translation phenomenon fully confirms Chen Yin Ke's strategy of "avoiding the name and living in the real world, taking the pearl and returning it to the casket", reflecting the openness and innovativeness of the Lingnan region in cultural exchanges.

To summarize, Lingnan architectural patterns show a rich diversity in modeling, covering a variety of types such as plant, animal, geometric, figure and composite patterns, each of which contains a wealth of specific motifs. At the same time, these patterns contain profound symbolism behind them, involving people's aspirations for a better life, the importance of family heritage, and the pursuit of moral cultivation. Lingnan architectural patterns are a concentrated manifestation of the history and culture, folk customs and aesthetic concepts of the Lingnan region, showing the concept of harmonious coexistence between man and nature, as shown in Figure 2.

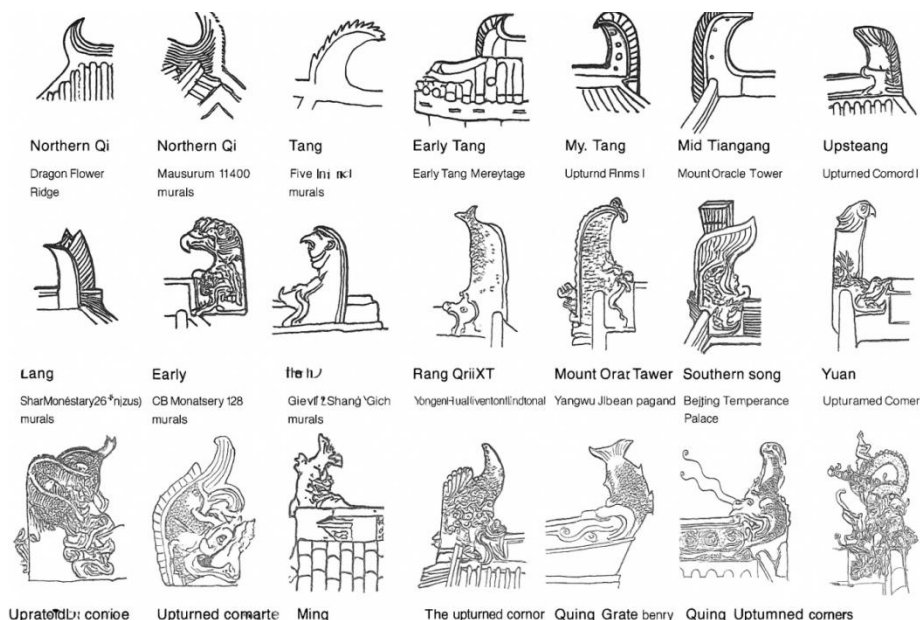


Figure 2 The Formation of Gourd Kisses in Various Dynasties [5]

4 THEORETICAL ANALYSIS OF AESTHETIC VALUE

4.1 Unity of Formal Beauty and Functional Beauty

Lingnan residential architecture pattern in the design of the design focuses on the unity of form and function. Ventilation openings in Lingnan buildings are often designed as exquisite lattice patterns, which not only satisfy the

need for ventilation, but also add to the artistic beauty of the building. Lingnan residential architectural patterns show artistic attainments in modeling and decorative techniques, the wok ear house of the Guangfu architecture, for example, the design of the mountain wall resembles a wok ear, the shape not only has a high aesthetic ornamental, presenting a generous and beautiful visual effect, but also by virtue of the unique form of a strong visual impact. Analyzed from the perspective of aesthetics, this design embodies symmetry and hierarchy, and its shape symbolizes the two ears of the official hat, implying the meaning of being the leader, reflecting the reflection of the social culture of the time in the form of architecture.

Lingnan residential architectural motifs are not only decorative, but also have significant functionality in actual use. The design of the wok ear house is both aesthetic and practical, and studies have shown that its unique shape facilitates the air circulation, provides good ventilation, and to a certain extent is fireproof, which fully demonstrates the perfect fusion of form and function. The layout and structure of Chaoshan houses are designed according to the local hot and humid climate conditions, which is conducive to ventilation and heat dissipation as well as moisture and humidity prevention, reflecting the precise adaptation and deep understanding of the building to the natural environment, which is a vivid practice of functional beauty in architecture. As an important part of Lingnan architectural culture, Lingnan architectural patterns vividly demonstrate the perfect unity of formal beauty and functional beauty with its unique design concept and exquisite craftsmanship, as shown in Figure 3.

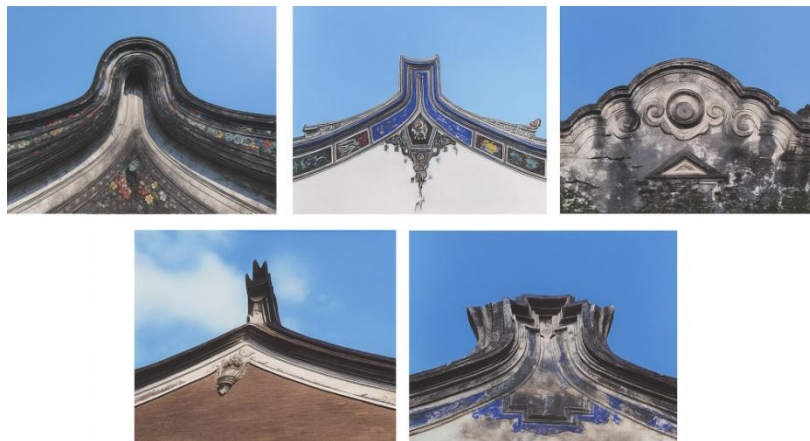


Figure 3 Five Elements Gables of Metal, Wood, Water, Fire, and Soil [6]

4.2 Fusion of Natural Beauty and Humanistic Beauty

Lingnan architectural patterns are good at combining natural beauty and humanistic beauty in their creation. For example, the plant pattern in Lingnan architecture not only imitates the form of natural plants, but also gives the plant pattern a symbolic meaning, reflecting the concept of harmonious coexistence of man and nature. Research on the integration path of natural beauty and humanistic beauty in Lingnan architectural patterns, Lingnan architectural patterns, as an important carrier of regional culture, have formed a high degree of integration of natural aesthetics and humanistic connotations over a long period of time through the analysis of typical cases of traditional architectural decorations in Lingnan, combined with the regional climate, craftsmanship and cultural symbols, revealing the creation of its "master of the natural and not confined to the shape, and the humanities and the shape of the god". It will provide theoretical support for the inheritance of contemporary regional architectural culture, as shown in Figure 4.



Figure 4 Lulianruo Park (photographed by our research team)

In terms of the choice of building materials and the use of decorative techniques, Lingnan houses fully demonstrate humanistic care. Local common wood and stone, due to the relatively low cost and easy processing, became the first choice of building materials, which reflects the pragmatic spirit of pragmatism of the Lingnan people. At the same time, the exquisite carvings and colorful decorations on the buildings cover a wide range of subjects such as flowers, birds, fishes and insects, landscapes and figures, etc. These decorations not only beautify the buildings from the appearance, but also, more importantly, send the people's aspirations for a better life and their reverence for nature. Lingnan folk

houses architectural patterns contain rich cultural allegory and symbolism, many specific patterns have a clear symbolic point, such as the bat pattern represents good fortune, fish pattern symbolizes the yearly surplus, the lotus pattern implies purity and elegance, etc. These symbols enrich the architecture. These symbols enrich the cultural connotation of the building.

4.3 Integration of Regionality and Ethnicity

The design of the architectural patterns of Lingnan residential buildings in the Ming and Qing dynasties highly embodied the ability to adapt to the local hot and humid climate and unique geographic environment, while skillfully combining practical functions with artistic expression. Take the lime sculpture and ceramic decorations at the roof ridge as an example, their thick forms and complicated decorations are not purely for the sake of aesthetics, but have the practical function of rainproof and reinforcement. These decorations use traditional auspicious motifs such as dragons, phoenixes, flowers and birds, which is derived from the Central Plains culture and convey the symbolism of wealth and prosperity. Looking at the wok ear wall, its unique shape not only has the practical effect of fire prevention and sun shading, but also the cloud pattern and water ripples carved on the edge of the wall, which not only echoes the cultural characteristics of the Lingnan region near the sea, but also implies the concept of "wind and water" as a folk prayer for good luck. This design concept not only improves the practicality of the building, but also enriches the cultural connotation of the building, making the building an important carrier of regional culture.

In terms of the choice of subject matter, Lingnan folk houses patterns show a remarkable feature of the deep intermingling of Central Plains culture and overseas culture. On the one hand, a large number of historical stories from Confucian culture, scenes of fishing, woodcutting, farming and reading, as well as auspicious symbols of the imperial examinations, such as the dragon-headed fish and the official hat form, are used. The use of these elements highlights the inheritance of the rituals and scholarly values of the Central Plains in Lingnan, reflecting the spread and rooting of Central Plains culture in Lingnan. On the other hand, exotic elements such as Roman numerals, Western floral scrolls, and Southeast Asian-style stained glass inlays are shown through the architectural patterns. This reflects the penetration of foreign cultures into the Lingnan region after the opening of the Maritime Silk Road. For example, the Manchurian windows of the Xiguan Daiya in Guangzhou combine colored glass with traditional wood carvings to create a unique "East-meets-West" decorative language. This example fully embodies the creative fusion of national aesthetics and foreign techniques in the context of a trading port, as shown in Figure 5.



Figure 5 Lu Family Mansion (photographed by our research team)

As an important carrier of ethnic identity, architectural patterns realize the effective transmission of the cultural kernel of ethnicity with the help of the symbol system. The ridge decorations of Hakka Earth Buildings are often decorated with motifs such as the bird facing the phoenix and the unicorn sending off its son, which emphasizes the cohesion of the clan and reflect the importance that the Hakka community attaches to family inheritance and unity. The beams of ancestral halls in Chaoshan are often decorated with the "Twenty-four Filial Piety Stories" to promote Confucian ethics and morality and to strengthen the moral code within the family. The "back of dragon-headed fish" shape of the wok ear wall is directly related to the image of "monopolize the dragon-headed fish's head (idiom, means come first in triennial palace examinations)" in the imperial examination culture, which originated from the cultural memory of the immigrants in the Central Plains. At the same time, Lingnan native Mazu sea god beliefs, feng shui taboo concepts, etc. Through the anchor pattern, bagua symbols and other regionalize symbols into the architectural details. This phenomenon forms a unique state of coexistence between Han mainstream culture and Baiyue folk beliefs. This cultural intermingling and coexistence enrich the cultural ecology of Lingnan region and promotes the communication and integration between different cultures[7].

The architectural patterns of Lingnan folk houses in the Ming and Qing dynasties, from the integration of regional adaptability and decorative function, to the symbolic presentation of multi-ethnic cultural elements, to the physical expression of folk beliefs and clan consciousness, all reflect the process of multicultural exchanges and mutual influences in the Lingnan region under the unique historical and cultural background of this period.

5 INSIGHTS AND CULTURAL HERITAGE IN THE CONTEXT OF GLOBALIZATION

5.1 Symbolic Deconstruction and Functional Reorganization

By deconstructing the visual symbol system of Lingnan architectural patterns, it is transformed into a modular design language. Many practical cases confirm the effectiveness of this strategy[8]. For example, the geometric ice cracks of the Manchurian window were deconstructed into splicable units and applied to the design of the lamps. The "Liu Guang" series of chandeliers in Shenzhen, China, uses layers of acrylic to realize the effect of light and shadow refraction, which not only retains the wisdom of traditional window lattice spatial division, but also meets the needs of modern illumination. By parametrically modeling the contours of a wok house into the ergonomic curves of a tea set's handle, ZENS(Zhepin Home) Furnishings' "Lingnan Impression" tea set collection successfully translates both aesthetics and function. This innovative use of traditional architectural patterns enables the product to meet modern functional requirements while displaying a unique cultural flavor. In order to promote the inheritance and innovation of Lingnan architectural patterns, the "Lingnan Construction Gene Bank" containing 36,000 sets of pattern data has been established, and an AI-assisted design platform has been developed. The platform is capable of automatically generating derivative patterns that meet modern aesthetics, and this project is a key project of Guangdong Intangible Cultural Heritage Protection Center in 2024. The traditional Lingnan architectural decoration patterns can be parametrically designed using digital technology, creating a new decorative language that is both traditional and modern.

5.2 Material Replacement and Process Innovation

The combination of traditional crafts and modern materials has given rise to new forms of expression. The Foshan non-heritage team transformed the brick carving technique of "pressing the ground to hide (means press down hard and chisel the area beyond the carving line, so that the carving pattern has different shades of shadow, which is slightly convex and concave relief, and can be referred to as "shallow relief")" into 3D printed texture molds, realizing the mass production of ceramic tableware with relief effect. Guangzhou Academy of Fine Arts combined the principle of light transmission of oyster shell windows with laser cutting technology to develop an intelligent glass curtain wall system with adjustable light transmission rate, which was applied to high-end office furniture. The lime Sculpture peony pattern was transformed into the surface texture of metal jewelry through nano-coating technology, which realized the lightweight presentation of the traditional pattern in Chow Tai Fook's 2024 "Lingnan Bloom" collection. These cases fully demonstrate that material replacement and process innovation provide a broader space for the application of traditional architectural patterns in modern product design. The ecological wisdom embedded in Lingnan architecture, such as natural ventilation and sun shading, may be deeply integrated with modern green building technologies to create more energy-efficient and environmentally friendly building systems[9]. For example, new air-conditioning systems combining traditional Lingnan ventilation principles and modern intelligent control technologies may emerge, greatly improving the energy efficiency of buildings.

5.3 Cultural Narrative and Scene Reconstruction

Extracting the cultural genes behind the patterns for storytelling design helps to enhance the cultural connotation of the product. The Shunde team took the spine beast of the ancestral hall, the "dragon-headed fish spitting out water", as a prototype, and designed an art device with the function of a humidifier through hydrodynamic simulation, and synchronized the relevant folklore with the help of a cell phone APP. The fishermen and woodcutter scenes in the wood carvings of the Xie Clan Ancestral Hall were deconstructed into a four-color silkscreen pattern, which was applied to the "Lingnan Stories" series of stationery gift boxes, and the cultural interpretations behind the pattern can be accessed by scanning the code. This way of cultural narrative and scene reconstruction enables consumers to have a deeper understanding of traditional culture and enhance their sense of cultural identity when using the products. These practices not only effectively pass on cultural memory, but also create considerable economic value[10]. For example, Dongguan's furniture industry increases its export value by 17% year-on-year in 2024 through the implantation of Lingnan pattern design elements; and Guangzhou's historic district renovation project will increase the length of tourist stay by 2.3 hours due to the innovative application of cultural elements.

6 CONCLUSION

During the Ming and Qing Dynasties, the architectural patterns of residential buildings in the Lingnan region provided people with aesthetic enjoyment visually with their rich diversity of symbols, and conveyed deep cultural connotations and social values through their unique symbolic meanings. Future research can further explore the subtle differences of these patterns in different regions and families, and dig deeper into the cultural roots behind them. In addition, the use of modern technology to digitally protect and pass on these architectural motifs is an important way to ensure that the cultural values they contain will continue for a long time.

In summary, this paper analyzes the aesthetic value of the architectural patterns of Lingnan folk houses in the Ming and Qing Dynasties, and points out that the application of decorative elements can effectively strengthen the cultural characteristics of the city, enhance the sense of belonging and identity of the citizens, and integrate traditional aesthetics into daily life in a more in-depth manner. By exploring the potential value of traditional architectural patterns and

expanding their application in more fields, this paper aims at promote the in-depth integration and sustainable development of traditional culture and modern industry, and to build a complete industrial chain centered on "Pattern IP - Design Transformation - Market Verification". Through in-depth study of the cultural value of Lingnan residential architectural patterns in the Ming and Qing Dynasties, this paper further promotes the deep integration of traditional aesthetics into modern lifestyles, and provides strong support for the integration of cultural heritage and modern product design.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

FUNDING

This research was funded by the following: 1) The Ministry of Education announced a major project (Category A) of the Special Topic of Chinese Excellent Traditional Culture (Nishan World Confucian Center/China Confucius Foundation Project Fund Project): "Interweaving and Coexistence: Research on Architectural Decoration in the Historical District of Macau " (23JDTCA010). 2) The 2025 Lingnan Culture Project of the Office of the Leading Group for Philosophy and Social Sciences Planning of Guangdong Province, titled "Innovative Application of Decorative Patterns in Historical Buildings of Macau from the Perspective of Artificial Intelligence (AI)" (GD25LN32). 3) Research Capacity Enhancement Project for the 2022 Doctoral Program Construction Units at Guangdong Polytechnic Normal University (22GPNUZDJS59 and 22GPNUZDJS58). 4) 2021 School-level Talent Support Program under the Research Project (2021SDKYB058), and the Research Initiation Fund of Guangdong Polytechnic Normal University awarded to Zhou Junling (99166990233). 5) Provincial First-Class Undergraduate Program and Course Construction Project by the General Office of the Ministry of Education (2020), including the First-Class Undergraduate Major: Environmental Design. 6) The First-Class Under-graduate Course: Fundamentals of Landscape Design (722991700360).

REFERENCES

- [1] Tang Xiaoxiang. Lingnan Modern Architectural Culture and Aesthetics. China Architecture & Building Press, 2010. <https://www.cabplink.com/commodity-details?productCode=5760273079498>.
- [2] Lu Qi. Foshan Ancestral Temple. Guangdong Garden, 2014, 36(5): 76-79.
- [3] Beatriz Basto da Silva. Cronologia da História de Macau. Translated by Xiaoyu. Macau Foundation, Macau, China. 1995, 1, 249.
- [4] Lu Qi, Lingnan private gardens. Beijing: Tsinghua University Press, 2013. https://www.tup.tsinghua.edu.cn/booksCenter/book_05356301.html.
- [5] Wu Qingzhou. Architectural Philosophy, Craftsmanship, and Culture. Beijing: China Architecture & Building Press, 2005, 220-225.
- [6] Li Shaofeng. A Study on Climate Adaptability of Typical Residential Buildings in Chaoshan and Hakka Areas in Guangdong Province Based on Parameterization. South China University of Technology, 2022, 27. <https://reurl.cc/2Q62Kv>.
- [7] Zhou Linjie. History of Modern Gardens in Guangdong. Beijing: China Architecture Industry Press, 2010, 1, 21.
- [8] Mo Bozhi. Mo Bozhi Anthology. Beijing: China Architecture Industry Press, 2012, 2, 5-8.
- [9] Zhou Junling, Pohsun Wang, Shuyuan Zhang. Research on Decorative Patterns of Doors and Windows for Historical Architecture in Macau. *Frontiers in Art Research*, 2022, 4(17): 36-42. DOI: <https://doi.org/10.25236/FAR.2022.041708>.
- [10] Yin R, Wang W, Xu H. Heritage and cultural creative product design: A case study of traditional patterns in China. *Journal of Cultural Heritage Management and Sustainable Development*, 2019, 9(4): 545-560. DOI: 10.1108/JCHMSD-09-2018-0074.