

Evolution of cross-cultural architectural decorative elements from a semiotic perspective: A comparative study of Ming-Qing Chinese and Malacca Baba-Nyonya architecture

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Abstract: This research systematically analyzes the morphological characteristics, symbolic meanings, and evolutionary patterns of decorative elements in Ming-Qing Chinese and Malacca Baba-Nyonya architecture through a semiotic perspective. The study employs an interdisciplinary approach, integrating architectural semiotics theory with field research to construct an analytical framework encompassing morphological analysis, semiotic interpretation, and cross-cultural comparison. Findings reveal that geometric and natural patterns dominate Baba-Nyonya architecture, while animal patterns and character/symbol patterns predominate in Ming-Qing architecture. Decorative elements in cross-cultural transmission demonstrate three translation modes: form preservation-meaning preservation, form preservation-meaning transformation, and form transformation-meaning transformation. Baba-Nyonya architectural decorations exhibit more vibrant colors and higher pattern density, while symbolically transitioning from traditional hierarchical order and religious connotations toward commercial prosperity and family prosperity values. The research findings not only validate Eco's theory of dual functions of architectural signs but also provide historical references and theoretical foundations for cross-cultural architectural design and cultural heritage preservation.

Keywords: *Baba-Nyonya, Cross-cultural comparison, Decorative elements Ming-Qing architecture, Semiotics.*

1. Introduction

1.1. Research Background and Objectives

Architecture not only serves residential functions but also constitutes an important symbol system for cultural transmission and identity construction. As Eco states, architecture "not only denotes its function but also connotes a certain ideology of the function" [1] making architectural decorative elements an important window for studying cross-cultural exchange. Decorative elements of Chinese architecture during the Ming-Qing period (1368-1911) combined exquisite craftsmanship with symbolic connotations, forming a systematic visual symbol system [2]. With the prosperity of the Maritime Silk Road, these decorative elements spread to Southeast Asia through trade, migration, and other channels, undergoing unique variations and integration in the local cultural context [2, 3].

Malacca, as an important port for trade between China and Southeast Asia, formed the unique Baba-Nyonya culture, a product of interaction between Chinese immigrants and Malay indigenous culture [4]. points out that the Baba-Nyonya "maintained a Chinese identity but were nevertheless distinctive as a result of acculturation to local and colonial cultures" [4] which is vividly reflected in architectural decorations [5]. However, existing research mostly discusses the characteristics of Ming-Qing architecture or Baba-Nyonya architecture from architectural history or cultural history perspectives, lacking systematic analysis of the evolutionary relationship between their decorative elements from a semiotic perspective [6, 7]. The core question of this research is: How did the symbolic forms and meanings of Ming-Qing Chinese architectural decorative elements evolve during their

transmission to Malacca Baba-Nyonya architecture? What cultural integration mechanisms and identity construction strategies do these evolutions reflect?

This research aims to systematically analyze the morphological characteristics, symbolic meanings, and evolutionary mechanisms of decorative elements in Ming-Qing Chinese and Malacca Baba-Nyonya architecture through a semiotic perspective, and to explore the translation patterns and innovation mechanisms of cultural symbols in cross-regional transmission. The theoretical foundation is established in the intersection of architectural semiotics and cultural semiotics. Munro points out that architectural semiotics focuses on "how architectural forms operate as a system of signs to convey meaning" [8]. Barthes emphasizes that "the city is a discourse and this discourse is truly a language" [9] considering the built environment as readable "text". Peirce's triadic classification of signs (iconic, indexical, and symbolic) [10] provides an analytical tool for this research, while [11] interpretation of Peirce's theory emphasizes "the dynamic process of semiosis, or sign action" [11]. views architecture as a communication system, suggesting that architectural forms have both functional references and cultural connotations [1].

1.2. Literature Review

Architectural semiotics views architecture as a sign system that transmits cultural information. Eco first systematically articulated the theoretical framework of architectural semiotics, pointing out that architectural elements have both "primary functions" (denotation) and "secondary functions" (connotation) [1]. Peirce's triadic classification of signs provides a methodological tool for the classification and analysis of architectural decorative elements [11]. In cross-cultural transmission, the semiotic properties of decorative elements often change, such as patterns with original symbolic meanings transforming into decorative iconic signs in new cultural contexts.

Research on Ming-Qing architectural decorations primarily focuses on typology, craft technology, and cultural symbolic meanings. Mazzeo, et al. [2] research on Ming Dynasty wooden architectural decorations revealed "the detailed characterisation of painting materials and techniques with special focus on the use of natural organic dyes and binding media" Mazzeo, et al. [2]. Zhang, et al. [12] examined the artistic and cultural characteristics of interior spaces in Lingnan Ming-Qing ancestral halls, finding that "the selection and arrangement of decorative elements reflect local cultural identity and clan values" Zhang, et al. [12]. Chung [13] research analyzes how decorative elements "function as visual markers of social hierarchy and spatial boundaries" Chung [13]. Ye [14] iconographic analysis of the "fu-lu-shou-xi" theme in Lingnan Qing Dynasty architectural decorations reveals "the integration of folk beliefs and social aspirations in decorative symbolism" [14].

Baba-Nyonya architecture is a product of the fusion of Chinese immigrant culture and Malay indigenous culture. Tan examined the cultural formation and identity construction of the Malacca Baba community, noting that they "developed a distinctive lifestyle that was a creative synthesis of Chinese, Malay, and Western elements" [4] while Chen analyzed how these buildings embody "hybrid cultural characteristics through spatial organization and decorative elements" Chen [15]. Kumala [5] research shows that these buildings integrate "elements of southern Chinese architecture, Malay tradition, and European colonial styles in response to both cultural preferences and climatic conditions" Kumala [5]. Paramitha, et al. [16] studied how Malacca heritage shophouses "adapt to contemporary tourism demands while preserving their cultural significance" [16].

Cross-cultural architectural research focuses on the variation and fusion of architectural forms and decorative elements in cultural transmission. Memmott and Davidson proposed a cross-cultural theoretical framework for architecture, emphasizing "the need to understand architectural meaning from within the cultural context that produces it" Memmott and Davidson [6]. Salama, et al. [7] proposed a culturally sensitive design methodology, emphasizing that understanding the cross-cultural evolution of architectural decorative elements requires "a dual reading of both the originating and receiving cultural contexts" [7].

Through literature review, it is evident that although architectural semiotics, Ming-Qing architectural research, Baba-Nyonya architectural research, and cross-cultural architectural theory each have rich achievements, there remains insufficient research systematically analyzing the semiotic evolution of Ming-Qing architectural decorative elements in Baba-Nyonya architecture by integrating these four fields. This research aims to fill this research gap.

2. Materials and Methods

2.1. Research Objects

This study selected Ming-Qing period (16th-20th century) architecture from northern and southern China and Baba-Nyonya architecture in Malacca as research objects. To ensure the representativeness of the samples, the study covered more than ten historical buildings, mainly divided into two categories: Chinese Ming-Qing architecture (Tianjin Shijia Mansion, Fujian Quanzhou Kaiyuan Temple, Jinjiang Wudianshi Chen Ancestral Hall, Guangdong Chaozhou Paifang Street) and Malacca Baba-Nyonya architecture (Malacca Baba-Nyonya Museum, Chen Academy, Zheng He Cultural Hall, Song Family Mansion). These buildings represent architectural decorative features from different regions of northern and southern China, as well as Baba-Nyonya architectural styles from different periods and functions in the Malacca region, covering both secular and religious buildings.

Research data collection included three aspects: physical measurement and image recording (collecting over 500 high-resolution photographs, precise measurement data of architectural decorative components, and material samples); field investigation and environmental recording (recording climate conditions, lighting characteristics, and other background information of the buildings' environment); interviews and historical materials (conducting 15 semi-structured interviews and collecting relevant archival documents, historical photographs, and restoration records). Recording focused on decorative elements in spaces such as door lintels, beams and columns, verandas, and courtyards, as well as craft details including wood carving, stone carving, painting, and tiles. All photographs were calibrated using standard color cards to ensure the accuracy of color data.

2.2. Research Methods

This research, based on Eco's and Peirce's semiotic theories, constructed a cross-disciplinary research framework employing the following research methods:

The study established a three-dimensional analytical framework: In terms of the morphological dimension, it focused on the geometric shapes, material characteristics, and color systems of decorative elements, using morphometric methods to quantitatively analyze decorative elements, measuring parameters including pattern density, shape complexity, and color saturation; regarding the semiotic dimension, based on Peirce's sign classification, it analyzed the semiotic properties and cultural meanings of decorative elements; in the cross-cultural dimension, it explored the translation and innovation mechanisms of decorative elements in the transmission process, analyzing how their forms and meanings adapt to changing cultural contexts [6, 17].

The research adopted a three-stage analysis procedure: The first stage conducted typological analysis, constructing a classification system for four basic pattern types (geometric patterns, natural/plant patterns, animal patterns, character/symbol patterns), using quantitative statistical methods to analyze the distribution of various decorative elements and multivariate cluster analysis to identify their combination patterns; the second stage performed semiotic interpretation, analyzing decorative samples through three-level coding, dividing sign interpretation into three levels - primary description, cultural association, and symbolic meaning, identifying three transformation modes of decorative elements; the third stage conducted cross-cultural comparative analysis, focusing on four analytical dimensions - morphological variation, meaning translation, functional transformation, and innovative integration, systematically comparing identical or similar decorative elements in Chinese Ming-Qing architecture and Malacca Baba-Nyonya architecture.

To ensure the objectivity and reliability of the research, multiple verification strategies were employed, including cross-referencing multiple data sources, expert review, and comparison with historical literature. In data processing, qualitative analysis software ATLAS.ti was used for sign coding and pattern recognition, and SPSS was used for statistical analysis, ensuring the scientific validity and reproducibility of the research findings.

3. Comparative Study of Typical Cases

Using the aforementioned three-stage analysis procedure, this section selects typical cases from the research to conduct empirical analysis, validate the research framework, and demonstrate the cross-cultural translation process of decorative elements.

3.1. Comparison of Secular Buildings: Late Qing Tianjin Shijia Mansion and Malacca Baba-Nyonya Museum

3.1.1. Basic Information of Case Buildings

Table 1.

Basic Information of Tianjin Shijia Mansion and Malacca Baba-Nyonya Museum.

Building Name	Geographic Location	Construction Time	Main Style Characteristics
Shijia Mansion	Yangliuqing, Tianjin, China	1875	Northern traditional mansion + Late Qing decorations
Baba-Nyonya Museum	Malacca City	1865-1919	Minnan + Malay + European multi-element fusion



Figure 1.

Field photographs of Tianjin Shijia Mansion and Malacca Baba-Nyonya Museum.

3.1.2. First Stage: Typological Analysis

Based on the classification system of four basic pattern types, statistical analysis of decorative elements in the two buildings shows significant differences in the distribution of decorative element types. The comparative analysis is presented in the table below.

Table 2.

Comparative Distribution of Decorative Element Types between Shijia Mansion and Baba-Nyonya Museum.

Decorative Element Type	Shijia Mansion	Baba-Nyonya Museum
Animal Patterns	Lions, dragons, qilins, bats (28.3%)	Dragons, phoenixes, butterflies, magpies, fish, etc. (15.4%)
Plant Patterns	Peonies, lotus, plum-orchid-bamboo-chrysanthemum (24.7%)	Pineapples, peonies, mangoes, tropical flowers (37.5%)
Geometric Patterns	Fret patterns, swastika patterns (16.5%)	Fret patterns, spiral patterns, European geometric patterns (31.8%)
Character/Symbol Patterns	Auspicious characters like fu-lu-shou-xi (30.5%)	Simplified auspicious characters like fu, xi (15.3%)

Shijia Mansion primarily features animal patterns and character/symbol patterns, reflecting the northern traditional culture's preference for auspicious animal images and textual symbols; the Baba-Nyonya Museum predominantly features plant patterns and geometric patterns, reflecting the influence of tropical environment and local aesthetics.

3.1.3. Second Stage: Semiotic Interpretation

Through three-level coding analysis of decorative samples, three transformation modes and their typical cases were identified: In terms of form preservation-meaning preservation (43.8%), lotus patterns in both buildings maintained their basic morphological features, with their symbolic meanings of purity and Buddhist culture also basically preserved. The lotus pattern in Shijia Mansion uses wood carving techniques with subtle lines, while the lotus in the Baba-Nyonya Museum is represented in colorful glazed ceramics, yet the core symbolic meaning remains unchanged; regarding form preservation-meaning transformation (36.2%), lion patterns in both buildings basically retained their forms but underwent symbolic meaning transformation. Lions in Shijia Mansion symbolize "success in all endeavors," related to the imperial examination culture, while lions in the Baba-Nyonya Museum emphasize commercial prosperity and family flourishing, reflecting the immigrant community's reinterpretation of cultural symbols from their origin; as for form transformation-meaning transformation (20.0%), traditional geometric patterns in Shijia Mansion combined with Malay spiral patterns and European collage techniques in the Baba-Nyonya Museum, creating new visual forms, while the meaning transformed from ritual order to decorative and commercial expression.

3.1.4. Third Stage: Cross-cultural Comparative Analysis

Focusing on four dimensions to examine the cross-cultural translation mechanisms of decorative elements: In terms of morphological variation, according to field measurements and color analysis data, decorative elements in the Baba-Nyonya Museum show increased color saturation (38% higher than Shijia Mansion), increased pattern density (approximately 23% increase), and clearer boundaries, reflecting the influence of Malay aesthetics and European decorative arts; regarding meaning translation, decorative elements in Shijia Mansion are mostly associated with imperial examination culture, family ethics, and traditional beliefs, such as qilin connected with the concept of "sending sons," while the Baba-Nyonya Museum shifted toward emphasizing commercial prosperity and secular life symbolic meanings, reflecting the pragmatic value orientation of the immigrant community; in terms of functional transformation, decorative elements in Shijia Mansion are strictly distributed according to hierarchical order, embodying social rituals, while decorative elements in the Baba-Nyonya Museum are distributed more freely and flexibly, with functions transitioning from ritual display to cultural identity expression and commercial symbolism; with respect to innovative integration, in terms of color craftsmanship, Shijia Mansion mainly uses red-green-gold paintings and gray brick-blue tiles, conforming to traditional regulations, while the Baba-Nyonya Museum integrates traditional red-gold colors with blue-green ceramic tile collage techniques, creating unique visual effects. In spatial layout, Shijia Mansion employs hierarchical spaces with multiple courtyards, while the Baba-Nyonya Museum

combines courtyards, stilted structures, and other locally adaptive designs, demonstrating creative responses to tropical environments.

3.2. Comparison of Religious Buildings: Fujian Quanzhou Kaiyuan Temple and Malacca Chen Academy

3.2.1. Basic Information of Case Buildings

Table 3.

Basic Information of Fujian Quanzhou Kaiyuan Temple and Malacca Chen Academy.

Building Name	Geographic Location	Construction Time	Main Style Characteristics
Quanzhou Kaiyuan Temple	Quanzhou, Fujian Province, China	Originally built in 686 during Tang Dynasty, most existing decorative components from Ming-Qing period	Traditional Buddhist temple + Minnan regional characteristics
Chen Academy, Malacca	Malacca City	1704	Minnan + Malay + European colonial style fusion

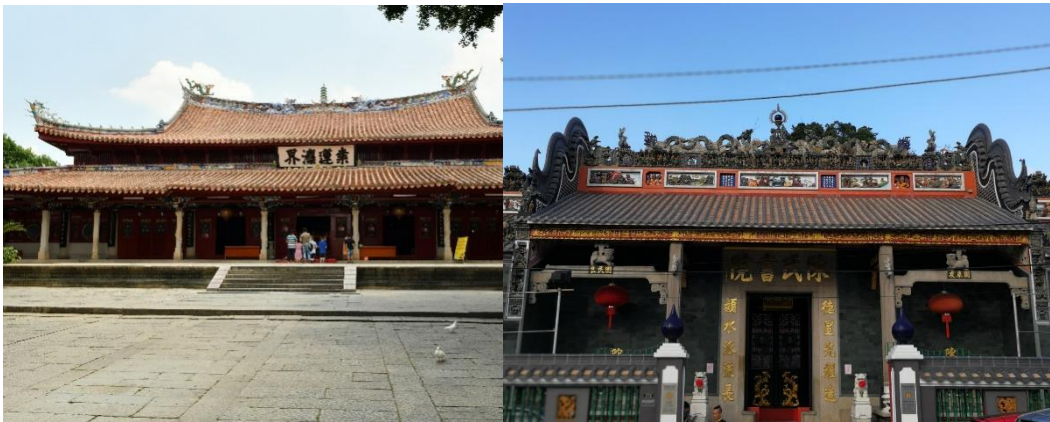


Figure 2.

Field photographs of Fujian Quanzhou Kaiyuan Temple and Malacca Chen Academy.

3.2.2. First Stage: Typological Analysis

Classification and statistical analysis of decorative elements in the two buildings indicate that religious buildings show different transformation patterns of decorative elements in cross-cultural transmission compared to residential buildings. The comparative analysis is presented in the table below.

Table 4.

Comparative Distribution of Decorative Element Types between Fujian Quanzhou Kaiyuan Temple and Malacca Chen Academy.

Decorative Element Type	Quanzhou Kaiyuan Temple	Chen Academy, Malacca
Animal Patterns	Dragons, phoenixes, lions, and other auspicious animals and Buddhist images (45.3%)	Dragons, phoenixes, butterflies, fish, and other traditional and local auspicious animals (27.6%)
Plant Patterns	Lotus, peonies, and other traditional religious plants (26.8%)	Lotus, tropical plants, and fruit patterns (33.4%)
Geometric Patterns	Fret patterns, swastika, and other Buddhist geometric symbols (16.2%)	Traditional patterns combined with Malay spiral patterns (29.2%)
Character/Symbol Patterns	Buddhist scriptures and blessing characters (11.7%)	Simplified auspicious characters and commercial prosperity symbols (9.8%)

Kaiyuan Temple's decorations mainly feature religious symbols, with a high proportion of animals and Buddhist images; Chen Academy reduced the proportion of religious images and increased secular decorative elements such as tropical plant patterns and geometric decorations.

3.2.3. Second Stage: Semiotic Interpretation

The symbol translation modes in religious buildings also show unique characteristics: In terms of form preservation-meaning preservation (52.6%), the proportion is higher in religious buildings, reflecting the conservatism of religious symbols. Especially core religious symbols like lotus and Buddha images basically maintained their original forms and religious meanings in Chen Academy; regarding form preservation-meaning transformation (31.2%), this is mainly manifested in traditional auspicious animals like dragons, transforming from religious guardian symbols to symbols of commercial prosperity and family flourishing; as for form transformation-meaning transformation (16.2%), this is particularly evident in spatial functional elements, such as the traditional Buddhist spatial layout of Kaiyuan Temple being combined with courtyard (Air Well) design in Chen Academy, with functions transforming from purely religious ceremonial spaces to multifunctional spaces integrating worship, social interaction, and ventilation.

3.2.4. Third Stage: Cross-cultural Comparative Analysis

In the third stage of cross-cultural comparative analysis, four main characteristics were discovered: In terms of morphological variation, Kaiyuan Temple primarily uses wood carving, stone carving, and traditional painting with dignified and harmonious colors, while Chen Academy extensively employs colorful glazed ceramics, lime mortar relief, and vibrant colors, reflecting the secularization tendency of religious decorations in cross-cultural transmission; regarding meaning translation, decorative elements in Kaiyuan Temple mainly carry religious functions and cultural traditions with relatively stable meanings, while Chen Academy transforms many religious symbols toward more secular wishes for family prosperity and commercial success; in terms of functional transformation, Kaiyuan Temple strictly follows traditional axial symmetry and religious hierarchical sequences, while Chen Academy, while retaining the basic axial layout, incorporates Malay ventilation and lighting design, demonstrating the multifunctional adaptation of religious spaces in cross-cultural contexts; with respect to innovative integration, the spatial composition and decorative distribution of Kaiyuan Temple follow strict religious norms, while Chen Academy creatively integrates Chinese religious architectural traditions with local environmental needs, forming a unique culturally mixed building type.

3.3. Comprehensive Case Analysis

Through systematic comparison of the above two groups of cases, common patterns in the cross-cultural transmission process of Ming-Qing architectural decorative elements can be derived:

In terms of typological distribution, Baba-Nyonya architecture generally reduced the proportion of animal patterns and character/symbol patterns while increasing the use of geometric patterns and plant patterns, reflecting the localized adaptation of decorative element selection.

Regarding symbolic meaning, both religious and secular buildings show a trend of transformation from hierarchical order and religious connotations toward commercial prosperity and secular life values, reflecting the value orientation shift of the immigrant community.

In terms of decorative form, Baba-Nyonya architectural decorations generally exhibit more vibrant colors, denser patterns, and clearer boundaries, reflecting the influence of tropical environments and multicultural aesthetics.

With respect to cross-cultural adaptation, religious buildings retained more original cultural symbols in form and meaning than secular buildings but showed a higher degree of innovation in spatial function, demonstrating differentiated strategies of different building types in cross-cultural transmission.

These findings reveal that cultural symbols undergo complex processes of selection, adaptation, and innovation in cross-regional transmission, providing rich empirical cases for understanding the cross-cultural evolution of architectural decorative elements.

4. Results and Discussion

4.1. Cross-cultural Evolutionary Characteristics of Decorative Symbols

The research found that geometric patterns and natural patterns predominate in Baba-Nyonya architecture, while animal patterns and character/symbol patterns predominate in Ming-Qing architecture. This reflects different preferences for decorative element selection between the two cultures, demonstrating the selective acceptance mechanism of cultural symbols in cross-regional transmission.

Morphological characteristic analysis shows that Baba-Nyonya architectural decorations exhibit high color saturation, high pattern density, and distinct boundaries, reflecting the influence of Malay and European colonial aesthetics on traditional Chinese decorative elements.

The research identified three main meaning translation modes: In terms of form preservation-meaning preservation, such as lotus patterns maintaining their Buddhist purity symbolism; regarding form preservation-meaning transformation, such as dragon patterns transforming from imperial power symbols to symbols of commercial prosperity and family flourishing; as for form transformation-meaning transformation, such as swastika patterns integrating with Malay geometric patterns, with meanings transforming from Buddhist symbols to auspicious implications.

This distribution reveals the hierarchical adaptation strategy of cultural symbols in cross-cultural transmission: basic visual elements tend to maintain their original forms and meanings; elements with strong symbolic significance tend to reconstruct cultural meanings while retaining forms; complex composite elements tend to undergo dual transformation in both form and meaning.

4.2. Cultural Fusion and Identity Construction Mechanisms

Baba-Nyonya architectural decorative elements exhibit distinctive characteristics of cultural fusion and local innovation. This innovative fusion, described by Liu, et al. [18] as a process of "cultural translation that involves both adaptation and creative reinterpretation"[18], reflects the immigrant community's selective preservation and reconstruction of their cultural memory. This is mainly manifested in the combination method, which integrates traditional Chinese symmetrical composition with Malay free-form composition; material application demonstrates localized innovation, using locally specific materials; color systems combine traditional Chinese color tones with vibrant Malay colors, creating a unique Baba-Nyonya color aesthetic.

Compared to the hierarchical distribution of decorative elements in Ming-Qing architecture, decorative elements in Baba-Nyonya architecture show blurred and commercialized identity markers. For example, the Nine Dragons Wall element, traditionally limited to imperial buildings, became widely applied in Malacca wealthy merchant residences, although with formal variations.

This change reflects the special social structure and identity of the Baba-Nyonya community—as a diaspora community, they express both their identification with their original culture and their social status in the new environment through decorative elements. The symbolic expression of commercial prosperity and social status exceeded the symbolic expression of traditional hierarchical order, consistent with Goh's observation that "Peranakan material culture represents a complex negotiation between cultural preservation and adaptation to new social contexts"[19].

5. Conclusion

This research systematically analyzed the evolutionary mechanisms and translation patterns of decorative elements in Ming-Qing Chinese and Malacca Baba-Nyonya architecture through a semiotic perspective. The findings show that Ming-Qing architectural decorative elements, in their transmission

to Malacca Baba-Nyonya architecture, both maintained certain continuity in form and meaning and demonstrated significant localized innovation and adaptation.

In terms of morphological characteristics, Baba-Nyonya architectural decorations exhibit more vibrant colors, higher pattern density, and clearer boundaries; regarding symbolic meaning, the symbolic significance of decorative elements transformed from traditional hierarchical order and religious connotations toward emphasizing commercial prosperity and family flourishing secular values; in terms of social function, the application of decorative elements transformed from strictly following hierarchical systems to highlighting commercial achievements and social status.

These research findings support Eco's theory that architectural elements function as "signs that denote their utilitarian functions and connote their symbolic functions" [1] and also echo Goh's analysis of "how diasporic communities negotiate cultural citizenship through material culture" [19], confirming that the meaning generation of architectural decorative elements is deeply influenced by sociocultural contexts. Meanwhile, the research also validates the cross-cultural architectural theory proposed by Memmott and Davidson [6] who argue that "architectural forms undergo significant transformation when transplanted across cultural boundaries" [6] indicating that cultural symbols in cross-regional transmission do not undergo simple unidirectional influence but experience complex processes of selection, adaptation, and innovation.

The theoretical contribution of this research lies in expanding the application of semiotic theory in cross-cultural architectural research and establishing a systematic analytical framework for architectural decorative elements. The practical significance is reflected in providing historical references and theoretical foundations for contemporary cross-cultural architectural design and cultural heritage preservation.

The limitation of the research is that the samples are mainly concentrated in Baba-Nyonya architecture in the Malacca region. Future research could extend to broader geographical areas, exploring translation patterns of architectural decorative elements in other cultural backgrounds; examine in depth the contemporary transformation and innovation of traditional decorative elements in the context of globalization; and employ digital technology for morphological and semiotic analysis of decorative elements to reveal broader patterns of cultural symbol transmission.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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