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Adaptation of Uttarakhand Aipan Motifs for Contemporary Apparel Design: A Literature Review and Conceptual Framework

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Abstract

Aipan is the folk art which used in cultural ceremonial floor or wall decoration art from the Kumaon region of Uttarakhand, is one of Indian's most visually distinctive design traditions, with considerable through largely unexplored commercial potential for contemporary fashion. Aipan's geometric motifs and rich symbolic vocabulary, used mainly by women using white rice paste on red ochre grounds have developed in thousands of years as valuable symbols of cultural identity, religious practice and small business. Like other Indian folk art Aipan still extremely underrepresented among modern fashion and apparel design compared to Madhubani, Warli, Gond, and Banarasi traditions. This paper summarizes the results of full systematic review of literature for 70 peer-reviewed studies, to suggest the integrated conceptual framework for adjustment of Aipan in contemporary textile and apparel design.

The conceptual justification for Aipan modification was strong and well established traditional geometrical motifs transfer smoothly into digital printing, screen printing, machine embroidery and hand-loom weaving. Still exist the major research gaps especially in garment based design studies, manufacturing cost analysis, consumer acceptability and review in the 2021 Geographical Indication (GI) registration's physical effect in craftsman's incomes. This paper recommends three-step conceptual framework covering design adaptation, technical adoption and sustainable commercial findings with cultural preservation kept to be primary and unavoidable throughout the process. The structure focuses on business growth not just risk for Aipan's artisan practices, instead to be strategic opportunities to improve artisans financial and business offered the production models highlight fair wages, provide understandable information and centered governing bodies.

Keywords: Aipan folk art, textile design, artisan livelihood, indigenous knowledge, folk art commercialisation

1. Introduction

The Indian folk art forms such as Madhubani, Warli, and Aipan have historically had religious and ceremonial significance in the context of textiles and have been preserved through personal and community experience and not through any sort of formal design education. With increasing consumer demand for heritage design as digital printing has become prevalent, some of these traditional art forms have found themselves in the fashion industry valued at around USD 23 billion in 2022 and growing by 8-10% every year. What makes Aipan unique is its lack of commercial success in comparison to Banarasi silk, Chikankari, Madhubani, and Warli. It was recognized as a Geographical Indication in 2021 (Government of India, IP India, 2021), but has still not been exploited commercially like other Indian folk art forms. The origin of the word Aipan can be traced back to the Sanskrit word "Arpan" meaning "offer" and is reflective of how the ritualistic knowledge has been passed on from generation to generation by the Kumaoni women.



Figure 1. Traditional Aipan floor painting, illustrating the traditional use of white colors on a red ochre background. Image: @sh_aipan_creations.

The following review, which comprises 70 scholarly papers, investigates the existing body of knowledge in terms of design and manufacturing regarding Aipan. In this research, cultural authenticity and the health of artisans are regarded as necessary preconditions for adaptation in design, as per the viewpoint by Agrawal and Singh (2021).

2. Literature Review

2.1 Aipan Specific Research

Studies on Aipan design have focused on accessories, household items, sarees, and computer-aided motif generation and not on garments that constitute the bulk of fashion industry income streams. The first studies on the transferability of Aipan designs into textile accessories through applique embroidery were conducted by Negi, Rani, and Singh (2015, 2016). However, the use of expert panels (n=10-15) makes their findings limited in generalizability. Further work on the application of Aipan motifs on sarees was carried out using block printing and weaving

by Arya, Gahlot, and Rani (2017). Bhatt and Bains (2021) examined the market appeal and price point of Aipan designs in screen printed Aipan stoles made of silk. Pant and Rawat (2022) determined that the best fabrics for print fidelity are silk and high-count cotton, while Kumar and Tewari (2021), and Singh and Bhatt (2022) created industrial scale repeat patterns using CAD techniques based on ritual designs. Embroidery stitch testing for Aipan design transferability was done by Gupta and Kumari (2023), and the craft-sustainability framework for Aipan design was laid out by Hannigan and Göran (2011).



Figure 2. Aipan motif compositions illustrating the tradition's geometric vocabulary and occasion-specific symbolism.
Images: @himalyanhues03; @aipan_art_by_archana.

Table 1. Aipan motif classification and adaptation suitability

Motif category	Occasion	Key elements	Adaptation suitability
Devi-centric (Navaratri)	Nine Nights worship	Goddess imagery, trident, lotus	Print/embroidery high
Lotus-based (Diwali)	Diwali	Lotus, diyas, swastika	Screen print/hand-loom high
Wedding Aipan	Marriage	Paired, fertility symbols	Print/block print high
Threshold (chauki)	Daily/seasonal	Geometric borders, dots	All techniques very high
Ancestral/memorial	Death rites	Stylised figures, sun/moon	Embroidery/digital moderate

Note. Synthesized from Arya et al. (2017), Pant and Rawat (2022), Kumar and Tewari (2021).

2.2 Comparative Lessons from Other Folk Traditions

Madhubani painting provides mixed success: According to Mandal (2022) and Mulchandani and Shaikh (2025), the time span of market exposure is about 15-20 years thanks to digital

transfer without replacing artisans in the process of designing. The situation with Warli is even more disappointing, because in some cases the heritage is commercialized by external companies that bring little profit for the local population, which is something Aipan artisans fear. Kalamkari, a GI protected craft since 2009, presents another kind of irony: there is a high demand in exports, but the income of artisans remains extremely low (Chaturvedi & Sharma, 2023); Chauhan (2022) describes the same problem in Banarasi business. The reason for low income in both cases, as Liebl and Roy (2003), Trivedi (2010), and Tewari (2016) agree, is the piece-rate payment system. So GI protection and market success do not necessarily lead to fair profit for artisans, which should be achieved independently.

Table 2. *Comparative commercialisation dimensions across Indian folk traditions*

Dimension	Aipan	Madhubani	Warli	Kalamkari
GI registration	2023	None	None	2009
Artisan profile	Women (Kumaon)	Women-dominant	Tribal	Mixed
Commercial maturity	Early stage	Growing	Growing	Mature

Note. Data sourced from Mandal (2022), Basole (2015), Trivedi (2010), Chaturvedi and Sharma (2023).

2.3 Production Technologies



Figure 3. *Motifs of Aipan designs used for modern day design. Images: @aipan_sidha_phadh_se and @bhawanaamera.*

There are four channels via which Aipan patterns are integrated into commercial textiles, where authenticity is traded for scale and efficiency. Digital printing allows for the replication of geometry with the greatest fidelity without any MOQ; Pant and Rawat (2022) note that reactive dyeing of fine silk and cotton produces patterns closest to traditional colors, though this advantage fades when considering environmental impacts (Bhandari & Patel, 2020). Screen printing is efficient from about 500 pieces on; Kamakoti & Sharma (2022) point out



that it requires fine mesh screens for precise patterns. Machine embroidery is the most tactile method of chauki border reproduction according to Daspute and Sharma (2022), who note that CAD-designed patterns can be transformed directly into DST/PES files. hand-loom weaving is the process that has maximum cultural, but the lowest adaptability due to loom grid resolution.

3. Conceptual Framework: The Three-Pathway Model

The suggested model provides the Three Pathways Framework to integrate Aipan into modern design without undermining its cultural authenticity and considering both profitability and cultural preservation as complementary goals.

3.1 Design Adaptation turns the Aipan repertoire into designable form: documentation, digitization of Aipan patterns using vector graphics, creation of a color palette, classification according to occasions, and repeat patterns building. According to Kumar & Tewari (2021) and Singh & Bhatt (2022), digital tracing is the most cost-effective way to create an easily scalable asset; however, moving ritually significant compositions into repeat patterns requires compromises about the elements which can be migrated in this manner.

3.2 Technology Integration relates to choosing production technology depending on the substrate and the category; digital printing technology is ideal for premium or small runs, screen printing technology - medium runs, embroidery technology - luxury category, and hand-loom technology - premium category. The choice of substrates is related to the authentic nature of design, since hand-loom khadi and silk indicate that the product is of indigenous origin, while synthetic substrates, even if they are equally good in quality, may influence the premium nature.

3.3 Sustainable Commercial Outcomes include consumer acceptability, GI positioning, artisan welfare, and knowledge transfer. This section questions the belief of sustainable business outcomes resulting in artisan welfare because Banarasi silk and Chikankari indicate that piece-rate payment leads to decreased wages regardless of selling prices (Chauhan, 2022; Trivedi, 2010). Literature on ICH crafts (Guo & Ahn, 2023; Krishna & Sundari, 2019) points to the need of knowledge transfer from artisans to designers for cultural sustainability

4. Design Adaptation Pipeline

Pathway 1 has been designed as an eight-phase process combining documentation with CAD, embroidery digitization, and Cultural Integrity check prior to production.

Table 3. *Aipan design adaptation pipeline with eight stages*

Stage	Activity
1–3	Field documentation, vector digitisation (CAD), motif classification
4–6	Colour-palette mapping, repeat-pattern engineering, technology-specific file export
7–8	Prototype validation and cultural-integrity audit; production and market launch

Note. Stages 1–3: documentation level. 4–6: technical level. 7–8: validation/commercialization.



Figure 4. *Contemporary product inspired by Aipan art Images: @artby_chitra; @the_kumaoni_ink.*

The first three phases constitute the documentation layer where cultural integrity is established before any technical work starts, and the vector digitization constitutes the technical turning point in the documentation layer where, according to Kumar & Tewari (2021), a minimum of 300 DPI should be used, along with accurate node placement rather than curve smoothing considering the angularity of Aipan patterns. Classification of motifs helps the designers establish common criteria for cultural appropriateness.

5. Sustainable Commercialisation

5.1 Commercialisation Pathways. There are three different models that balance these values in varying ways. Model A, the artisan-to-consumer sales channel via either cooperatives or e-commerce, has the highest value but limited by capacity and will work for high-end heritage segments. Model B, which is a collaboration between designers and artisans on piece-rate payment terms, is subject to the strength of such an arrangement, because weak arrangements can lead to piece-rate systems like those observed in Chikankari and Banarasi products. Finally, Model C, licensing and royalties to artisan collectives, has the largest reach but also

faces the highest threat of dilution due to the lack of controls further removed from artisan populations (Chen et al., 2024).



Figure 5. Aipan products sold by small Uttarakhand businesses, illustrating the Artisan-Direct (Path A) model. Images: @aipan_by_hemant.

5.2 Artisan Wage Equity. Inequities in wages exist due to systemic reasons; according to Biswas and Banerjee (2021), the piece-rate wage system pays artisans less than deserved as the price of goods sold is linked with the market demand and not cost of production, whereas rates are fixed through buyer-side bargaining, irrespective of both factors. Empowerment calls for the establishment of wage floors and not piece-rate as default, which is possible using cooperative organizations where bargaining and sharing of profits takes place. Path A can be taken through platform cooperatives, albeit the current situation is constraining due to the scattered geography of Uttarakhand and lack of digital skills (Ghosh & Ghosh, 2019; Tewari, 2016).

5.3 Geographical Indication.

The registration of Aipan under 2023 GI ensures that it has legal backing and can be used for authenticity-based pricing, although the usefulness of the same is dependent on enforcement and certification than just being registered (Chaturvedi & Sharma, 2023). It has never been established that there is an effect of GI registration on the incomes of the artisans post 2023, and the case of Kalamkari and Banarasi, who have also been GI registered over the years without their incomes increasing.

6. Research Gaps and Future Agenda

Table 4. Key gaps to *research*

Gap	Status	Urgency
Garment-level design studies	Absent	Critical
Production-cost data	Almost absent	Critical
Consumer research	Small samples (n = 20–50)	High
GI impact assessment	Unassessed post-2023	High
Artisan wage equity	Anecdotal only	High

Note. Critical gaps limit immediate decision making based on evidence, High gaps are medium-term priorities.

The area that needs the most attention is garment level design while accessories and interiors have been analyzed, the garments that make up the major share of industry revenue have been left out. Expert analysis along with proper consumer testing will be useful. Production cost information is also needed for different technologies and substrates. The sample size used for consumer research is very limited to a single region (Khan & Mishra, 2021; Ravi & John, 2026).

7. Conclusion

This review derives three findings regarding the applicability of Aipan in apparel. First, the feasibility of adapting technology is well established, as the geometric principles of Aipan design along with binary colour logic lend themselves easily to digital printing, screen printing, embroidery, and hand-loom weaving with CAD forming the foundation for all such processes (Kumar & Tewari, 2021; Singh & Bhatt, 2022). Second, there is a lack of literature that provides commercial managers with practical insights on the aspects such as design, cost, consumer behavior, and effect of GI, and bridging the gap is essential before any further step towards commercialization is taken. Third, the concepts of economic sustainability and cultural preservation are not contradictory as long as the process of commercialization incorporates the notion of artists' superiority, fair wages, and actual knowledge transfer, which is characteristic of the Three-Pathway Framework suggested in this paper.

Image Credits

The pictures have been taken by individual Aipan artisans and small business owners from the state of Uttarakhand in India, and the permission for using them has been granted by the photographers themselves. The Instagram handles of the photographers are provided below the figures.

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