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Investigation and Research on the Innovation Mechanism of Bai Ethnic Tie-dye Patterns under the Background of Cultural and Tourism Integration

Yuhan Feng

Yunnan University, Kunming, China
3232874060@qq.com

Abstract. As one of the first batch of intangible cultural heritages in China, Bai ethnic tie-dye craft takes its patterns as the core cultural carrier and aesthetic expression. Against the current background where digital technology has deeply penetrated the design field, Bai ethnic tie-dye patterns present a brand-new look significantly different from the traditional paradigm in themes, styles and generation methods. Based on the analysis of national policies for the coordinated development of culture and tourism, this paper sorts out the innovation driving forces and innovation paths in the innovation mechanism of Bai ethnic tie-dye, and concludes that the innovation achievements of Bai ethnic tie-dye mainly stem from the interweaving of multiple driving forces such as policy drive, market drive, endogenous creativity of inheritors and cross-industry linkage. This paper sorts out the presentation of creative tie-dye patterns under different innovation driving forces, and intuitively presents the dynamic development context of intangible cultural heritage brought by the innovation mechanism through classification.

Keywords: Bai ethnic tie-dye, tie-dye patterns, innovation, inheritance

1. Introduction

During my undergraduate years, I participated in a Bai ethnic tie-dye experience activity and developed a deep interest in the blue-and-white tie-dye works. Meanwhile, in communication with Professor Jin Shaoping from Yunnan University, I found that there are definite innovative practices in Bai ethnic tie-dye. As a concrete representation of cultural practice, patterns provide a clear and identifiable entry point for observing and analyzing the innovation dynamics of Dali Bai ethnic tie-dye.

Tie-dye was called "jiaoxie" in ancient times. As early as more than a thousand years ago, the ancestors of the Bai ethnic group mastered the dyeing technology. Most raw materials used for Dali Bai ethnic tie-dye are cotton-linen blended white cloth or pure white cloth, and the dye is indigo solution extracted from natural plants such as argy wormwood, isatis root and polygonum tinctorium growing on Cangshan Mountain [1]. As the ultimate visual presentation and material carrier of this handicraft, Bai ethnic tie-dye patterns deeply embody the collective aesthetic consciousness and cultural logic of the Bai ethnic group. Figuratively speaking, tie-dye is a "talisman" that runs

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through the whole life of Bai people. When a child is born, the grandmother will give a tie-dye shawl as a blessing for protection; at a wedding, the newlyweds and their relatives and friends tie a bed sheet with the pattern of "kylin delivering a son" together; at the end of life, children will prepare pure tie-dye shrouds for their parents [2]. Therefore, taking patterns as the research object can most intuitively capture and trace the innovation dynamics and evolution trajectory within the craft system.

Domestic academic research on Bai ethnic tie-dye patterns can be roughly divided into three modules: the first is the typological study of patterns, most research results were produced in the late 20th century; the second is the analysis and interpretation of the cultural connotation of patterns, which takes traditional patterns as the main research object, and explores the cosmology and life interest of Bai ancestors through analyzing cultural connotations. Since it involves anthropology, ethnology, sociology and other professional fields, it has become the research focus of many scholars and is the most abundant module in the literature database; the last is the application of tie-dye patterns in modern design such as cultural and creative products. Such research is mostly conducted by design scholars, focusing on the innovative application of patterns.

2. Overview of Bai ethnic tie-dye patterns

Bai ethnic tie-dye patterns embody the wisdom of the Bai people and reflect their ideological concepts. It can be called a historical "cloth" recording Bai thoughts. A piece of white cloth, a dose of blue natural dye, coupled with countless hemp ropes, endows this white "cloth" with historical heritage through the combination of tying and dyeing. Patterns have become an important research focus, through which we can perceive the living environment, historical evolution and local customs of the Bai people.

2.1. Categories and symbolic meanings of patterns

According to their symbolic differences, Bai ethnic tie-dye patterns can be roughly divided into four categories: natural patterns, religious patterns, auspicious patterns and geometric patterns.

The natural patterns of Bai ethnic tie-dye are mainly imitations of animals and plants. The craft of natural patterns is complex, and it takes long-term craft accumulation to complete a fairly good animal pattern. Plant patterns are simpler than animal patterns, but usually plant patterns and animal patterns appear in combination more often. The Bai people love the land that nurtures them, so they often depict the unique mountains and rivers of Dali on cloth, such as patterns of the 19 peaks of Cangshan Mountain, the bright moon over Erhai Lake, and the "Wind, Flower, Snow and Moon" scenic spots, which directly reflect the unique regional features of Dali. They are usually matched with plant patterns. Common plant patterns fall into categories of flowers, leaves and fruits, among which chrysanthemum, willow leaf, peach, grape and other patterns are the most common [3]. Animal patterns include butterflies, birds, fish, bees, deer, cranes, etc., which bring spiritual comfort by symbolizing freedom, joy, harvest and longevity.

Religious totem patterns are a concentrated reflection of the local beliefs of the Bai ethnic group, including the integration of multiple beliefs such as Buddhism and Taoism. They are usually patterns of lotus, precious decorative flower, Dharma wheel and so on. There are also remains of animal totems in Bai ethnic tie-dye, such as fish patterns and butterfly patterns, which are mostly related to ancient reproductive worship and ancestral memory.

Auspicious patterns usually adopt homophony, symbolism and combination methods to embed people's expectations for a happy life into the patterns. For example, the pattern of a magpie

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perching on a plum branch implies "beaming with joy"; the pattern of deer, cranes and pine trees implies "longevity and auspiciousness"; the pattern of lotus and carp implies "surplus year after year". These classic combinations are full of blessings and good wishes.

Although geometric abstract patterns are "abstract", they are all extracted from natural shapes and still bear traces of ancient textile craftsmanship. Common forms include circles, diamonds, zigzags, spiral patterns and continuous meander patterns. Their structure is very regular, presenting a rhythmic sense of order and neat beauty. Geometric patterns are the easiest type for beginners to master, which can be completed through simple tying and dyeing.

The Bai ethnic tie-dye patterns passed down by older generations have developed into a mature, stable and meaningful pattern system, which contains the Bai people's ideas of conforming to nature and praying for good luck. These ideas have become the endogenous driving force for pattern innovation later. Clarifying the categories of these traditional patterns also provides standards and basis for measuring and evaluating modern innovative designs.

2.2. Embodiment of pattern innovation

Dali Bai ethnic tie-dye embraces all elements on the road of innovation, showing multiple dimensions of innovative forms. When transforming from old styles to new designs, many new patterns have emerged. The themes have broken the previous framework that only focused on nature and ethnic beliefs, and incorporated modern life details and popular cultural symbols. Even patterns with modern storytelling like *The Little Prince* have appeared, making the content of patterns more diverse.

In terms of color application, the innovation is manifested in the development from the traditional single blue and white color scheme to multiple colors. By developing natural dyes such as gardenia fruit, saffron and sappan wood, inheritors have transformed tie-dye from the old style with only blue to a colorful form. Tie-dye is no longer limited to blue, and colors coordinate with each other to form richer artistic effects. This colorful tie-dye breaks through the tone limitation of traditional monochrome tie-dye, emphasizes the coordination and unity of multiple colors, and creates different dyeing shades through the differences in width, narrowness, tightness, looseness, sparseness and density during tying and sewing, thus forming artistic effects of different patterns (as shown in Figure 1).

Figure 1. Colorful tie-dye patterns (image source: Dali prefecture media convergence center)

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At the technical level, the innovation is mainly reflected in the emergence of new techniques such as the "Fanpu imitation tie-dye" process. On the basis of the original tie-dye craft, this process omits the bundling procedure, and the color halo layers of patterns are richer, presenting a complex, blended, gorgeous and thick color effect. It combines the styles of tie-dye and splash painting, and can produce a hazy flowing style and the beauty of returning to nature.

The composition of patterns has also undergone innovative evolution, developing from the regular geometric patterns of traditional Bai style to a more free and abstract form. While maintaining traditional aesthetic characteristics, modern tie-dye patterns integrate modern design concepts, with more flexible and changeable composition. They not only retain the symmetrical beauty and sense of balance of traditional patterns, but also show the agility and expressive force of modern art (as shown in Figure 2).

Figure 2. Regular geometric tie-dye patterns (image source: Dali prefecture media convergence center)

The expansion of product application fields is another innovation dimension that needs attention. Tie-dye is no longer limited to traditional costumes and cloth products, but has expanded to clothing, home furnishing, cultural and creative products and other fields (as shown in Figure 3). More than 2,000 categories such as tie-dye ornaments, eco-friendly book covers and fashionable clothing have been developed, which fundamentally meet the diversified needs of modern consumer groups. This application innovation enables tie-dye craft to better integrate into modern life and realize the living inheritance of traditional crafts.

Figure 3. Tie-dye patterns on curtains (image source: Dali prefecture media convergence center)

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These innovative practices not only enrich the artistic expression forms of Bai ethnic tie-dye, but also are the concrete manifestation of its new vitality in contemporary society, becoming a cultural bridge connecting tradition and modernity.

3. Analysis of multiple driving forces for the innovation of Bai ethnic tie-dye

The innovation of Bai ethnic tie-dye is not the result of a single force, but a complex system composed of external environmental stimulation and internal subjective initiative. It can be roughly divided into four different driving forces, which promote the innovation of Bai ethnic tie-dye. Patterns are the most intuitive presentation and an important window for us to explore the innovation mechanism. Therefore, this paper focuses on the tie-dye pattern achievements under multiple innovation driving forces. This part will systematically analyze its four core driving forces.

3.1. Policy drive

Since the 19th National Congress of the Communist Party of China, General Secretary Xi Jinping has made important instructions on promoting the integrated development of culture and tourism for many times. The Third Plenary Session of the 19th Central Committee of the Communist Party of China arranged the establishment of the Ministry of Culture and Tourism to make overall plans for the development of cultural undertakings, cultural industries and tourism. The 20th National Congress of the Communist Party of China made arrangements to promote the in-depth integrated development of culture and tourism. The Third Plenary Session of the 20th Central Committee of the Communist Party of China proposed to improve the institutional mechanism for the in-depth integrated development of culture and tourism. The development strategy of "cultural and tourism integration" has been mentioned in many meetings, making policy orientation the primary innovation driving force. On September 10 this year, the 17th Session of the Standing Committee of the 14th National People's Congress was held. The meeting reported the work of "promoting the in-depth integrated development of culture and tourism", and sorted out the deficiencies and improvement measures, which constructed an institutional environment and guided the development direction for tie-dye pattern innovation.

The policy-led innovation drive mainly plays two roles. The first is to build platforms and share resources. The Publicity Department of Dali Prefecture Party Committee, Yunnan Provincial Department of Culture and Tourism and other government organs have organized tie-dye experience activities in primary schools, and posted related tweets on online platforms to expand the influence of tie-dye intangible cultural heritage. At the same time, they subsidize representative inheritors and hold design competitions such as "Creative Dali", which directly provide physical space, financial support and exhibition opportunities for pattern innovation. Dali Intangible Cultural Heritage Protection Center has organized research and training courses for inheritors, invited designers to communicate with craftsmen, and encouraged inheritors to access modern aesthetic concepts and integrate them into the re-creation of traditional patterns. This government-led cross-border communication effectively lowers the innovation threshold and stimulates creative inspiration.

3.2. Market drive

Market drive is the most direct external pulling force for the innovation of Bai ethnic tie-dye. With the rapid development of Dali's tourism industry, Zhoucheng Village, known as the "hometown of Bai ethnic tie-dye art", receives more than 200,000 tourists every year, and the market demand has

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undergone fundamental changes. Tourists are no longer satisfied with traditional tablecloth fabrics, but pursue light, fashionable and well-designed souvenirs and daily necessities. As a tourism product, tie-dye has been developed with expanded product categories including fabrics, bed sheets, tablecloths, scarves, pillow towels, handkerchiefs, door curtains, curtains, sofa towels, satchels, cushions, cup mats, clothing, shoes, etc. Pattern designs are also constantly innovating, from only 4 ancestral patterns preserved to nearly 1,000 patterns, including traditional patterns, modern themes, and patterns of foreign cultures such as Japan [4]. The Puzhen Bai Ethnic Tie-dye Museum has expanded from the original three or four hundred products to more than 2,000 categories such as clothing and daily necessities, and more than 80% of the products are sold to more than 10 countries and regions such as Japan, Britain and the United States. The market selects more popular pattern styles through consumer choices. The modern aesthetics pursued by the younger generation of consumers, such as individuation, minimalist style and Ins style, have derived more abstract, geometric and white-space-rich modern patterns from traditional complex tie-dye patterns. This market drive ensures the effective transformation of innovation achievements, enables the cultural value of tie-dye to be realized through economic value, and feeds back the sustainable development of the entire industry.

3.3. Endogenous motivation of inheritors

Duan Yinkai, a national-level inheritor, and Duan Shukun, a provincial-level inheritor, have innovated more than 100 stitching methods on the basis of more than 30 traditional stitching methods, and developed natural dyes to free tie-dye from the limitation of single blue color. This kind of innovation is not a passive response, but originates from profound cultural accumulation and active artistic pursuit, which is a form of cultural consciousness. Many new-generation inheritors have received more education and even artistic training. They are no longer satisfied with mechanically copying traditional patterns, but hope to express personal artistic concepts and contemporary interpretations of tradition. Duan Yuan, the son of Duan Shukun, spent more than a year completing *The Painting of the Barbarian King Worshiping Buddha* (as shown in Figure 4), and the work *Mountains* created with imitation dragon flower stitching method are all natural development based on a deep grasp of traditional essence. This endogenous drive ensures that innovation does not deviate from its origin, and maintains the authenticity and cultural depth of tie-dye craft.

Figure 4. *The Painting of the Barbarian King Worshiping Buddha* (image source: Dali culture and tourism)

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3.4. Cross-border integration drive

The participation of teachers and students from university design majors and independent designers has brought modern design theories, methodologies and global perspectives. They have established two-way cooperation models with universities such as the Academy of Arts & Design of Tsinghua University and Yunnan Arts University, and integrated modern design concepts into traditional tie-dye through curriculum development, workshop practice and other methods. Chen Shengtao, a London haute couture designer, cooperated with Zhang Hanmin, a Bai ethnic tie-dye inheritor, to develop a Yunnan plant color card: warm brown dyed with walnut peel, light yellow dyed with eucalyptus leaves, and azure dyed with bayberry, making more than 50 natural colors glow with vitality in modern design. Artist Lin Fanglu created the tie-dye art work *She*, which integrates multi-modal art forms such as tie-dye, painting, sculpture and soft sculpture. In *She's*, she abandoned the dyeing process and only retained the pure natural color of white cloth, so as to pursue a kind of tension formed by shrinkage (as shown in Figure 5) [5]. This kind of cross-border integration breaks the inherent boundaries of the craft industry, and gives birth to revolutionary innovation achievements through collision and integration. It constantly challenges and redefines the boundaries of tie-dye, and opens up a brand-new, high-value possibility space for it.

Figure 5. *She* series works (image source: Art+ Shanghai Gallery)

4. Patterns under different innovation-driven paths

4.1. Policy path

Driven by policies, Bai ethnic tie-dye patterns present distinct cultural identity characteristics. This path is mainly promoted by government forces such as national intangible cultural heritage protection policies and cultural revitalization projects. Pattern innovation presents typical features of "strengthened traditional symbols, complete cultural narrative and prominent artistic value" [6]. In terms of color application, it strictly follows the traditional binary color logic of "white background with blue flowers" or "blue background with white flowers". The indigo blue dyed with isatis root is regarded as the purest blue of Dali Bai ethnic group. This color choice is not only the embodiment of craft inheritance, but also the adherence to cultural authenticity. The composition layout pursues symmetry, balance and fullness, and emphasizes that every pattern carries meaning and every meaning conveys auspiciousness. Whether it is a centrally symmetrical cluster flower or a square

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continuous border decoration, it reflects the aesthetic concept of harmony and perfection. Patterns under this path are mostly used in cultural exhibitions, museum collections, important gifts and other scenarios. For example, works such as traditional patterns of the Ming and Qing Dynasties and fragments of Tang Dynasty jiaoxie collected by the Puzhen Bai Ethnic Tie-dye Museum are not only a faithful restoration of traditional crafts, but also a visual expression of cultural self-confidence.

4.2. Market path

Tie-dye patterns driven by the market present commercialized characteristics, which are mainly promoted by market forces such as tourism consumption, fashion trends and public aesthetics. Pattern innovation shows a typical feature of diversified themes. Pattern themes have expanded from traditional nature and ethnic beliefs to modern life elements and popular cultural symbols, and even modern theme patterns such as *The Little Prince* have appeared, showing a diversified trend of theme selection. In terms of color application, it breaks through the limitation of traditional blue and white colors, making tie-dye present colorful effects such as red, yellow, green, emerald green and jade green, and emphasizing the coordination and unity of multiple colors. The composition layout is more flexible and changeable, which not only retains the symmetrical beauty and sense of balance of traditional patterns, but also adds the agility and expressive force of modern art. Patterns under this path are mostly used in consumption scenarios such as clothing, household products and cultural and creative products. For example, among the more than 2,000 product categories developed by Puzhen Tie-dye, from traditional tablecloth fabrics to clothing and daily necessities, more than 80% of the products are sold to more than 10 countries and regions such as Japan, Britain and the United States, realizing the successful transformation from cultural identity to market commodities (as shown in Figure 6).

Figure 6. Commercialized tie-dye (image source: Visual China official website)

4.3. Inheritor path

This path is mainly promoted by internal forces such as inheritors' cultural consciousness, artistic pursuit and technical innovation. Duan Yinkai, a national-level inheritor, has innovated more than 100 stitching methods on the basis of more than 30 traditional stitching methods. Her flower tying skill is praised as "tying flowers is as exquisite as embroidering", and the tightness of each stitch

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affects the integrity of the final pattern. Duan Shukun, a provincial-level inheritor, focuses on the dyeing process. "We Bai people can't live without tie-dye all our lives. It is like the blue sky and white clouds shuttling between Cangshan Mountain and Erhai Lake," said Duan Shukun, a representative inheritor of provincial-level intangible cultural heritage. Bai ethnic tie-dye inheritors always integrate their hometown memories with tie-dye craft. Behind their superb skills are their affection for their own nation and love for their hometown. Patterns under this path are mostly used for artistic creation, cultural inheritance, craft display and so on. The works often have high artistic value and collection value, reflecting the inheritors' in-depth exploration of the craft itself and their cultural consciousness.

Figure 7. Tie-dye by inheritor Duan Yinkai (image source: Dali Culture and Tourism)

4.4. Cross-border integration path

Tie-dye patterns driven by cross-border integration have distinct innovative breakthroughs, which is a highly noticeable breakthrough path for tie-dye patterns. Driven by external forces such as designers, artists, universities and brands, pattern innovation presents a typical feature of diversified forms. In terms of pattern design, cross-border cooperation breaks the inherent boundaries of traditional tie-dye, and combines traditional Bai ethnic tie-dye patterns with commercial brands. Under this path, Bai ethnic tie-dye goes to the international stage with the influence of brands, and brands also gain more attention with tie-dye elements, achieving a win-win situation. Patterns under this path are mostly used in art exhibitions, fashion design, cultural innovation and other scenarios. The works often have high innovation and international influence, reflecting the living inheritance and creative transformation of tie-dye craft in contemporary society. It is worth noting that the influence of cross-border integration is incomparable to that of the market path, but the cross-border integration path alone cannot achieve wide dissemination. Only with the joint action of the four paths can tie-dye maintain its "living" inheritance.

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Figure 8. Tie-dye packaging design (image source: *Packaging & Design*)

5. Conclusion

While the innovative practice of Bai ethnic tie-dye has achieved remarkable results, it also faces many challenges and problems that need reflection. The first is the difficulty in balancing cultural authenticity and commercialization. Although product innovation driven by the market has expanded application fields and presented a good market trend, it also faces risks of excessive commercialization and homogeneous competition. Tie-dye is originally part of intangible cultural heritage and should be regarded as a cultural artwork. However, due to the declining number of excellent tie-dye inheritors, there is an urgent need for tie-dye to step out of its comfort zone and enter the public vision. But this has led some products to simplify the craft and weaken the cultural connotation in order to cater to the market, resulting in the hollowing out of tie-dye craft.

The second is the problem of inheritor fault. The skill levels of tie-dye inheritors are uneven, and high-quality inheritors are very rare. Although the younger generation of inheritors have received more education, very few of them are truly willing to devote themselves to studying the craft and sticking to tradition. The craft inheritance is facing the crisis of generational gap.

Finally, there is the dilemma of intellectual property protection. As a traditional craft, the ownership of intellectual property rights of tie-dye and its patterns is relatively vague, and plagiarism and imitation are rampant. Many innovative achievements developed by inheritors day and night are difficult to be effectively protected, which greatly dampens the enthusiasm of innovation subjects and is very unfavorable to the traditional inheritance and development of patterns.

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