

Digital Translation of Visual Genes in Traditional Murals: Cultural Inheritance and Innovation in JD.com Brand IP Design

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Abstract: Against the backdrop of policies promoting the integration of the digital economy with traditional culture, this study explores the digital translation pathways of traditional mural visual genes through the practical case of JD.com brand IP design. By constructing a design model of "Cultural Analysis - Digital Translation - Scenario Application" and integrating digital design and artificial intelligence-driven technologies, this research achieves the modern reconstruction of traditional artistic elements. The findings indicate that digital translation not only effectively revitalizes the contemporary value of cultural heritage but also provides a new paradigm of cultural empowerment for corporate brand development, offering a reference pathway for the implementation of the "Two Innovations" policy in the commercial sector.

Keywords: Cultural Digitalization; Visual Genes; IP Design; Intangible Cultural Heritage; JD.com Case Study.

1. Research Background and Significance

At the policy level, the national guideline *Opinions on Promoting the Implementation of the Cultural Digitalization Strategy* explicitly proposes the goal of building cultural digitalization infrastructure. The 2023 Central Economic Work Conference further emphasizes the development direction of "new forms of digital culture," providing top-level design guidance for the digitalization of traditional arts. In industry practice, 27 government departments, including the Ministry of Commerce, have jointly promoted the application of digital technologies in cultural product development. JD.com Retail data shows that in 2022, sales of cultural and creative products increased by 85% year-on-year, and digital collectible transactions exceeded three million, underscoring the urgent market demand for digitalized cultural products. However, traditional mural art faces severe transmission challenges: according to a Dunhuang Academy report, 50% of the existing murals in the Mogao Caves have exhibited deterioration such as fading and flaking, with the fragility of physical carriers accelerating the loss of cultural heritage. Traditional dissemination methods also struggle to meet modern aesthetic demands. A survey by Tsinghua University's Cultural and Creative Development Institute reveals that 72% of designers lack the capability to modernize traditional patterns, highlighting a disconnect in the innovation transformation chain [1].

In this context, this study presents threefold innovative value: (1) In response to the *14th Five-Year Plan for Cultural Development*, which emphasizes cultural heritage revitalization, this research constructs a "Analysis-Translation-Application" technological pathway, offering a methodological breakthrough to address the preservation, weak dissemination, and sluggish transformation challenges of mural art. (2) By validating JD.com's IP design practice, this study demonstrates the feasibility of commercial brands as cultural carriers, integrating corporate technological innovation with traditional cultural resources to form a closed-loop model of "Technological Decoding - Design

Translation - Market Validation," contributing empirical evidence for the "Two Innovations" policy in the commercial sector. (3) At the theoretical level, this research breaks through the conventional limitation of intangible cultural heritage studies that focus solely on protection rather than transformation. It proposes a quantitative index system for digital translation of visual genes, making it possible to extend mural art from museum settings to consumer markets, thereby offering an interdisciplinary research paradigm for the value reconstruction of cultural heritage in the digital economy era [2].

2. Aesthetic Analysis of Dunhuang Mural Elements

As a "visual epic" of civilizational exchange along the Silk Road, Dunhuang murals have withstood millennia of erosion while retaining their timeless aesthetic brilliance. Their artistic language not only serves as a medium for the eastward transmission of Buddhism but also embodies a fusion of multiple artistic traditions, including meticulous Chinese brushwork, Western shading techniques, and Greek sculptural influences. In today's digital era, redefining the aesthetic genes of these murals provides prototype inspiration for artistic innovation in the age of artificial intelligence. From the religious narrative of line work to the symbolic system of colors, from the cosmological expressions in composition to the philosophical metaphors in patterns, these aesthetic characteristics constitute a complete visual grammar, marking new spatial-temporal coordinates for the modernization of traditional cultural resources.

2.1. Religious Narrative in Line Rhythm

The "floating ribbon" line-drawing technique in murals, employing methods such as "orchid-leaf strokes" and "iron-wire strokes," elegantly outlines the ethereal motion of celestial beings. The S-shaped curve of a Bodhisattva's fingertips and the serrated halo flames establish rhythmic contrast, conveying both Buddhist solemnity and the fluid aesthetics of the Silk Road. From the rough simplicity of the Northern Liang period to the refined elegance of the Northern

Wei and Western Wei dynasties, and eventually to the dynamic grace of the Tang Dynasty, each era's line style serves distinct religious narrative needs. The fluidity, thickness variation, and rhythmic pattern of the lines shape the religious world depicted in murals, immersing viewers in an atmosphere of sanctity and transcendence. These techniques not only influenced the evolution of Chinese traditional mural art but also provide valuable references for contemporary digital visual design.

2.2. Symbolic Metaphors in Color Systems

The primary color system of ultramarine derived from lapis lazuli, vermilion extracted from cinnabar, and gold leaf forging "Buddha's gold" conveys distinct religious meanings: blue symbolizes Buddha's wisdom, red signifies the cycle of life and death, and gold represents the Pure Land of Bliss. In Cave 257's *Jataka of the Deer King*, the transition between warm and cool tones creates spatial depth, generating an illusion of time-space traversal in a two-dimensional mural, embodying the Buddhist concepts of "emptiness" and "impermanence." Due to the dim lighting within caves, mural artists skillfully employed color contrast and harmony to enhance the sacredness of Buddhist figures. By utilizing limited color palettes with shadowing techniques, they created dreamlike spatial effects, reinforcing Buddhist life

philosophy through visual metaphors. This intricate color construction endows murals with a striking visual impact, embedding profound religious thought within every detail, enabling viewers to experience the depth of Buddhist doctrine through visual engagement.

2.3. Cosmological Expressions in Composition Structure

Employing a zigzag panoramic composition and a central stupa-tower structure, murals such as Cave 61's *Mount Wutai Illustration* incorporate over seventy geographical landscapes into a unified visual plane. By utilizing dispersed perspective, the murals convey an expansive Buddhist spatial narrative. The rhombic grids and coffered ceilings reflect the Mandala cosmological order, embodying the Buddhist philosophy of "Mount Sumeru within a mustard seed." This compositional method not only illustrates the boundless nature of the Buddhist universe but also establishes a dynamic balance between macro and micro, heaven and earth. Moreover, Dunhuang murals seamlessly integrate symmetry and asymmetry, with reserved margins and inscribed titles guiding the viewer's gaze while symbolizing the generative process from the tangible to the intangible [3].

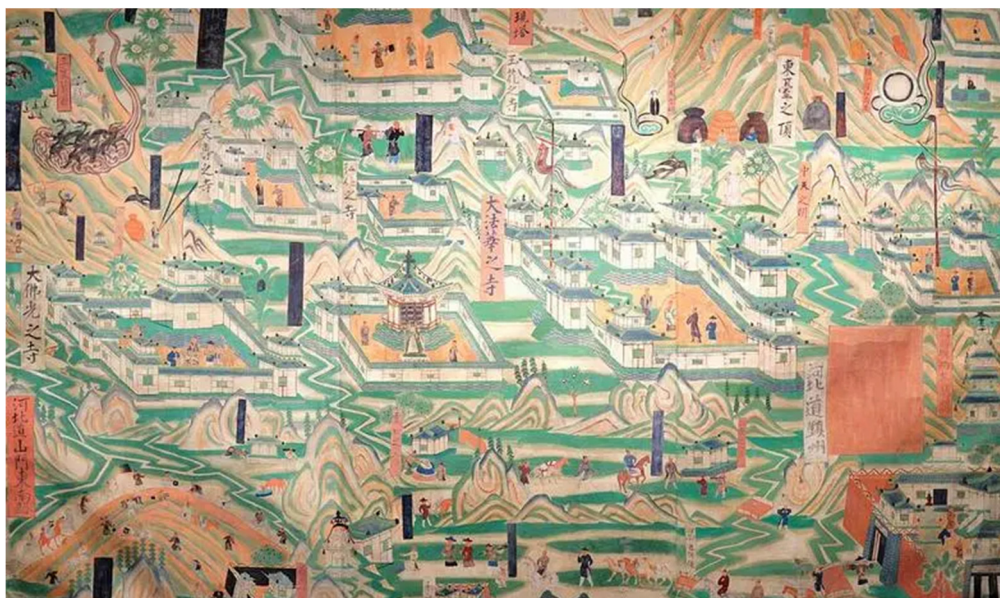


Figure 1. Mogao Cave 61 - Partial View of the Mount Wutai Map

2.4. The Symbolic Semantics of Pattern Systems

The honeysuckle pattern, scroll pattern, and pearl pattern collectively form a trio of botanical motifs. Among them, the three-rabbit shared-ear pattern on the caisson of Mogao Cave 407 constructs a perpetual motion loop through the cyclic pursuit of rabbit ears, metaphorically conveying the Buddhist concept of "three-life reincarnation." The combination of flame patterns and lotus motifs establishes a visual rhetoric that transitions from earthly suffering to nirvanic rebirth. These patterns encapsulate not only historical narratives and philosophical thoughts but also serve as crucial carriers of cultural identity and social memory. Translating the connotations of these patterns and symbols into creative elements can enhance the cultural depth and emotional resonance of design works, exerting a profound impact on

contemporary visual arts, industrial design, and related fields. In the context of digital technology, transforming the dynamic lines of murals into vector paths, deconstructing mineral color spectrums into digital palettes, and adapting geometric compositions to screen-based interactions have become new propositions for the integration of culture and technology.

3. Analysis of the Necessity of Applying Dunhuang Mural Elements in JD's IP Design

In the digital consumption era, brand IP design is not merely the presentation of visual symbols but also the deep integration of cultural values and commercial logic. As a treasure of Chinese traditional culture, Dunhuang murals, featuring diverse imagery such as flying apsaras, donor figures, and Vajra warriors, provide a rich cultural resource

for JD's IP design. Compared to the youth-oriented IP designs prevalent in the market, the incorporation of Dunhuang elements can endow JD with distinctive brand value. This integration enhances the brand's cultural connotation, deepens consumer experience, and fosters sustainable business development, from unique storytelling to profound emotional resonance and ethical commercial sustainability.



Figure 2. Three Hares Lotus Caisson on the Ceiling of Mogao Cave 407

3.1. The Digital Translation of Cultural Genes: Constructing a Differentiated Brand Narrative

The current e-commerce platform IP designs primarily emphasize youthfulness and cartoon aesthetics, such as Taobao's "Tao Doll" and Vipshop's "Vip Rabbit." "Tao Doll" attracts young users with its cute aesthetic, focusing on entertainment but lacking cultural depth; "Vip Rabbit" emphasizes fashion trends but lacks historical heritage. In contrast, JD's "Joy," by integrating Dunhuang mural elements, demonstrates the potential to construct a differentiated brand narrative. As a treasure of Chinese culture, Dunhuang murals imbue "Joy" with cultural genes, establishing a foundation for its unique positioning.

The design of "Joy" extracts clothing patterns and color schemes from Dunhuang murals, surpassing mere cartoon imagery to endow it with cultural significance. Unlike the shallow IP designs of Taobao and Vipshop, "Joy" prioritizes cultural storytelling. For example, during the "618" shopping festival, "Joy" can incorporate storylines from Dunhuang murals to narrate a "fusion of ancient and modern" cultural tale. This digital translation of cultural genes constructs JD's distinct "cultural e-commerce" brand identity, forming a stark contrast with other e-commerce platforms and reinforcing JD's brand image through a cultural heritage perspective[4].

3.2. The Temporal Overlap of Emotional Resonance: Creating an Immersive Consumer Ritual

Against the backdrop of consumption upgrading, consumer demand has shifted from functional satisfaction to emotional experience and cultural identity. As a cultural heritage spanning millennia, Dunhuang murals offer abundant artistic charm for fostering brand emotional resonance. JD leverages this cultural resource through digital techniques such as vectorization, color digitization, and dynamic rendering to overcome temporal constraints. By precisely extracting and converting the lines, patterns, and colors of ancient murals into modern visual language, JD evokes consumer recognition of historical culture, bridging the emotional gap

between the brand and its consumers.

Dunhuang murals embody the historical memory of East-West cultural exchanges, with their figures and narratives carrying profound emotional energy. By integrating digital translation with brand storytelling, JD constructs a deep emotional narrative. For instance, JD's "Silk Road Spirit" campaign aligns its technological innovation narrative with the historical backdrop of cultural exchange in murals. This storytelling approach not only elevates the brand's cultural sophistication but also allows consumers to perceive the interplay between history and modernity, fostering a brand identity that embodies both depth and value.

Through digital empowerment, Dunhuang mural elements create a unique immersive consumer ritual for JD. This ritual enables consumers to engage in a cultural ambiance during shopping, fostering deep emotional connections and forming a differentiated competitive advantage.

3.3. The Reconstruction of Business Ethics: A Sustainable Value Circulation System

Under the guidance of sustainable development principles, business ethics have shifted from short-term profit maximization to long-term value creation. By digitally translating Dunhuang mural elements into "Joy," JD integrates traditional cultural genes with sustainable consumption concepts, establishing a closed-loop system of "cultural empowerment—behavioral guidance—value circulation," providing an innovative paradigm for social responsibility in e-commerce platforms.

The donor figures in Dunhuang murals symbolize the spirit of dedication, while the cyan-green color palette implies ecological co-existence. Through digital design techniques, these cultural elements are transformed into "Joy's" visual symbols and behavioral metaphors. "Joy" is shaped as an "eco-guardian," symbolizing resource circulation and sustainable development. This translation process not only preserves the core essence of Dunhuang culture but also conveys JD's commitment to sustainability through modern visual language, enabling consumers to intuitively perceive JD's social responsibility.

By leveraging this cultural symbolism, "Joy" promotes sustainable consumption behaviors. Consumers engage in cultural interactions through the purchase of eco-friendly products, accumulating points for rewards, forming a continuous incentive cycle of "consumption—recognition—reconsumption." Additionally, JD's use of biodegradable packaging and recycling programs guides resource circulation, further reinforcing sustainable incentives.

In this process, the tripartite interaction among consumers, brands, and IP design (as illustrated in Figure 3) forms the core framework of the sustainable value circulation system. Consumers, driven by cultural recognition and ethical fulfillment, practice responsible consumption; brands, through IP storytelling, reinforce their social responsibility image and enhance competitiveness; and the digital translation of Dunhuang elements acts as a cultural medium, linking these two aspects. JD's practice demonstrates that the creative transformation of traditional cultural genes effectively supports the sustainable development of e-commerce platforms.

4. Analysis of JD IP Design Practice Based on Dunhuang Mural Elements

Based on the classical imagery and cultural connotations of Dunhuang murals, cultural empowerment design practices of the JD brand IP are explored through visual symbol translation, mineral color spectrum regeneration, and image narrative transformation, incorporating both popularity and

storytelling. The design is initiated from iconic figures such as the Dunhuang Flying Apsaras, the Nine-Colored Deer, and donor portraits, integrating modern aesthetics to endow Joy with profound cultural heritage. This approach enhances brand communication effectiveness, promotes Chinese cultural heritage, and explores pathways for the integration of commerce and cultural preservation.

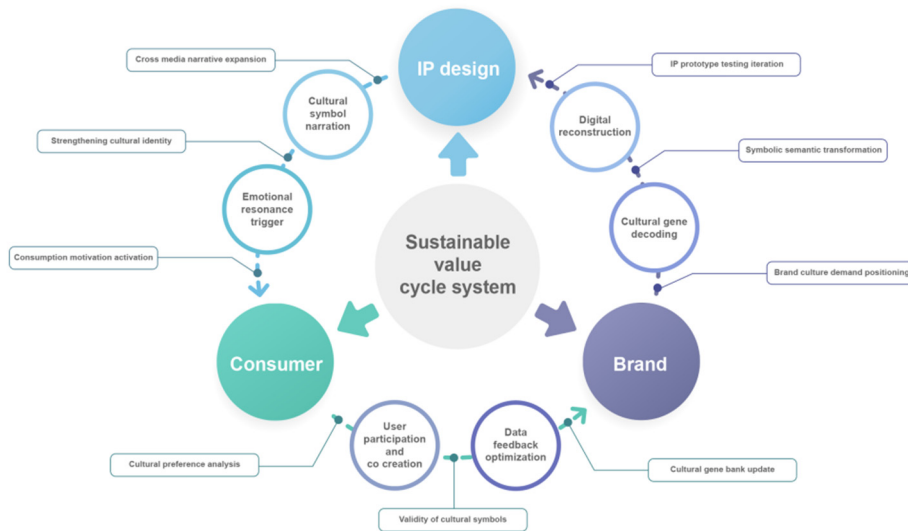


Figure 3. Sustainable Value Cycle Framework

4.1. Project Background

Driven by the dual forces of the digital economy and consumption upgrades, the cultural added value of brand IP has become a core dimension in establishing differentiated competitiveness for e-commerce platforms. JD, using its mascot "Joy" as an emotional touchpoint, has successfully built user recognition through its "quality" gene. However, its image remains limited to functional expression. To address the Generation Z demand for cultural identity and emotional consumption, JD needs to enhance its IP through cultural empowerment. Dunhuang mural elements, with their unique visual characteristics and symbolic significance, serve as the key to this transformation.

The images of flying apsaras and the Nine-Colored Deer in Dunhuang murals embody universal values such as "freedom" and "protection," which align closely with JD's brand philosophy of "trust" and "responsibility." Additionally, the visual genes of ceiling patterns and mineral pigments offer translatable symbolic resources for contemporary design. This project utilizes "Joy" as the carrier and adopts a three-tiered practice of visual translation, narrative reconstruction, and value circulation to achieve dual objectives. From a commercial perspective, cultural differentiation reshapes the IP image, enhancing brand premium and user engagement. From a cultural perspective, leveraging e-commerce traffic amplifies the dissemination of Dunhuang art, exploring an innovative path of "commercial support for heritage preservation"[5].

4.2. Brand Background Research

As a leading e-commerce platform in China, JD positions itself as a "quality e-commerce" provider dedicated to delivering an efficient and reliable shopping experience. Internet-based research indicates that JD's primary audience consists of urban middle-class consumers and young

professionals, predominantly aged 25–45. This demographic generally has a high level of education, strong purchasing power, values personalization, and places significant importance on brand cultural connotations and sustainable development.

In terms of IP design, JD users expect the integration of modern aesthetic elements, such as minimalist lines and contemporary silhouettes, to reinterpret traditional culture through a modernized visual language that aligns with urban lifestyles[6]. Additionally, influenced by social media, users exhibit a heightened sensitivity to trends and anticipate interactive elements in IP design to enhance engagement and brand value. With the rise of the "Guochao" (national trend) movement, younger generations show a strong preference for IPs incorporating Chinese cultural elements, particularly those with auspicious meanings and profound cultural narratives. They seek to infuse their lives with positive symbolism, fulfilling both their sense of identity and emotional value. Furthermore, environmental sustainability and social responsibility have become key user concerns, leading them to favor brands that embrace sustainable principles. Enhancing interactivity and sustainability provides essential direction for the subsequent design strategy.

4.3. Design Strategy

4.3.1. Cross-Media Translation of Visual Symbols and Reconstruction of Styling Language

This design practice integrates Dunhuang mural visual elements into four different styling designs of JD's "Joy" through cross-media translation and the reconstruction of visual language. These transformations are reflected in patterns, clothing, headwear, and overall styling.

As shown in Figure 4, the "Joy" design draws inspiration from flying apsaras and donor figures. The patterns simplify cloud motifs and lotus patterns from murals into cartoon-style continuous decorations. The attire transforms the flowing

robes of apсарas into modern suits, while the overall design captures the dynamic movement of apсарas. Ribbons and sacred birds symbolize agility and transmission.

In Figure 5, "Joy" integrates elements of the Nine-Colored Deer and Vajra Warriors. The antler patterns of the Nine-Colored Deer are refined into simplified divine beast motifs on the attire. The clothing transforms from the Vajra Warrior's armor into a modern hoodie, with cloud-pattern embellishments to enhance cultural depth. The large eyes in the headwear symbolize protection. The overall static posture conveys themes of guardianship and companionship.

Figure 6's "Joy" design is inspired by donor figures. The floral and honeysuckle patterns in the murals are streamlined into flowing decorations on the robe. The attire shifts from the donor's wide robes to a traditional long robe. The headwear replaces complex crowns with curled horns and incorporates green decorative patterns. The overall posture introduces a friendly tilt, and the figure holds a ruyi (a ceremonial scepter) to echo donor imagery, symbolizing auspiciousness and blessings.

Figure 7 merges guardian deities and donor warriors. The cloud motifs and scaled embellishments in the murals are simplified into refined patterns on the long robe. The attire transitions from the guardian deity's armor to a traditional robe. The headwear simplifies the guardian deity's helmet into double-arc feather ornaments with golden ring details. The overall stance, designed with a staff-holding gesture, symbolizes guidance, protection, and authority.

Through this translation and reconstruction process, the four "Joy" designs extract cultural symbols from Dunhuang murals and recontextualize them into modern styling language, laying the foundation for subsequent color and narrative design.



Figure 4. Line Draft Design



Figure 5. Line Draft Design



Figure 6. Line Draft Design

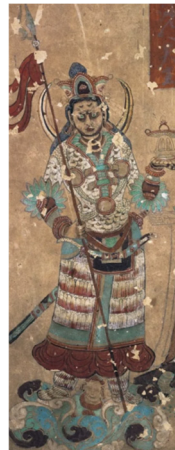


Figure 7. Line Draft Design

4.3.2. Deconstructivist Practice of Mineral Chromatics and Contemporary Regeneration of Symbols

By employing a deconstructivist approach, the traditional color system is integrated into the four stylistic designs of JD "Joy," endowing them with modern aesthetics and brand symbolism. The colors in Dunhuang murals originate from natural mineral pigments such as cinnabar, malachite green, lapis lazuli, ochre, and charcoal black, presenting a solemn and ancient visual style. The deconstructivist practice dismantles and reconstructs these hues, optimizing them to align with modern design requirements, thereby enhancing visual impact and cultural recognition.

Joy Image 1 draws inspiration from the celestial beings (Feitian) and donor figures. Its color scheme is derived from mural hues of green-blue, ochre red, and gold. Green-blue serves as the primary color of the suit, with increased saturation to enhance its modern appeal, symbolizing vitality and environmental consciousness, resonating with JD's green logistics philosophy. The ochre red and gold embellish the sacred bird decorations, forming flowing ribbons that add a sense of nobility while preserving the purity of the celestial imagery [7]. The overall color scheme is enhanced by contrasts of light and dark to create depth.

Joy Image 2 incorporates elements from the Nine-Colored Deer and Vajra Warriors. The colors are extracted and refined from the deep blue and reddish-brown tones of the murals. Deep blue is used as the primary color for the hoodie, exuding a sense of calmness with a modern touch, while reddish-brown is applied to mythical creatures and accents on the belt and hat details, enhancing visual depth and symbolizing wisdom and protection. This aligns with JD's brand philosophy of companionship and trust for its users.

Joy Image 3 takes inspiration from donor figures and the Ruyi scepter. Its color scheme is based on mural hues of green-blue, ochre red, gold, and black. The green-blue

patterns and robe motifs represent vitality and harmony, while ochre red, adjusted for saturation, appears more elegant, symbolizing nobility and dedication. The golden Ruyi and dark contour lines enhance layering, embodying the blessings traditionally associated with donor figures and aligning with JD's commitment to quality service.

Joy Image 4 integrates elements from guardian deities and donor warriors. The colors are derived and optimized from ochre red, green-blue, and indigo in the murals. Ochre red serves as the primary robe color, symbolizing authority and protection, while green-blue and gold accentuate feathered headpieces and the engravings on the staff, reinforcing the sacred aura. Gold is also incorporated into cloud motifs, adding depth and strength, symbolizing loyalty and trust, which echo JD's logistics security philosophy (Figure 8).

Through this deconstructivist practice, the color system of the four "Joy" figures draws inspiration from the mineral palette of Dunhuang murals. After modern optimization, it is imbued with contemporary symbolic significance, establishing a visual foundation for brand storytelling.



Figure 8. Coloring draft

4.3.3. Paradigm Shift of Schema and Image Narratives under the Reset of Temporal and Spatial Dimensions

Within the context of modern brand building, the traditional imagery of Dunhuang murals is reinterpreted to reconstruct schema and image narratives. This process imbues JD "Joy" with profound cultural connotations and contemporary brand value, catering to users' demands for cultural identity, emotional resonance, and trend appeal. The resetting of temporal and spatial dimensions aims to break the religious narrative framework of traditional murals and reposition them within the context of contemporary commerce and technology. Through schema reconstruction and narrative innovation, a dynamic and interactive brand story is crafted.

Joy Image 1 is modeled after celestial beings (Feitian) and donor figures. The schema transitions from the mural depictions of celestial flight and devout offerings to a modern sprinting posture. The narrative shifts from religious transcendence and devotion to JD Logistics' "mission must be achieved" and the seamless user experience of "boundaryless connection." The agility of the celestial beings and the sacred bird symbolize the efficiency of smart logistics, while the donor figure's lotus imagery transforms into JD's green packaging, representing environmental commitment. The sprinting movement conveys brand efficiency and vitality, shaping the narrative of "intelligent ribbons, a greener future."

Joy Image 2 integrates the Nine-Colored Deer and Vajra Warriors. The schema evolves from the mural depictions of the deer's altruistic rescue and the warrior's protective stance into a poised, standing display posture. The narrative shifts from Buddhist themes of kindness and guardianship to JD's philosophy of "user companionship" and "quality assurance." The wisdom and large eyes of the Nine-Colored Deer symbolize service optimization driven by big data, while the stability of the Vajra Warrior represents secure logistics

support, shaping the brand story of "guarding trust, mission accomplished."

Joy Image 3 is based on donor figures. The mural depiction of a donor holding a Ruyi scepter in a gesture of goodwill is reimagined as user interaction. The narrative transitions from religious blessings to JD's "quality service" and "merchant empowerment." The donor's treasured objects and the Ruyi imagery transform into symbols of smart technology assistance, while the auspicious gourd, associated with longevity, signifies users' well-being, constructing the brand story of "Ruyi empowerment, auspicious protection."

Joy Image 4 merges elements from guardian deities and donor warriors. The schema evolves from murals depicting guardians holding staffs and warriors in formidable stances into a guiding posture with a staff. The narrative shifts from Buddhist themes of authority and loyalty to JD's "logistics assurance" and "brand trust." The guardian deity's staff and feathers symbolize the precision of the intelligent supply chain, while the warrior's formidable presence transforms into the robust support of global logistics. The staff-holding motion, enhanced through dynamic design, reinforces the brand's strength, shaping the story of "loyal protection, intelligent defense" (Figure 6).

Through this reset of temporal and spatial dimensions, the schema and narratives of the four "Joy" figures are detached from the religious connotations of Dunhuang murals and embedded into JD's modern commercial context, achieving a fusion of cultural heritage and brand innovation.

5. Conclusion

This study explores the digital translation pathways of traditional mural visual elements based on the brand IP design of JD.com, constructing a "Cultural Analysis–Digital Translation–Scenario Application" model to achieve the modernization of traditional artistic elements. By extracting the lines, colors, compositions, and symbolic patterns of Dunhuang murals and integrating them with the shape optimization, symbolic translation, and color adaptation of brand IP images, traditional culture is endowed with new commercial communication value. The findings indicate that digital translation not only enhances the cultural depth of brand narratives but also expands the innovative practices of intangible cultural heritage in commercial contexts. The four groups of IP images—Flying Apsaras, Donors, Warriors, and Dharma Guardians—respectively embody brand characteristics such as intelligent connectivity, brand empowerment, security protection, and global supply chain support. The mineral-based color spectrum of Dunhuang murals, optimized through a deconstructivist approach, adapts traditional colors to modern visual languages while reinforcing brand emotional identity. This research validates that cultural heritage can be revitalized through brand IP, providing a referential pathway for the digitalization of the cultural industry and the cultural empowerment of commercial brands.

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