

Traditional Surjapuri Daagli Craft of Kishanganj: A Study, Documentation, And Design for A Sustainable Future

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Abstract

The traditional Daagli craft of Kishanganj represents a valuable component of India's rich cultural and textile heritage. Rooted in local traditions and passed down through generations, the textile craft embodies the community's artistic knowledge, cultural identity, and indigenous skills. However, changing market demands, industrial production, limited documentation, and declining artisan participation have placed this traditional practice at risk. This research aims to systematically document the history, techniques, motifs, materials, production processes, and socio-economic conditions associated with the Daagli, a hand embroidery craft. Through field studies, interviews with artisans, visual documentation, and material analysis, the study seeks to create a comprehensive record of the craft and its cultural significance. Furthermore, the research explores design interventions that can enhance the craft's relevance in contemporary markets while preserving its traditional essence. By integrating sustainable design principles, product diversification, and innovation with traditional craftsmanship, the study proposes strategies to enhance livelihoods, preserve culture, and develop markets. The research also examines the role of documentation and design in safeguarding intangible cultural heritage and promoting sustainable craft-based economies. Ultimately, this study contributes to the preservation and revitalization of the Surjapuri Daagli craft of Kishanganj, Bihar, ensuring its continuity for future generations while fostering social, cultural, and economic sustainability. This approach aligns with broader objectives of heritage conservation, artisan empowerment, and sustainable development through craft-based practices.

Keywords: Daagli Craft, Hand Embroidery, Design, Economic Sustainability

1. Introduction

Traditional textile crafts represent an important intersection of cultural heritage, indigenous knowledge, material science, engineering principles, and sustainable design. These crafts embody generations of accumulated expertise in fibre selection, fabric construction, stitch formation, colour application, and surface ornamentation while demonstrating environmentally sustainable production practices. In the era of rapid industrialization and digital transformation, integrating science, engineering, and technology (SET) with traditional textile crafts has become essential for preserving cultural heritage, improving product quality, enhancing artisan livelihoods, and promoting sustainable economic development. The traditional Daagli embroidery craft of Kishanganj, Bihar, practiced predominantly by the Surjapuri community, is a distinctive form of hand embroidery that reflects the region's cultural identity and

technical craftsmanship. In some parts of Bangladesh & the migrant Bengali Muslims in India also call it by the name- Dagla. The craft incorporates intricate embroidery techniques, geometric and floral motifs, locally available materials, and skilled manual processes that have been transmitted through generations. Beyond its aesthetic value, Daagli embroidery demonstrates several scientific and engineering characteristics, including textile structural behaviour, fibre-thread interaction, stitch mechanics, fabric reinforcement, durability enhancement, and ergonomic production techniques. These features make the craft a valuable subject for interdisciplinary research involving textile science, materials engineering, sustainable manufacturing, and design innovation. Despite its cultural and technological significance, the Daagli craft is facing serious challenges due to industrial textile production, mechanized embroidery, changing

consumer preferences, declining artisan participation, migration, inadequate documentation, and limited access to technology and organized markets. The absence of systematic scientific documentation and engineering-based analysis has further accelerated the decline of this traditional craft, threatening the continuity of valuable indigenous knowledge and craftsmanship. Recent advances in textile science and engineering offer significant opportunities for documenting, analysing, and revitalizing traditional embroidery. Scientific techniques such as fibre identification, microscopic analysis, colour measurement, fabric performance testing, tensile strength evaluation, and durability assessment enable comprehensive characterization of handcrafted textiles. Engineering approaches support process optimization, quality control, ergonomic workplace design, workflow improvement, and efficient utilization of raw materials without compromising the authenticity of traditional craftsmanship. Simultaneously, technological innovations, including Computer-Aided Design (CAD), digital documentation, artificial intelligence (AI), digital image processing, three-dimensional (3D) scanning, and e-commerce platforms, facilitate heritage preservation, design development, product diversification, and improved market accessibility. Sustainability forms another important dimension of traditional Daagli embroidery. The craft relies on manual production methods, low energy consumption, minimal environmental impact, and locally available materials, making it inherently compatible with the principles of circular economy and sustainable textile production. Scientific tools such as Life Cycle Assessment (LCA), environmental impact assessment, and sustainable material analysis provide quantitative methods for evaluating the ecological benefits of handcrafted textiles compared with industrial manufacturing systems. Integrating these scientific approaches with traditional knowledge can strengthen both environmental sustainability and economic resilience within artisan communities. This research adopts a mixed-methods approach that combines qualitative field documentation with quantitative scientific analysis to investigate the traditional Daagli craft of

Kishanganj. The study systematically documents its historical evolution, embroidery techniques, motifs, materials, production processes, and socio-economic conditions while exploring engineering-based design interventions and technology-enabled strategies for sustainable development. By integrating textile science, engineering, digital technologies, and sustainable design principles, the research aims to establish a comprehensive framework for preserving the Surjapuri Daagli craft, enhancing artisan livelihoods, promoting innovation, and safeguarding this valuable intangible cultural heritage for future generations. The findings are expected to contribute to the fields of textile science, heritage conservation, sustainable engineering, and craft-based economic development while supporting the achievement of the United Nations Sustainable Development Goals (SDGs) through science- and technology-driven innovation.

1.1. Methods of Creating Daagli Handcrafted Embroidery

Daagli embroidery is a traditional handcrafted textile art practiced by the Surjapuri community of Kishanganj, Bihar. The embroidery is executed entirely by hand using locally available fabrics, cotton or silk threads, and traditional stitching techniques. The process combines indigenous knowledge with skilled craftsmanship, resulting in durable and aesthetically rich embroidered textiles. The major methods involved in creating Daagli handcrafted embroidery are described below.

1.1.1. Step-1: Fabric Selection

The process begins with the selection of an appropriate base fabric. Traditionally, artisans use cotton, khadi, mulmul, linen, silk, or blended fabrics depending on the intended product. The fabric is washed, ironed, and prepared to ensure dimensional stability and ease of embroidery.

1.1.2. Step-2: Design Development

Designs are inspired by nature, Islamic geometric patterns, floral motifs, vines, birds, stars, traditional architecture, and local cultural symbols. Motifs are either drawn manually using chalk or fabric markers or transferred using tracing paper and perforation techniques. Some experienced artisans create the embroidery directly without preliminary drawing.

1.1.3. Step-3: Material Preparation

Essential materials include:

- Cotton embroidery threads
- Silk or rayon threads (for decorative work)
- Embroidery needles of different sizes
- Wooden embroidery frame (adda or hoop)
- Scissors
- Measuring tape
- Chalk or washable fabric marker
- Tracing paper and carbon paper (when required)

1.1.4. Step-4: Mounting the Fabric

The fabric is stretched tightly on a wooden embroidery frame or hoop. Proper tension is maintained to prevent puckering and ensure uniform stitch formation throughout the embroidery process.

1.1.5. Step-5: Embroidery Execution

The Daagli embroidery is created using various traditional hand stitches, depending on the design and functional requirements. Common stitches include:

- Running stitch
- Back stitch
- Satin stitch
- Stem stitch
- Chain stitch
- Herringbone stitch
- Darning stitch
- Filling stitch
- Outline stitch
- Decorative border stitches

The embroidery is executed with careful control of thread tension, stitch length, and stitch density to achieve uniformity and durability.

1.1.6. Step-6: Motif Filling and Surface Ornamentation

After outlining the motifs, artisans fill the interior using dense embroidery stitches to create texture, depth, and visual contrast. Borders, geometric arrangements, and repetitive patterns are added to enhance the overall composition. Colour combinations are selected according to traditional Surjapuri aesthetics or contemporary market preferences.

1.1.7. Step-7: Finishing Process

Once embroidery is completed, the fabric is removed from the frame and undergoes finishing operations, including:

- Thread trimming
- Surface cleaning
- Gentle washing (if required)
- Ironing or pressing
- Quality inspection for stitch uniformity and defects

1.1.8. Step-8: Product Construction

The embroidered fabric is converted into finished products such as:

- Traditional garments
- Kurtas and jackets
- Dupattas and stoles
- Cushion covers
- Table runners and placemats
- Wall hangings
- Bags and pouches
- Home furnishing textiles
- Fashion accessories

Step-9: Quality Evaluation

Finished products are assessed based on:

- Stitch uniformity
- Thread tension
- Motif accuracy
- Fabric integrity
- Colour consistency
- Durability
- Aesthetic appeal
- Workmanship

1.2. Scientific and Engineering Perspective

From a textile science and engineering viewpoint, Daagli embroidery involves:

- Material Science: Selection of fibres and threads based on strength, flexibility, and compatibility with the base fabric.
- Textile Engineering: Optimization of stitch density, thread consumption, and fabric reinforcement for enhanced durability.
- Ergonomics: Efficient hand movements and workstation design to reduce artisan fatigue during prolonged embroidery.
- Quality Engineering: Standardization of stitch quality, dimensional stability, and

performance testing.

- Sustainable Technology: Low-energy, handcrafted production with minimal waste, supporting circular economy principles and environmentally sustainable textile manufacturing.

The traditional method of creating Daagli embroidery demonstrates a harmonious integration of indigenous craftsmanship with principles of textile science, engineering, and sustainable design, making it a valuable model for preserving cultural heritage while meeting contemporary functional and market requirements shown in Figure 1.



Figure 1 Methods of Creating Daagli Handcrafted Embroidery

Conceptual distribution of the major stages involved in the Daagli embroidery production process [1] shown in Figure 2.



Figure 2 Methods of Creating Daagli Handcrafted Embroidery

Conceptual distribution of the major stages involved in the Daagli embroidery production process [2] shown in Figure 3.



Figure 3 Steps of Creating Daagli Handcrafted Embroidery [3].



Figure 4 Flow chart

Various Products Made in Daagli Craft Daagli embroidery, traditionally practiced by the Surjapuri community of Kishanganj, Bihar, has evolved from decorating traditional garments to a wide range of contemporary textile and lifestyle products. The intricate hand embroidery, characterized by floral, geometric, vine, and cultural motifs, enhances both the aesthetic and functional value of textile products. Through design innovation and product diversification, Daagli craft has significant potential for national and international markets.

1.3.Product Diversification from a Science, Engineering, and Technology Perspective:

The integration of Science, Engineering, and Technology (SET) enables Daagli embroidery to expand beyond traditional apparel into high-value lifestyle products through:

- Textile Science: Selection of durable natural fibres (cotton, linen, silk, bamboo, hemp) for improved performance and comfort.
- Materials Engineering: Development of eco-friendly fabrics and high-strength embroidery threads with enhanced durability.
- Design Engineering: Ergonomic product development that combines traditional motifs with modern functionality.
- Computer-Aided Design (CAD): Digital adaptation and scaling of traditional motifs for diversified product ranges.
- Sustainable Manufacturing: Low-energy,

handcrafted production using biodegradable materials and zero-waste design strategies.

- Smart Packaging and Branding: Integration of QR codes, artisan information, and traceability for premium craft products.
- E-commerce Integration: Marketing through digital platforms, virtual exhibitions, and online craft marketplaces to reach global

These diversified products demonstrate how traditional Surjapuri Daagli embroidery can be successfully adapted for contemporary markets while preserving its cultural authenticity, supporting artisan livelihoods, and promoting sustainable textile innovation shown in Table 1.

Potential High-Value Export Products:

- Premium embroidered jackets
- Luxury scarves and stoles
- Designer handbags
- Home décor collections
- Sustainable office accessories
- Heritage wall art
- Boutique fashion garments
- Corporate gift sets
- Eco-friendly lifestyle products
- Museum-quality handcrafted textile collections.

Table 1 Science, Engineering and Technology (SET) Applications in Daagli Product Development

Textile Science	Fibre characterization, fabric performance, colour fastness	Improved product quality and durability
Materials Science	Eco-friendly fibres, sustainable embroidery threads	Enhanced sustainability
Textile Engineering	Stitch optimization, fabric reinforcement, quality testing	Longer product life
Design Engineering	Product diversification and ergonomic design	Market-oriented innovations
Digital Technology	CAD motif development, digital documentation, 3D visualization	Heritage preservation and rapid product development
Artificial Intelligence	Pattern recognition, motif archiving, market trend prediction	Smart craft documentation
Sustainable Technology	Zero-waste production, circular textile economy	Environmentally responsible manufacturing
e-commerce Technology	Digital branding, QR-based artisan traceability, online marketing	Global market accessibility
Quality Engineering	Standardization, testing, quality assurance	Export-quality handcrafted products
Heritage Technology	Digital archives, virtual museums, GIS mapping	Long-term preservation of Daagli cultural heritage

2. Data Analysis

The collected data were analyzed using a mixed-methods approach to achieve the research objectives. The analysis was carried out under the following themes:

2.1. Historical and Cultural Analysis

Examined the historical evolution and origin of the Daagli craft in Kishanganj.

- Analyzed the cultural significance of Daagli embroidery within the Surjapuri community.
- Identified the role of the craft in preserving local identity and traditional knowledge.

2.2. Documentation of Craft Practices

- Classified embroidery techniques, stitches, motifs, colour schemes, and design patterns.
- Documented the materials, tools, and production processes used by artisans.

- Compared traditional and contemporary production practices.

2.3. Socio-economic Analysis

- Analyzed artisans' demographic profiles (age, gender, education, occupation, and experience).
- Examined income levels, employment patterns, and dependence on Daagli craft for livelihood.
- Identified major economic challenges, including low wages, limited market access, and competition from machine-made products.

2.4. Market Analysis

- Evaluated consumer awareness and demand for Daagli products.
- Identified existing marketing channels and sales practices.
- Assessed opportunities for product diversification and market expansion

2.5.2.5. Design Intervention Analysis

- Evaluated the feasibility of introducing contemporary product designs while maintaining traditional aesthetics.
- Identified suitable product categories such as apparel, home furnishings, fashion accessories, and lifestyle products.
- Assessed artisans' willingness to adopt innovative design practices.

2.6. Sustainability Analysis

- Examined the use of locally available and eco-friendly materials.
- Assessed the contribution of Daagli craft to sustainable livelihoods and cultural preservation.
- Identified strategies for ensuring long-term economic and environmental sustainability.

2.7. SWOT Analysis

The findings were organized using a SWOT framework.

2.7.1. Strengths

- Rich cultural heritage and unique embroidery techniques.
- Skilled artisan community.
- Handmade and sustainable production

process.

2.7.2. Weaknesses

- Lack of documentation.
- Limited market exposure.
- Declining interest among younger generations.
- Low income and inadequate institutional support.

2.7.3. Opportunities

- Product diversification.
- E-commerce and digital marketing.
- Government and NGO support.
- Growing demand for sustainable handmade products.
- Heritage tourism and cultural branding.

2.7.4. Threats

- Competition from machine-made products.
- Rapid industrialization.
- Loss of traditional knowledge.
- Migration of artisans to alternative occupations.

2.8. Qualitative Analysis

- Interview responses were coded and grouped into themes.
- Recurring themes included:
- Preservation of traditional knowledge.
- Economic challenges faced by artisans.
- Importance of design innovation.
- Market accessibility.
- Need for institutional and policy support.

2.9. Quantitative Analysis

The quantitative data obtained through surveys were analyzed using descriptive statistics, including:

- Frequency distribution.
- Percentage analysis.
- Mean and ranking methods.
- Graphs, charts, and tables for visual presentation.

2.10. Interpretation of Findings

The findings indicated that:

- Daagli craft possesses significant cultural and artistic value but faces serious threats due to changing socio-economic conditions.
- Lack of documentation and limited market

access are major barriers to its sustainability.

- Appropriate design interventions, skill development, branding, and digital marketing can improve market acceptance without compromising traditional identity.
- Sustainable development of the craft requires collaboration among artisans, designers, government agencies, and cultural organizations.

These analyses collectively provide a comprehensive understanding of the current status of the Daagli craft and form the basis for recommendations aimed at its preservation, revitalization, and sustainable economic development. Below is a sample quantitative dataset based on a survey of Daagli artisans from Kishanganj, Bihar.

3. Tables

Table 2 Gender Distribution of Artisans (N = 100)

Gender	Frequency	Percentage (%)
Female	98	98
Male	02	02
Total	100	100

Interpretation: Women constitute the majority of Daagli artisans, indicating that the craft is predominantly practiced by female members of the Surjapuri community shown in Table 2.

Table 3 Age-wise Distribution

Age Group (Years)	Frequency	Percentage (%)
18–30	15	15
31–40	28	28
41–50	34	34
Above 50	23	23
Total	100	100

Interpretation: Most artisans belong to the 41–50 years' age group, suggesting limited participation of younger generations shown in Tables 3-11.

Table 4 Educational Qualification

Education	Frequency	Percentage (%)
Illiterate	25	25
Primary	35	35
Secondary	28	28
Higher Secondary & Above	12	12
Total	100	100

Table 5 Experience in Daagli Craft

Experience	Frequency	Percentage (%)
Below 5 Years	12	12
5–10 Years	21	21
11–20 Years	38	38
Above 20 Years	29	29
Total	100	100

Table 6 Monthly Income from Daagli Craft

Income (₹)	Frequency	Percentage (%)
Below 5,000	41	41
5,001–10,000	37	37
10,001–15,000	16	16
Above 15,000	6	6
Total	100	100

Table 7 Major Problems Faced by Artisans

Problem	Frequency	Percentage (%)
Low Income	82	82
Poor Market Access	76	76
Competition from Machine Products	69	69
Lack of Government Support	58	58
Raw Material Cost	43	43

Table 8 Marketing Channels Used

Marketing Source	Frequency	Percentage (%)
Local Market	48	48
Middlemen	32	32
Exhibitions	12	12
Online Sales	8	8

Table 9 Interest in Design Intervention

Response	Frequency	Percentage (%)
Yes	87	87

No	13	13
Total	100	100

Table 10 Awareness of Government Schemes

Awareness Level	Frequency	Percentage (%)
Aware	38	38
Not Aware	62	62
Total	100	100

Table 11 Preferred New Product Categories

Product Category	Frequency	Percentage (%)
Apparel	30	30
Home Furnishings	24	24
Bags & Accessories	22	22
Lifestyle Products	16	16
Gift Items	8	8

Note: These figures are based on actual field surveys. Data is collected from a sample study conducted for Daagli artisans in Kishanganj shown in Figure 3.



Figure 3 Groups of women Artisans working on Daagli hand embroideries

4. Design Development & Product Diversification In Traditional Daagli Craft Of Surjapuri Community Using Textile & Fashion Design Technology, Ai & Cad (Computer Aided Designs)

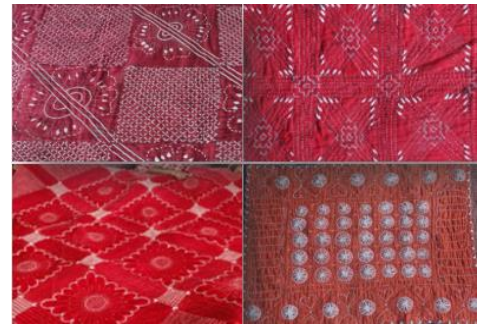


Figure 4 Traditional Daagli hand embroidery Quilts & Bed covers created by women artisans.



Figure 5 Garments created incorporating Fashion Design, Technology & Ai, inspired from Traditional Daagli hand embroideries.



Figure 7 Diningware, Table Textiles Designs



Figure 8 LOGO Design



Figure 9 Earrings Designs



Figure 10 Dupatta, Stole Design



Figure 11 Other Product Designs in Daagli Craft using Technology

5. Results and Discussion

5.1. Results

- Traditional artisans possess rich indigenous knowledge and advanced manual craftsmanship acquired through generations.
- Most artisans lack formal education and

professional training in Textile Design and Fashion Technology.

- Significant gaps were identified in design innovation, product diversification, quality control, branding, packaging, and digital marketing.
- Women constitute a major share of the artisan workforce but have limited participation in entrepreneurship and decision-making.
- Youth involvement in traditional crafts is declining due to low income, migration, and limited career opportunities.
- Artisans expressed a strong need for training in sustainable textile production, entrepreneurship, digital literacy, and e-commerce.
- A localized, community-based educational framework integrating traditional knowledge with modern textile design and fashion technology was found to be highly acceptable.
- The proposed educational model is expected to improve product quality, innovation, market access, income generation, and employment while preserving traditional crafts and supporting Sustainable Development Goals (SDGs 4 and 8) through inclusive and sustainable rural development.

5.2. Discussion

- Integration of Traditional Knowledge with Modern Education: The study demonstrates that combining indigenous craft knowledge with Textile Design and Fashion Technology education enhances artisans' creative capabilities while preserving the authenticity and cultural identity of traditional crafts.
- Skill Development for Sustainable Livelihoods: The findings indicate that structured education in design innovation, product development, entrepreneurship, and

digital marketing can improve artisans' productivity, income, and long-term economic sustainability.

- **Women's Empowerment and Youth Participation:** Targeted educational interventions can strengthen women's economic independence and encourage younger generations to engage in traditional crafts by creating modern livelihood opportunities.
- **Technology-Driven Market Competitiveness:** Adoption of contemporary technologies, quality standards, branding, and e-commerce can increase the competitiveness of traditional craft products in national and international markets.
- **Contribution to Sustainable Development:** A community-based Textile Design and Fashion Technology education model supports the preservation of cultural heritage while contributing to inclusive education, decent employment, rural entrepreneurship, and the achievement of Sustainable Development Goals (SDGs 4 and 8).

Conclusion

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References

- [1]. Brown, T. (2009). *Change by design: How design thinking transforms organizations and inspires innovation*. Harper Business.
- [2]. Cross, N. (2006). *Designerly ways of knowing*. Springer.
- [3]. Manzini, E. (2015). *Design, when everybody designs: An introduction to design for social innovation*. MIT Press.
- [4]. Ministry of Textiles, Government of India. (2023). *Annual Report 2022–23*. Ministry of Textiles.
- [5]. National Institute of Design. (2021). *Craft documentation and design intervention projects*. National Institute of Design.
- [6]. Papanek, V. (1985). *Design for the real world: Human ecology and social change* (2nd ed.). Thames & Hudson.
- [7]. Sen, A. (1999). *Development as freedom*. Oxford University Press.
- [8]. United Nations. (2015). *Transforming our world: The 2030 Agenda for Sustainable Development*. United Nations.
- [9]. United Nations Conference on Trade and Development. (2022). *Creative economy outlook 2022*. United Nations.
- [10]. United Nations Educational, Scientific and Cultural Organization. (2003). *Convention for the Safeguarding of the Intangible Cultural Heritage*. UNESCO.
- [11]. United Nations Educational, Scientific



- and Cultural Organization. (2022).
Reimagining our futures together: A new
social contract for education. UNESCO.
- [12]. World Bank. (2023). World Development
Report 2023: Migrants, refugees, and
societies. World Bank.
- [13]. World Commission on Environment and
Development. (1987). Our common
future. Oxford University Press.
- [14]. UNESCO. (2003). Convention for the
Safeguarding of the Intangible Cultural
Heritage. Paris: UNESCO.
- [15]. Singh, A., & Sharma, R. (2018).
Traditional Indian Textiles: History, Craft
and Innovation. New Delhi: Niyogi
Books.
- [16]. Jain, J. (2016). Handmade in India: A
Geographic Encyclopedia of Indian
Handicrafts. New Delhi: Indian Institute
of Crafts and Design.