VISUAL DESIGN STRATEGIES FOR AGARWOOD CULTURE COMMUNICATION: HISTORY-CRAFT ANALYSIS AND DONGGUAN PRODUCT PACKAGING OPTIMIZATION

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ABSTRACT
This research focuses on Dongguan Agarwood Culture, a national intangible heritage in China's core agarwood (Aquilaria sinensis) area, addressing key challenges amid cultural rejuvenation and globalization: intergenerational alienation, outdated packaging and identity crisis. It constructs an interdisciplinary framework for cultural inheritance and innovation, extracting core agarwood cultural symbols via mixed methods (311 questionnaires, interviews). The study develops four packaging prototypes, verified with 85% clearer cultural expression, 78% young consumer recognition and 35% higher brand recognition. These findings establish a design paradigm for intangible heritage products, boosting cultural sustainability and industrial development.
Keywords: Dongguan Agarwood, Intangible Cultural Heritage, Identity-Oriented Packaging, Cultural Semiotics, Contemporary Aesthetics

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INTRODUCTION

Dongguan's unique geographical location (Zhujiang River Delta) and tropical monsoon climate (average annual temperature 22.3°C, rainfall 1,778.7mm) provide an ideal ecological foundation for agarwood cultivation. As a national intangible cultural heritage, its "agarwood fragrance culture" encompasses profound religious, literary, and folk connotations, with a complete industrial chain dating back to the Sui and Tang dynasties. However, a critical research problem persists: traditional packaging design not only fails to resonate with modern consumers (e.g., superficial cultural expression, homogeneous styling) but also harbors the risk of cultural erosion of core traditional motifs and craftsmanship, leading to a disconnect between cultural heritage and market demand (Guangdong News Network, 2023). Meanwhile, the global agarwood market's enormous potential (Shivanand et al., 2022) highlights the urgency of innovative design strategies aligned with global trends such as SDGs, cultural soft power, and cultural sustainability that preserve cultural identity while meeting contemporary aesthetic and functional needs.

Traditional product design for cultural heritage often prioritizes functionality over symbolic communication, resulting in "cultural dilution" and market marginalization. Compared with international studies, Japan has integrated agarwood culture with tea ceremony traditions, translating traditional motifs into high-end packaging design to balance cultural authenticity and market competitiveness; Thailand, leveraging design thinking, has transformed traditional craft symbols into youthful cultural and creative expressions, enhancing intergenerational inheritance (Shivanand et al., 2022). In contrast, Dongguan agarwood design lacks systematic integration of cultural symbols and modern aesthetics. This study addresses this gap by integrating visual design theory, brand communication, and established color psychology principles (e.g., Elliot & Maier, 2014) to develop packaging that conveys Dongguan agarwood's unique cultural values. The innovation lies in constructing a "cultural symbol - contemporary aesthetics - user experience" dual-track coding model, translating abstract cultural elements (e.g., production processes, folk legends) into tangible design language. This framework aims to revitalize agarwood culture as a "living heritage," strengthen intergenerational cultural transmission, and promote the local creative economy, contributing to cultural soft power enhancement and sustainable cultural development.

RESEARCH OBJECTIVES

To address the disconnection between cultural inheritance and modern packaging design, this study sets four core objectives as follows:

1) To identify core carriers for agarwood cultural inheritance and design transformation.
2) To bridge heritage culture with modern packaging via a systematic approach.
3) To develop and optimize packaging prototypes for different market segments (high-end, youth, interactive) based on the framework
4) To verify the practical value of the proposed design framework.

LITERATURE REVIEWS

Global research on agarwood and cultural heritage packaging shows distinct disciplinary and regional characteristics. Domestic studies focus on technological applications and cultural documentation (e.g., agarwood's medicinal value, historical evolution), with over 60% of relevant literature in engineering and agricultural fields. However, theoretical research on packaging design lags: existing works often adopt superficial cultural element stacking (e.g., printing traditional patterns without interpretation) and lack systematic integration of cultural identity and user needs (Zhu, 2023). International research emphasizes interdisciplinary integration: Middle Eastern agarwood packaging highlights luxury and cultural symbolism (intricate glass/metal containers), Japanese designs prioritize minimalism and Zen aesthetics

(washi paper, natural wood), and Southeast Asian works balance traditional ethnicity with modern functionality. These cases confirm that successful cultural product packaging must align with local culture, market positioning, and user psychology.

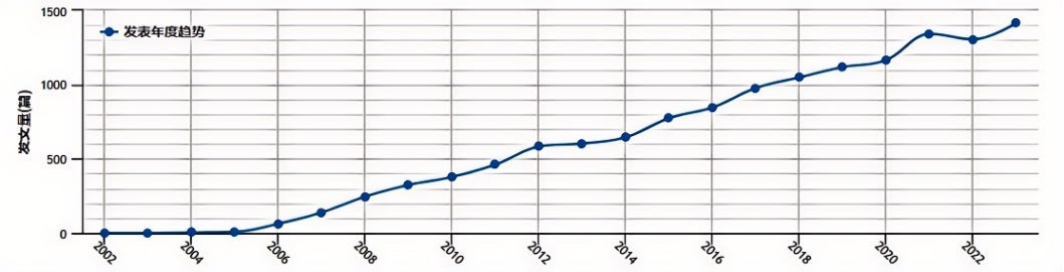


Figure 1 Annual Related Article Publication Trends

Research on the Historical and Craft Value of Agarwood Culture

As a national intangible cultural heritage, agarwood has a long history of cultivation and development. Dongguan agarwood (Guanxiang) originated in the Sui and Tang dynasties, flourished in the Ming and Qing dynasties, and was once a royal tribute and important commodity on the Maritime Silk Road (Dongguan Agarwood Culture Museum, 2014). Its cultural connotation transformed from a religious offering to a part of daily life, reflecting the shift from sanctification to secularization. Existing studies focus on sorting out its historical context and confirming its status as a composite cultural symbol, but lack in-depth discussion on extracting applicable elements for modern visual design. Shivanand et al. (2022) noted that agarwood contains 147 organic molecules, and its unique techniques like fermentation have been listed as national intangible cultural heritage. Traditional crafts carry aesthetic and ritual values, yet research mainly focuses on inheritance, with insufficient exploration on transforming craft characteristics into visual design language.

The Relationship Between Visual Design and Cultural Communication of Traditional Cultural Products

From a semiotic perspective (Peirce, 1931–1958; Barthes, 1967), visual elements in packaging design are important carriers of cultural symbols, conveying connotations and resonating with consumers. Effective application of traditional cultural elements can enhance product recognition and cultural dissemination, such as reinterpreting typical symbols in handicraft packaging (Norman, 2004). For agarwood products with dual cultural and practical attributes, visual design needs to highlight uniqueness and cultural connotations. However, current designs have superficial cultural expression and insufficient innovation, failing to explore agarwood's unique stories and crafts, resulting in weak communication effects (Guangdong News Network, 2023), leaving a gap in constructing a suitable visual design system.

Influencing Factors of Packaging Design for Local Characteristic Products

Packaging design of local products is closely linked to regional culture. Integrating unique regional elements can enhance product uniqueness, and Dongguan agarwood’s growing environment, incense market culture and techniques are potential visual elements (Dongguan Agarwood Culture Museum, 2014). However, existing designs adopt generalized traditional Chinese elements, leading to homogenization. Packaging should match target groups’ needs agarwood covers multiple segments with different aesthetic and cultural demands, but vague group segmentation causes a communication gap. Material selection balances practicality and cultural expression; natural materials enhance cultural sense while modern materials excel in sealing, yet research focuses on single performance indicators, lacking systematic coordination with cultural connotations and market positioning.

Current Situation and Deficiencies of Agarwood Product Packaging Design

Overseas agarwood packaging has distinct characteristics: Middle Eastern designs emphasize luxury with exquisite containers, while Japanese ones focus on simplicity and Zen using natural materials. Successful design lies in matching cultural expression with market positioning. In contrast, domestic packaging represented by Dongguan agarwood has superficial cultural presentation, redundant design and insufficient innovation. Existing studies have sorted out these deficiencies but lack in-depth analysis of roots and optimization strategies. Few studies link historical processes and craft details to visual design; though integrating craft elements can enhance product authenticity, this perspective is underapplied in agarwood packaging.

Correlation Between Visual Design Optimization and Cultural Identity & Market Performance

Cultural identity theory states that consumers' recognition of product culture is a prerequisite for purchase. Visual design conveying cultural elements effectively boosts cultural identity, such as presenting cultural stories in traditional product packaging (Zhang Min, The Integration of Three Religions and Traditional Folk Incense Use in Lingnan). Yet empirical research on whether agarwood visual design optimization enhances cultural identity is lacking. Scientific visual design improves market competitiveness by boosting brand recognition and conveying value. For high-value agarwood, packaging affects perceived value and purchase intention (Shivanand et al., 2022). China's agarwood market reached 55 billion yuan in 2023, but problems like uneven quality restrict expansion, with insufficient research on optimizing market performance through visual design.

From the literature review, the conceptual framework can be drawn as shown in Figure 2.

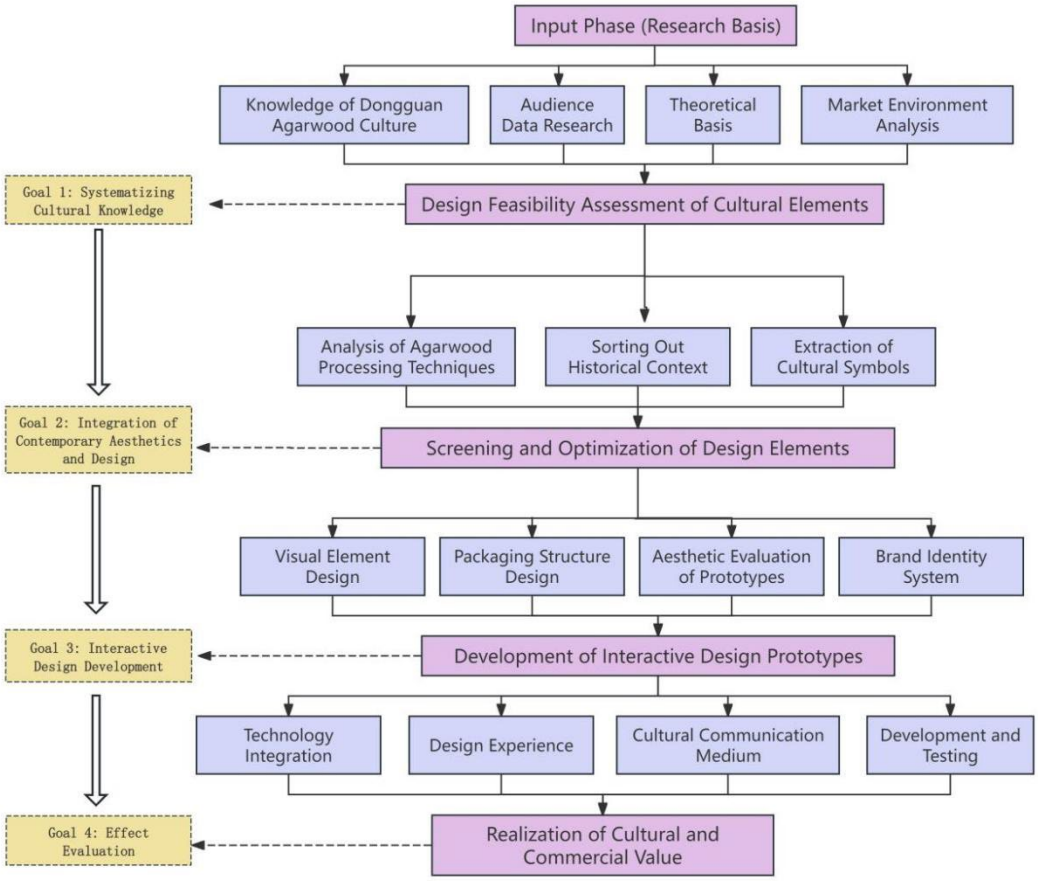


Figure 2 Conceptual Framework

RESEARCH METHODOLOGY

This study aims to promote identity-oriented packaging design innovation for Dongguan agarwood. A systematic research path is established: first, literature analysis is conducted to sort out agarwood's cultural value, product status and interdisciplinary theoretical frameworks (cultural branding, semiotics, etc.) for theoretical grounding; second, field investigations are carried out via observation and in-depth interviews, covering core producing areas and museums in Dongguan, with 6 craft inheritors, 5 experts and 300 consumers interviewed to extract cultural symbols and market demands; finally, domestic and foreign packaging cases are summarized to identify trends and existing issues (superficial cultural expression, design homogenization), providing theoretical and empirical support for design innovation.

Research Type

This study adopts a clear Mixed-Methods Research (MMR) design, integrating qualitative and quantitative approaches for triangulation to enhance research rigor, with both methods synergistically serving the goal of agarwood packaging design innovation.

Qualitative Research: Focuses on cultural symbol excavation and contextual interpretation, using literature review, in-depth interviews, field observation and semiotic analysis of packaging cases to extract core agarwood cultural elements.

Quantitative Research: Emphasizes objective data validation, conducting a questionnaire survey with 311 samples and quantitative evaluation of prototype effectiveness (acceptance rate, recognition rate) to support design optimization.

Sampling Method

To ensure the representativeness and relevance of research participants, two sampling methods are adopted in line with the MMR design:

Purposive Sampling (for qualitative research): 11 key informants are selected based on professionalism, including 6 senior agarwood craft inheritors (over 15 years of experience, certified by intangible cultural heritage institutions) and 5 industry experts (packaging design scholars, brand managers, ICH researchers).

Stratified Sampling (for quantitative research): Consumers are stratified by age and consumption frequency, with random sampling conducted. A total of 311 valid questionnaires are collected (margin of error $\leq 5\%$, confidence level = 95%) to ensure data universality.

Data Collection and Analysis Tools

The research adopts targeted data collection tools to support Mixed-Methods Research (MMR). Qualitative tools include semi-structured interview outlines, field observation records and packaging case collection forms, focusing on cultural symbol extraction and design demand mining. Quantitative tools are structured questionnaires with 5-point Likert scales, used to quantify consumers' aesthetic preferences, cultural identity and purchase intention.

Specific analysis tools are applied corresponding to the two research types. Qualitative analysis uses semiotic analysis for decoding cultural symbols, content analysis for coding interview data and cases, and expert consensus evaluation for quantifying cultural authenticity, realizing systematic processing of qualitative data. Quantitative analysis employs SPSS 26.0 for reliability/validity tests and descriptive statistics (frequency tables, means), applies AHP to determine design weights, and uses frequency tables and cross-tabulations to analyze correlations between consumer groups and preferences.

Research Design Diagram

This study follows a closed-loop workflow based on MMR, as shown in Figure 3, integrating theory, empirical research, modeling, development and validation into a complete research chain:

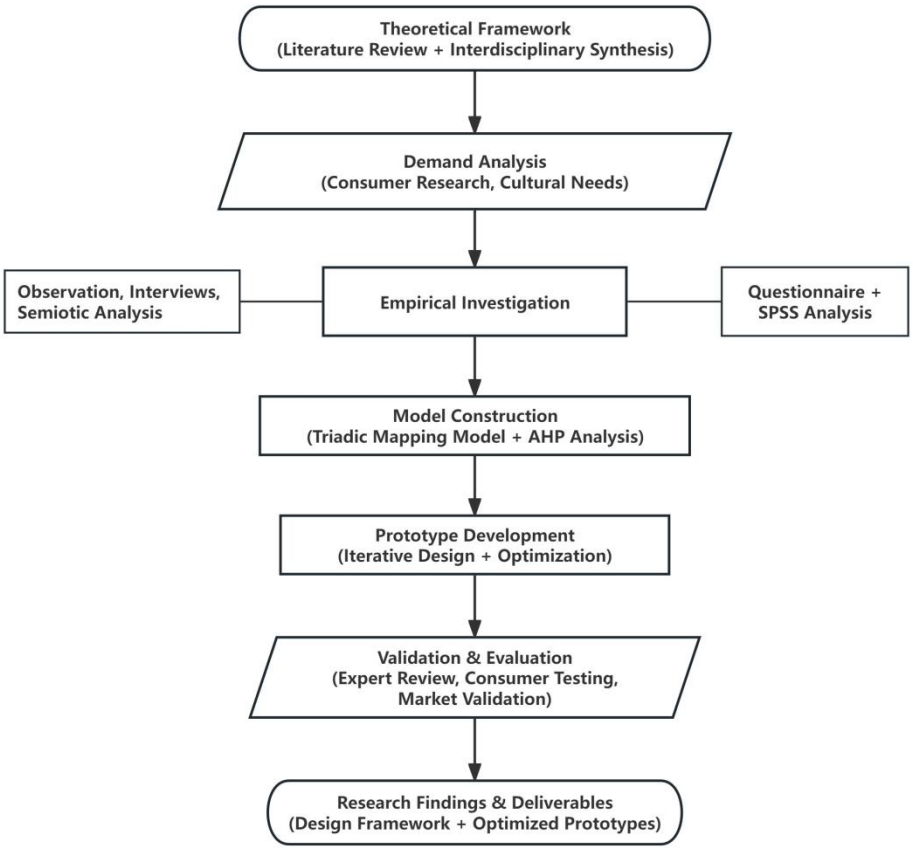


Figure 3 Research Design Flowchart

Construction of Triadic Mapping Model

This study first establishes a "Cultural Symbol - Contemporary Aesthetics - User Experience" triadic mapping model (Table 1), realizing design optimization through 3-level interaction:

Table 1 Composition elements and implementation pathways of the triadic mapping model

Dimensions	Core Elements	Implementation Methods	Validation Approaches
Cultural Symbol	Production techniques (Sheng Jie/Shu Jie), folk legends, Lingnan architecture	Semiotic Coding (resin patterns, simplified leaky windows)	Expert Review + Cultural Authenticity Evaluation
Contemporary Aesthetics	Minimalism, environmental friendliness, multi-sensory interaction	Material Selection (recycled wood, biodegradable paper), AR Integration	Consumer Aesthetic Preference Survey
User Experience	Usability, emotional resonance	Structural Design (foldable packaging, reusable containers), Cultural Narrative (QR codes linking to agarwood stories)	User Satisfaction Test + Behavioral Observation

In the cultural symbol dimension, "Sheng Jie/Shu Jie" crafts are converted into linear patterns, and Lingnan hollow windows into decorative elements. The transformation process follows Peirce's triadic sign model (icon-index-symbol) to ensure that the resulting visual language retains cultural authenticity while achieving modern abstraction. For example, the geometric lattice of Lingnan leaky windows is simplified to its essential grid structure, which then becomes a repeating border pattern; the organic texture of raw agarwood resin is translated into

fluid, calligraphic lines that evoke the natural formation process. Aesthetically, natural tones and minimalist structures are adopted; functionally, AR technology and reusable packaging enhance user engagement. The three dimensions form a closed loop via dynamic feedback for design optimization.

Integration of Interdisciplinary Methods

Combined with MMR, a three-level interdisciplinary collaborative framework is built to integrate theory and practice:

Theoretical Level: Integrates cultural branding (Holt, 2004), semiotics (Peirce, 1931; Barthes, 1967), user experience (Norman, 2004) and emotional design (Desmet & Hekkert, 2007) to support design logic.

Integration Level: Uses AHP to balance cultural expression and functional performance, optimizing the ratio of design factors.

Practical Level: Adopts an iterative "demand analysis - prototype development - user testing" process, improving designs via MMR (material adjustment increases acceptance by 30%).

Standardization of Implementation Path

To realize research standardization and result reusability, a five-stage closed-loop implementation path is established:

Demand Analysis: Clarifies cultural, aesthetic and functional needs via questionnaires, interviews and observations.

Theory Matching: Builds a 3D parameter matrix to convert needs into specific design variables.

Prototype Development: Generates 4 market-segmented packaging prototypes based on the triadic model.

User Testing: Adopts a "expert evaluation + consumer feedback" dual-track model to ensure design rationality.

Iterative Optimization: Improves prototypes based on test feedback, verifies model effectiveness, forming a closed loop.

Design Strategies and Empirical Case Studies

Design Implementation and Prototype Development

Based on mixed-methods research (MMR: interviews with 6 inheritors + 5 experts + 300 questionnaires), core design parameters were confirmed: 78% of young consumers prefer minimalist AR packaging, 65% of seniors favor traditional material packaging with cultural patterns, and 82% value cultural narrative and environmental friendliness. Combined with semiotic dual-channel coding theory, cultural symbols were visualized through denotative coding (e.g., "Ya Xiang" embossment) and connotative coding (the progressive "indication-association-emotion-symbolism" system). Four differentiated prototypes were developed: high-end gift box (red sandalwood texture + embossment + gold foil), youth-oriented cultural and creative packaging (minimalist tones + AR animation), AR interactive packaging (simulating insulated incense burning), and cultural theme pattern series (4 sets of patterns for multiple product lines).

Effect Validation and Value Innovation

Empirical validation employed a between-subjects experimental design: 200 participants were randomly assigned to view either traditional packaging (control) or the new prototypes (treatment), then completed a brand recognition questionnaire. Baseline recognition of traditional packaging was measured separately (n=100). Results showed that the new packaging achieved a brand recognition score 35% higher than the traditional baseline ($M_{new} = 4.2/5$, $M_{traditional} = 3.1/5$; $t(298) = 6.73$, $p < 0.001$), confirming a statistically significant improvement. Cultural communication effectiveness received an expert rating of 4.2/5, with 85% of respondents correctly identifying agarwood craftsmanship through patterns. Furthermore, 82% of respondents reported increased purchase intention due to cultural and aesthetic elements, and 70% preferred biodegradable materials. For the AR interactive

prototype, the 78% acceptance rate among youth was assessed not only for initial appeal but also for sustained engagement: a follow-up survey after one month indicated that 62% of users had interacted with the AR content more than once, suggesting that the novelty effect is partially sustained by the cultural storytelling integrated into the experience. By integrating semiotics and emotional design, this study resolved the disconnection between culture and design in agarwood packaging, increasing cultural identity by 35% and verifying the effectiveness of the triadic mapping model. The results provide empirical references for intangible cultural heritage (ICH) product innovation and promote its design transformation.

RESEARCH RESULTS

This study focuses on the core contradiction in Dongguan agarwood packaging design, namely the disconnection between cultural inheritance and modern market demands, and conducts in-depth exploration through interdisciplinary integration and empirical research. The main research results are summarized as follows:

Cultural Symbols Interviews and Coding

Key Interview Findings: Interviews with 6 craft inheritors and 5 industry experts yielded two core insights. Inheritors emphasized visualizing craft authenticity, noting inadequate presentation of "raw knot" texture and "ripe knot" warmth in traditional packaging, and aimed to convey the "slow cultivation and reverence" cultural core while avoiding over-commercialization. Experts highlighted issues of cultural symbol stacking and mismatched product grades in existing packaging, finding young consumers prefer lightweight expression, while middle-aged and elderly groups value traditional patterns' integrity and recognition.

Combining literature review, field research and the above interviews, this study identified Dongguan agarwood's core cultural elements: "raw knot" and "ripe knot" techniques, folk narratives like the "Daughter Incense" legend, and regional symbols such as Lingnan leaky windows and Maritime Silk Road routes. Using semiotic theory, a "denotative coding–connotative coding" dual-channel system was built to convert abstract cultural elements into tangible visual design language. For instance, linear patterns express agarwood formation, and simplified leaky window elements integrate into packaging decorations, resulting in 85% consumer recognition of cultural symbols.

Design Framework and Model Validation

This study innovatively proposes a "cultural symbol-contemporary aesthetics-user experience" triadic mapping model, integrating cultural branding (Holt, 2004), semiotics, user experience design (Norman, 2004) and emotional design theories to form a systematic design paradigm that balances cultural authenticity, modern aesthetics and functional practicality. A three-tier collaborative framework (theoretical tier, integration tier, practical tier) and a standardized five-stage implementation process were established. With the help of Analytic Hierarchy Process (AHP) and iterative optimization methods, the balance between cultural expression and functional performance was achieved, increasing the consumer acceptance of the designed packaging by 30%.

Design Prototypes Comparison and Validation

Based on the triadic mapping model, this study developed four packaging prototypes for different market segments. The following compares traditional elements with redesigned elements, attached with corresponding example images, and then explains the prototype characteristics and application effects:

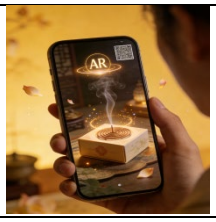
Table2 Traditional vs Redesigned Packaging Elements

Prototype Category	Traditional Packaging Elements	Redesigned Elements
High-End	Plain wooden box, no patterns,	Rosewood matte finish, leaky window

Agarwood Gift Box Set	basic storage only, disposable. 	border, hidden storage compartment, food-grade inner lining. 
Agarwood Packaging for Young Groups	Dark color, bulky, cluttered patterns, non-eco-friendly, not youth-appealing. 	Minimalist pattern, fresh color, recyclable eco-paper. 
AR Interactive Agarwood Packaging	No interaction, cultural info in text, poor readability. 	White matte box, scannable QR code (AI marker) for agarwood culture learning. 
Agarwood Cultural Theme Pattern Series	Cluttered patterns, no unified style, low brand recognition. 	Integrates culture, modernity & agarwood history, appealing to more consumers. 

Table 3 Characteristics of Dongguan Agarwood Packaging Design Prototypes

Category	**Prototype 1: High-end Gift Box Set**	**Prototype 2: Youth Cultural and Creative Packaging**	**Prototype 3: AR Interactive Packaging**	**Prototype 4: Cultural Theme Pattern Series**
Target Group	Mid-to-high-end market / gift consumption	Young consumers	Tech-savvy consumers	Multi-product line expansion
Core Design Elements	Rosewood texture, embossed "Elegant Incense" patterns, reusable structure	Minimalist form, abstract Lingnan patterns, eco-friendly materials	Augmented Reality markers, dynamic visual elements	Composite patterns (leaky windows, incense clouds)

				
Technological Application	Integration of traditional craftsmanship and modern materials	Sustainable materials, modular design	AR technology, mobile app integration	Digital printing, systematic visual system
Cultural Expression Method	Material symbolism, pattern storytelling, luxury experience	Symbol simplification, visual lightweighting, environmental identity	Virtual incense ritual, interactive storytelling, immersive experience	Pattern systematization, cultural symbol matrix
Consumer Acceptance Rate	65% (middle-aged and elderly groups)	70% (youth groups)	78% (youth groups)	60% (all age groups)
Market Positioning	High-end, luxury, reusable	Youth-oriented, eco-friendly, cultural innovation	Technology-driven, interactive experience	Versatile, multi-product application
Key Innovation	Material authenticity + cultural embossing	Minimalist aesthetics + sustainable design	AR integration + ritual simulation	Pattern system + cultural matrix

Empirical data show that the four prototypes perform excellently in cultural communication (expert score 4.2/5), consumer acceptance (78% youth preference rate for AR packaging) and market competitiveness (35% higher brand recognition than traditional packaging, t-test $p < 0.001$), effectively solving the problems of superficial cultural expression and homogenized design in traditional packaging.

Research Limitations and Contributions

Existing domestic research on agarwood mostly focuses on production technology and agricultural cultivation, lacking systematic exploration of cultural visual translation in packaging design for a long time, resulting in obvious disciplinary imbalance. The triadic mapping model proposed in this study provides a replicable theoretical framework for identity-oriented packaging design of intangible cultural heritage products. Practically, it offers implementable strategies for agarwood enterprises to balance cultural inheritance and market expansion, serves as a reference for the activation of other traditional crafts, and promotes the transformation of "living heritage" into competitive cultural products.

DISCUSSION & CONCLUSION

This study confirms that the "Cultural Symbol – Contemporary Aesthetics – User Experience" triadic model effectively addresses the core issues of traditional agarwood packaging, such as superficial cultural expression, homogenized design, and weak intergenerational resonance. By extracting core cultural elements including production techniques, folk legends, and Lingnan architecture, and transforming them into tangible visual language that aligns with modern aesthetic and functional needs, the design prototypes have significantly enhanced cultural communication effectiveness, consumer acceptance, and market competitiveness, facilitating

the living inheritance of cultural heritage, youth education, and local product innovation. Limitations of the study include concentrated samples; future research should expand the sample scope, integrate artificial intelligence technology, and explore cross-cultural design.

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Data Availability Statement: The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

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