

Research on the Modern Product Transformation of Traditional Bamboo Weaving Craft from the Perspective of Sustainable Design

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Abstract

Based on the background of global sustainable transformation and the creative transformation of fine traditional Chinese culture, this study systematically explores the transformation paths, innovation models, and development strategies of traditional Chinese bamboo weaving craftsmanship in modern product design from the perspective of sustainable design theory. It first clarifies the connotation of sustainable design and its high compatibility with bamboo weaving craftsmanship in three dimensions: environment, economy, and social culture. By in-depth analyzing the ecological attributes of bamboo, the low environmental impact of bamboo weaving craftsmanship, and its profound value as an intangible cultural heritage, the study demonstrates the natural advantages of bamboo weaving craftsmanship as a high-quality carrier for sustainable design. Furthermore, combined with a large number of cutting-edge domestic and foreign cases such as Chongzhou bamboo weaving (Sichuan), Qingshen bamboo weaving (Sichuan), Chishui bamboo weaving (Guizhou), and the design practice of Su Sheng Home Furnishing, it elaborates on the specific paths and methods of the modern transformation of bamboo weaving craftsmanship from four aspects: "material-technology", "function-form", "design-language", and "scene-business format". The research reveals that through strategies such as material science innovation, product function reconstruction, design language translation, and multi-scenario integration, traditional bamboo weaving can effectively realize the inheritance of its cultural genes and the regeneration of modern value. The paper also objectively analyzes the core challenges facing the current bamboo weaving industry, such as technical bottlenecks, market acceptance, and talent training, and accordingly proposes targeted countermeasures including building a "government-industry-university-research-user" collaborative innovation system, strengthening brand narrative and digital marketing, and establishing a diversified modern inheritance mechanism. This study aims to provide a systematic solution with both theoretical depth and practical feasibility for the contemporary revival of traditional handicrafts, and contribute Chinese wisdom and local cases to global sustainable design practices.

Keywords

Sustainable design; Bamboo weaving craftsmanship; Product transformation; Intangible cultural heritage; Ecological design; Innovation strategy

1. Introduction

In the contemporary era facing global environmental crises and resource shortages, sustainable design has become an important concept and inevitable trend in product development. This concept emphasizes minimizing resource consumption and environmental impact throughout the entire product life cycle, while taking into account the inheritance of social and cultural values. As a traditional handicraft with a history of thousands of years, bamboo weaving craftsmanship is attracting increasing attention due to its characteristics of renewable materials, low-carbon production process, and biodegradable products, which are highly consistent with the principles of sustainable design.

Traditional Chinese bamboo weaving craftsmanship has a long history. For example, Chongzhou bamboo weaving in Sichuan has a history of more than 2,000 years, and the bamboo weaving in Sansui County, Qiandongnan, can be traced back to the late Ming and early Qing dynasties. However, with the development of industrial civilization, traditional bamboo weaving, like many other handicrafts, is facing severe survival challenges. The complexity of bamboo weaving craftsmanship and the singleness of product functions have made it decline under the impact of the market economy. A large number of low-cost products produced by mass machine production have flooded the market. Due to the slow production speed and small output of traditional hand-woven bamboo products, their value and price are difficult to be proportional. At the same time, young people have low attention and participation in traditional handicrafts, leading to an increasingly serious inheritance gap. Therefore, how to combine this green and low-carbon craftsmanship with contemporary design concepts to develop products that meet modern aesthetics and functions has become an urgent issue to be solved.

This study aims to systematically research the transformation paths of traditional bamboo weaving craftsmanship in modern products from the perspective of sustainable design. By analyzing successful cases and practical experiences, it explores the innovative methods of bamboo weaving in materials, craftsmanship, functions, and aesthetics, so as to provide feasible strategies for the contemporary revival of traditional craftsmanship and local practical cases for sustainable design theory. The study comprehensively uses methods such as literature analysis, case comparison, and theoretical construction, selects representative bamboo weaving innovation cases such as Chongzhou bamboo weaving, Qingshen bamboo weaving, and Chishui bamboo weaving, and deeply analyzes their transformation strategies and effects to reveal the vitality and development potential of traditional bamboo weaving craftsmanship in modern society.

2. Compatibility between Sustainable Design and Bamboo Weaving Craftsmanship

Sustainable design pursues the harmonious unity of environmental friendliness, social equity, and economic prosperity. Traditional bamboo weaving craftsmanship, which has evolved over thousands of years, shows an astonishingly high compatibility with this pursuit. This compatibility is not accidental, but stems from the survival wisdom accumulated by Chinese civilization in long-term practice, making it a potential local practical carrier for the concept of sustainable design.

2.1. Material Sustainability: A Green Gift from Nature

Bamboo is the material foundation of bamboo weaving craftsmanship, and its excellent environmental performance is the primary embodiment of the sustainability of bamboo weaving.

Growth characteristics and renewability: Bamboo belongs to the Poaceae family and is one of the fastest-growing plants on earth. Some moso bamboo varieties can grow more than 1 meter in 24 hours during the peak growth season and can be harvested for use in 3-5 years. Its growth cycle is much shorter than that of wood, which takes decades or even hundreds of years to mature. Bamboo reproduces asexually through its rhizome system. Once planted, it can be continuously harvested and used for many years, realizing a sustainable management model of "harvesting without deforestation". In contrast, traditional materials such as wood and plastic, the former regenerates slowly, while the latter relies on non-renewable fossil fuels. Bamboo has an incomparable advantage in renewability.

Ecological functions and carbon sequestration capacity: Bamboo forests are ecosystems with strong ecological service functions. Studies have shown that moso bamboo forests have outstanding carbon sequestration capacity. Each hectare of moso bamboo forest can absorb about 5.09 tons of carbon dioxide per year and release a large amount of oxygen. Its carbon sequestration and oxygen release capacity is better than that of many tropical rainforests and temperate forests. In addition, the intertwined rhizome system of bamboo forests can effectively conserve water sources, maintain soil and water, prevent landslides, and is crucial for maintaining the ecological security of mountainous areas. Bamboo forests also provide habitats for many organisms, helping to protect biodiversity. Therefore, developing the bamboo weaving industry and expanding bamboo forest cultivation is itself a positive ecological construction project.

Environmental potential of "bamboo replacing plastic": Against the background of global response to plastic pollution, the initiative of "bamboo replacing plastic" has emerged and received widespread response from the international community. Bamboo has low energy consumption in the production process, and its products are naturally biodegradable, which will not form "white pollution". From the perspective of life cycle assessment, the carbon footprint of bamboo products throughout their

life cycle is much lower than that of plastic products and many metal products. The "bamboo replacing plastic" case of Qingshen bamboo weaving was selected as an excellent case of "Intangible Cultural Heritage for Sustainable Development" in the Asia-Pacific region in 2024, which is a high recognition of its environmental value by the international community. Xinyi City, Guangdong Province, plans to achieve a comprehensive output value of 60 billion yuan for the bamboo weaving industry by 2025. Driven by the "dual carbon" goal and the concept of green development, it has also seen the huge market potential of bamboo as a substitute for high-carbon emission and high-pollution materials.

2.2. Process Sustainability: Ingenious Manufacturing with Low Energy Consumption

The production process of traditional bamboo weaving craftsmanship itself is a model of low environmental impact.

Low energy consumption and low emissions: Traditional bamboo weaving techniques mainly rely on the manual operation of craftsmen. The entire process from bamboo selection, splitting, peeling, slicing to weaving hardly relies on large-scale machinery, resulting in extremely low energy consumption. In sharp contrast to the high energy consumption and high emissions of modern industrial production lines. During the processing, except for a small amount of water for cleaning, almost no wastewater, waste gas, or toxic and harmful substances are produced, making it a clean production technology.

Maximizing material utilization: Bamboo weaving craftsmanship contains a profound concept of "cherishing things". In the production process, craftsmen carefully plan according to the natural shape and characteristics of bamboo to make the best use of it. Even the bamboo shavings and leftover materials generated during the production process are often used as fuel or compost, realizing the full value chain utilization of resources with extremely low waste generation rate. This ultimate respect and utilization of materials is a valuable experience worthy of learning from modern industrial design.

Green integration of tradition and modernity: The contemporary bamboo weaving industry is not standing still, but on the basis of retaining the essence of handcraft, it timely introduces modern technology to further enhance the sustainability of its craftsmanship. For example, the introduction of intelligent equipment in the bamboo industry processing workshops in Rong'an County, Liuzhou, is a typical case. CNC laser engraving machines can engrave complex patterns on bamboo slices with a precision of 0.01 millimeters, greatly reducing the errors and material waste that may occur in manual engraving; CNC woodworking engraving machines efficiently and accurately mill product components through multi-axis linkage, improving material utilization rate and production efficiency. This model of "intelligent manufacturing + manual craftsmanship" does not replace manual work, but liberates craftsmen from

repetitive and high-intensity physical labor, allowing them to focus on more creative weaving links, achieving a win-win situation of efficiency improvement and resource conservation, which is an important direction for the sustainable evolution of traditional craftsmanship.

2.3. Cultural Sustainability: The Spiritual Root of Living Inheritance

As an intangible cultural heritage, the sustainability of bamboo weaving craftsmanship is not only reflected in the material level, but also deeply rooted in its rich cultural connotation and social value.

Carrier of ecological wisdom: Traditional Chinese bamboo weaving craftsmanship profoundly reflects the philosophical thought of "harmony between man and nature". Craftsmen respect the natural characteristics of bamboo and process and create in accordance with its physical laws. Various techniques in the weaving process, such as picking and pressing, elastic insertion, twisting, and edging, are the crystallization of wisdom formed in long-term practice to coexist harmoniously with materials. This view of creation based on nature, conforming to nature, and utilizing nature is exactly the core spirit advocated by contemporary sustainable design.

Cultural identity and emotional connection: In Chinese culture, bamboo is endowed with noble qualities such as modesty, integrity, perseverance, and evergreen, and is an object praised by literati. Bamboo weaving products carry the collective memory and lifestyle of specific regions, and are emotional bonds connecting the past and the present, individuals and communities. By using and appreciating bamboo weaving products, people can feel the temperature of traditional culture and enhance their cultural identity and sense of belonging. The continuation of this cultural value is an important part of social sustainability.

Living inheritance and international exchange: Facing the crisis of inheritance, active inheritance practice is the key to cultural sustainability. Through holding international training courses, Qingshen bamboo weaving not only teaches weaving skills to foreign students, but also conveys the underlying cultural concepts and life philosophy. By 2024, 163 foreign students have been trained. This cross-cultural communication not only protects the craftsmanship itself, but also enables it to gain new understanding and appreciation in the global context, realizing the creative transformation and innovative development of culture. By holding bamboo weaving competitions, Xinyi, Guangdong, gathers skilled craftsmen to exchange skills and encourage innovation, which is also an effective path to enhance the cultural vitality of bamboo weaving and promote its contemporary transformation.

3. Modern Product Transformation Paths of Bamboo Weaving Craftsmanship

Integrating traditional bamboo weaving craftsmanship into modern life and maximizing its sustainable value lies in a series of systematic transformation paths. These

paths are not isolated, but interweave and interact with each other, promoting bamboo weaving from an "ancient craft" to "modern wisdom".

3.1. Innovation in Materials and Technology: Endowing Traditional Materials with Modern Vitality

Materials are the material foundation of design, and technological innovation is the engine of realization. The modern transformation of bamboo weaving craftsmanship starts with the in-depth innovation of bamboo itself and its processing methods.

Scientific bamboo processing and performance improvement: Traditional bamboo weaving products are easily affected by changes in humidity and temperature, which may cause mold, cracking and other problems, limiting their service life and application scope. Modern materials science modifies bamboo through physical and chemical methods, such as carbonization, drying and setting, resin impregnation, etc., which significantly improves the durability and environmental adaptability of bamboo products. For example, by compounding with polymer materials, bamboo-based composite materials with both the beauty of bamboo and the toughness of plastic can be manufactured, expanding their application in fields such as electronic product casings and automotive interiors.

Introduction of intelligent and digital manufacturing technology: As mentioned in the previous Rong'an County case, intelligent equipment such as CNC laser engraving and CNC milling has brought unprecedented precision and complexity to bamboo weaving. In addition, 3D scanning technology can accurately obtain the shape data of traditional classic artifacts and establish digital archives; 3D modeling and virtual simulation software such as Clo3D allow designers to pre-simulate the texture, structure and light and shadow effects of bamboo weaving on the computer for rapid iteration, greatly reducing design and development costs and time. The virtual simulation design based on Clo3D technology proposed in the research on Chongzhou bamboo weaving is exactly a reflection of this trend. The intervention of digital technology has not weakened the value of handcraft, but provided more powerful tools and broader imagination space for hand creation.

Material compounding and cross-border integration: Breaking the singleness of bamboo and creatively combining it with other materials is an effective way to develop new products. The vases created by Su Sheng Home Furnishing by combining bamboo weaving with ceramics are classic cases. The lightness and transparency of bamboo silk and the warmth and thickness of ceramics form a contrast and complementarity in texture, producing an artistic effect of "1+1>2". Bamboo weaving can also be combined with various materials such as metal, glass, concrete, and textiles to create mixed-material products that meet different functional needs and aesthetic tastes. For example, using bamboo weaving as the surface layer and combining it with metal frames to make furniture not only retains the natural beauty of bamboo, but also utilizes the structural strength of metal.

3.2. Reconstruction of Product Functions and Forms: Transformation from Tools to Roles

The core of modern transformation is to make bamboo weaving products serve the life of contemporary people, which means their functions and forms must undergo fundamental reconstruction.

Transformation from agricultural use to living aesthetics: This is the most common functional transformation path. The entrepreneurial journey of Yang Dajuan, an inheritor of the intangible cultural heritage of bamboo weaving in Sansui, Guizhou, is a typical representative. She keenly perceived market changes and shifted bamboo weaving from agricultural tools such as back baskets and winnowing baskets to the development of living aesthetic products and fashion accessories such as bamboo weaving lamps, bamboo weaving paintings, bamboo weaving earrings, brooches, and pendants. These products no longer emphasize their original practical functions, but highlight their decorativeness, artistry, and cultural symbolic significance, meeting the modern consumers' demand for personalized and emotional consumption, and even successfully exported to markets with high appreciation for craft aesthetics such as Japan.

Integration of practicality and artistry: A higher level of transformation is to achieve the perfect unity of practical functions and artistic expression. The "Bean" series chandeliers of Su Sheng Home Furnishing are a model. The designers not only consider the basic function of lighting, but also create a three-dimensional form with a sense of rhythm and transparency through the splicing and combination of bamboo weaving monomers. The light passes through the gaps of the bamboo strips, casting dappled light and shadow, creating a unique spatial atmosphere. Here, bamboo weaving is both a functional component and an art sculpture, realizing the in-depth integration of "use" and "beauty". Another case, the "Empty" series chairs, cleverly utilizes the mechanical properties of bamboo weaving and uses it as the load-bearing seat surface, subverting people's stereotype of bamboo weaving as "fragile" and showing the potential of traditional craftsmanship in modern structural design.

Transformation from static objects to interactive experiences: In the era of experience economy, the product form of bamboo weaving can go beyond physical objects and extend to services and experiences. The "intangible cultural heritage + cross-border" model promoted by Yang Changqin, an inheritor of Chishui bamboo weaving in Guizhou, is an exploration of this path. She not only develops physical products, but also creates bamboo tourism research routes around "eating bamboo, using bamboo, appreciating bamboo, and playing with bamboo", allowing tourists to personally experience the bamboo weaving production process. This "product + experience" model transforms consumers into participants, deepens their understanding and emotional connection with bamboo weaving culture through interaction, and also creates new revenue channels. In addition, combining bamboo weaving with smart hardware, such as developing bamboo weaving products integrated with LED

dimming, Bluetooth speakers, or wireless charging functions, increases the dimension and fun of user interaction with products.

3.3. Translation and Expression of Design Language: Aesthetic Reconstruction of Ancient Rhymes with New Voices

To make bamboo weaving acceptable to modern consumers, especially young people, it is necessary to conduct contemporary translation of its design language, so that it not only retains cultural genes but also conforms to modern aesthetics.

Extraction and modern expression of cultural symbols: In-depth excavation of the regional cultural elements contained in bamboo weaving, and abstracting, simplifying, and reconstructing them into modern design symbols. The brand design scheme of Chongzhou bamboo weaving provides an excellent example. It extracts the iconic images of Chongzhou such as the architectural outline of Jiezi Ancient Town and the natural scenery of Jiguan Mountain, and combines them with the weft and warp interweaving texture of bamboo weaving to design a highly recognizable brand logo. This logo is no longer a concrete bamboo weaving pattern, but a modern graphic integrating regional characteristics and craft features, which is concise and profound. In product design, traditional patterns can also be geometrically and modularly processed and applied to modern furniture or home accessories.

Integration of modern aesthetic principles: Injecting the principles advocated by modernist design such as "simplicity", "rationality", and "systematization" into bamboo weaving design. The works of Su Sheng Home Furnishing generally have pure forms, clear logic, and exquisite details. For example, the common combination of white and wood color in its products is a classic modern color scheme that can naturally integrate into various styles of indoor environments. In the design process, using modular design thinking to decompose complex bamboo weaving structures into standardized units, facilitating large-scale production and flexible combination to adapt to different spatial needs. The integration of this modern aesthetic eliminates the "rustic" or "outdated" feeling that traditional bamboo weaving may bring, making it present an elegance and fashion that transcends the times.

Systematic brand building: The success of a single product is not enough to support the revival of the entire industry; a strong brand must be established. The brand concept of "Western Sichuan Bamboo Charm, Chongzhou Ingenuity" proposed by Chongzhou bamboo weaving accurately conveys its regional cultural attributes and craftsmanship spirit. Based on this concept, a brand color system dominated by turquoise and earthy yellow has been established, and an exclusive font combining the charm of seal script with modern simplicity has been designed. This complete visual identity system elevates traditional craftsmanship to the height of modern brand operation, enhancing the market recognition, trust, and added value of products.

3.4. Integration and Expansion of Multiple Scenarios: Reshaping the Living Space of Craftsmanship

The value of products is ultimately realized in the use scenario. Bamboo weaving craftsmanship needs to break through the original narrow application fields and integrate into broader life and commercial scenarios.

In-depth integration of cultural tourism and experience scenarios: Combining bamboo weaving with cultural tourism, research education, and leisure vacation is an effective way to expand its social influence and economic benefits. The high-quality bamboo tourism routes created by Chishui City attract about 20,000 tourists to experience bamboo weaving culture every year, realizing a win-win situation of "intangible cultural heritage communication" and "tourism consumption". The "scenario-based consumption + cultural tourism integration" model proposed in the research on Chongzhou bamboo weaving suggests laying out a complex business format space integrating bamboo weaving exhibition, manual experience, tea drinking, reading and other functions in the core business district, aiming to attract young customer groups pursuing quality life and unique experiences. In this scenario, bamboo weaving is no longer just a commodity for sale, but a core element for creating an immersive cultural experience.

Value enhancement in high-end customization and art scenarios: Promoting bamboo weaving to the high-end customization market and art field is an important strategy to enhance its cultural status and economic value. Some high-quality products in Qingshen bamboo weaving, such as intricate bamboo weaving paintings and large-scale bamboo weaving art installations, have become objects of collection and customization. The transformation of Langou Village, known as "China's No. 1 Bamboo Weaving Village", has proved that by building a high-end brand image, bamboo weaving can drive the industrial upgrading and rural revitalization of the entire region. Participating in international art exhibitions and cooperating with well-known artists or designers can greatly enhance the artistic reputation of bamboo weaving and endow it with collection value and brand premium.

Broad stage for international exchange and sustainable design scenarios: As an emissary of Chinese culture, bamboo weaving craftsmanship shows unique charm on the international stage. The international training courses of Qingshen bamboo weaving not only spread craftsmanship, but also export China's ecological values and lifestyle. A student from the Philippines plans to use what he has learned to help people and the disabled in his country increase their income, reflecting the potential value of bamboo weaving craftsmanship in promoting global sustainable development and poverty alleviation. Displaying innovative bamboo weaving products at international sustainable design forums and green product expositions can make them enter the vision of global sustainable consumption and connect with a broader international market.

4. Challenges and Countermeasures Facing the Bamboo Weaving Industry from the Perspective of Sustainable Design

Although the modern transformation of bamboo weaving craftsmanship shows vigorous vitality, from the systematic requirements of sustainable design, the entire industry still faces many in-depth challenges. Only by facing up to and solving these problems can we achieve its long-term and healthy sustainable development.

4.1. Technical Bottlenecks and Breakthrough Paths

The primary challenge facing the bamboo weaving industry is technical bottlenecks. Although bamboo has many advantages, its complex internal structure makes processing difficult and production costs high. In addition, most bamboo resource directional cultivation models aim at improving productivity, lacking a directional cultivation system closely combined with the processing needs of bamboo products, which cannot meet the demand for special raw materials for diversified "bamboo replacing plastic" products.

To address these technical bottlenecks, breakthroughs can be sought in the following aspects: First, strengthen the research on directional bamboo cultivation and cultivate bamboo with specific properties according to the needs of different final products. Researchers from the International Bamboo and Rattan Center have proposed that future directional bamboo forest cultivation needs to further strengthen the selection of special bamboo species, accurately locate business objectives, promote technological innovation, and build an intelligent and dynamic cultivation system. Second, develop low-cost and efficient processing technologies, such as the intelligent production equipment adopted by enterprises in Rong'an County, which improves processing precision and efficiency through CNC laser engraving machines and CNC woodworking engraving machines. Third, establish a full life cycle database of bamboo to provide a scientific basis for the environmental impact assessment of bamboo products and promote the application of bamboo in emerging fields such as carbon trading and environmental product declarations.

In terms of material research and development, the development of Ruichang bamboo weaving shows that when facing product transformation problems, innovative design is needed to meet the aesthetic and functional needs of contemporary people. Exploring the innovative paths of Ruichang intangible cultural heritage bamboo weaving technology under the concept of sustainable design can provide new ideas for solving technical bottlenecks. Bamboo weaving craftsmanship needs to actively explore the integration with new materials and technologies on the basis of retaining the essence of traditional craftsmanship, and expand its application fields and performance.

4.2. Market Acceptance and Brand Building

Market acceptance is another major challenge facing the modern transformation of bamboo weaving. At present, the price of disposable bamboo products is usually two to three times that of traditional plastic alternatives, making them less competitive in

price-sensitive markets. In addition, traditional crafts such as Chongzhou bamboo weaving also face problems such as "weak brand influence, insufficient product innovation, and pending improvement in market competitiveness".

Strategies to improve market acceptance should include: First, strengthen brand narrative and cultural value, and increase product premium through brand building. The brand building research of Chongzhou bamboo weaving proposed the brand concept of "Western Sichuan Bamboo Charm, Chongzhou Ingenuity", establishing a differentiated brand image by exploring regional cultural characteristics. Second, develop differentiated product lines and design products of different prices and styles for different customer groups. The development strategy of Yang Dujuan in Sansui, Guizhou is worth learning from - she not only retains traditional bamboo weaving craftsmanship, but also develops small cultural and creative products suitable for modern aesthetics, such as bamboo weaving brooches and earrings. Third, use digital marketing and experience economy to expand market influence. Studies have shown that a "new media marketing + digital display" collaborative system can be built, relying on social platforms such as WeChat and Douyin to create a content ecosystem, and activating user participation through craft documentaries, live streaming with goods, etc.

In terms of market expansion, Yang Changqin, an inheritor of Chishui bamboo weaving, shared the experience of "intangible cultural heritage + industry" and established a development model of "Party branch + company + cooperative + farmer household" to promote the large-scale development of the bamboo weaving industry. This model not only drives 108 fixed jobs and more than 200 flexible jobs in the local area, but also realizes the year-end dividends of villagers in the ethnic village. Through industrialized development, bamboo weaving products can more effectively enter the market and improve market acceptance and share.

4.3. Craft Inheritance and Talent Training

The sustainable development of bamboo weaving craftsmanship is inseparable from talent support, but it is currently facing the dilemma of "low participation of young people and an increasingly serious inheritance gap". Traditional bamboo weaving craftsmanship is complex, with a long learning cycle, and limited economic returns, making it difficult to attract the younger generation.

Solving the talent problem requires multiple approaches: First, build a diversified inheritance system, combining traditional master-apprentice inheritance with modern education. Qingshen bamboo weaving attracts domestic and foreign students to learn bamboo weaving craftsmanship through forms such as international training courses. In 2024 alone, the Qingshen bamboo weaving training base has organized 5 international training courses, training 163 foreign students. Second, focus on cross-border talent training, not only teaching traditional craftsmanship, but also cultivating modern design, marketing, and management capabilities. The research on

Chongzhou bamboo weaving proposes to "improve the inheritance talent training system and strengthen the cultivation of innovative thinking and market operation capabilities". Third, create a good career development environment and improve the economic income and social status of bamboo weaving practitioners. Yang Changqin's practice in Chishui City has shown that through industrialized development, bamboo weaving craftsmen can embark on the road to prosperity, thereby enhancing the attractiveness of the profession.

In terms of education and training, the approach of Xinyi City is worth learning from. They not only regularly organize masters to give on-site lectures and teach skills, cultivating many skilled craftsmen, but also discover bamboo weaving talents and encourage bamboo weaving innovation through holding bamboo weaving competitions. The participants in the bamboo weaving competition include not only experienced bamboo weaving craftsmen, skilled women, but also young bamboo weaving art lovers, and even school students who have mastered a craft by helping their families weave. This multi-level participation provides talent guarantee for the sustainable development of the bamboo weaving industry.

5. Conclusion

From the perspective of sustainable design, the modern product transformation of traditional bamboo weaving craftsmanship is a systematic project involving innovation and collaboration in materials, technology, functions, design, and market. By analyzing the transformation paths of bamboo weaving craftsmanship in modern products, this study draws the following conclusions:

First, traditional bamboo weaving craftsmanship is highly compatible with the concept of sustainable design. The rapid renewability, low carbon footprint, and biodegradability of bamboo make it an ideal substitute for traditional materials such as plastic and metal. The promotion of the "bamboo replacing plastic" initiative further highlights the environmental value of bamboo. The "bamboo replacing plastic" case of Qingshen bamboo weaving was successfully selected as a case of "Intangible Cultural Heritage for Sustainable Development" in the Asia-Pacific region in 2024. This environmental advantage lays a solid foundation for the application of bamboo weaving in sustainable design.

Second, the modern transformation of bamboo weaving craftsmanship needs to follow multi-dimensional paths. In terms of materials and technology, improve bamboo performance and processing efficiency through 3D remodeling and material compounding; in terms of product functions, realize the transformation from agricultural use to living aesthetics and expand application scenarios; in terms of design language, create product forms that meet contemporary aesthetics through the extraction of cultural symbols and the integration of modern aesthetics; in terms of scenario integration, integrate bamboo weaving into multiple scenarios such as home furnishing, cultural tourism, and high-end customization to expand market space. These paths

support each other and jointly promote the modern transformation of bamboo weaving craftsmanship.

Finally, the sustainable development of the bamboo weaving industry needs to address challenges in technology, market, and talent. Reduce production costs through directional bamboo cultivation and processing technology innovation; improve market acceptance through brand building and differentiated products; solve the problem of lack of successors through a diversified inheritance system and cross-border talent training. Only by systematically solving these problems can bamboo weaving craftsmanship truly achieve sustainable development.

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