International Journal of Advanced Engineering Research and Science (IJAERS)
Peer-Reviewed Journal
ISSN: 2349-6495(P) | 2456-1908(O)
Vol-13, Issue-6; Jun, 2026
Journal Home Page Available: https://ijaers.com/
Article DOI: https://dx.doi.org/10.22161/ijaers.136.1

Culture Adaptation and Transformation of Traditional Kashi Kari with Modular Concept

Mahnoor Munir[1], Dr. Xinhua Li [2], Simran Khan[3]

[1]MSc Student in Fashion Design and Engineering, Zhejiang Sci-Tech University, Hangzhou, China.
Email: mahnoormunir59@gmail.com
[2]School of Fashion Design & Engineering, Zhejiang Sci-Tech University, Hangzhou, China
Email: xinhuali@zstu.edu.cn
[3]MSc Student in Fashion Design and Engineering, Zhejiang Sci-Tech University, Hangzhou, China.
Email: simran.yousafi@gmail.com

Received: 25 Apr 2026,

Received in revised form: 20 May 2026,

Accepted: 23 May 2026,

Available online: 06 Jun 2026

Keywords*— *Kashi kari, Modular fashion, Architecture art, Cultural transformation, Sustainable fashion design

***Abstract*—** *This study explores the transformation of Kashi Kari, a traditional architectural tile art, into contemporary modular fashion. Known for its complex geometric patterns, structured symmetry, and vibrant color schemes, Kashi Kari has historically been used in monumental architecture such as tombs, mosques, and civic buildings. The craft embodies local identity, cultural memory, and artisanal knowledge, making it a key source of inspiration in modern design fields. The research examines the integration of Kashi Kari's traditional motifs, patterns, and color schemes into modular fashion, characterized by detachable, reconfigurable, and sustainable clothing components. Drawing structural and visual inspiration from four architectural landmarks—Shah Mosque (Iran), Blue Mosque (Turkey), Hassan II Mosque (Morocco), and Blue Mosque of Mazar-e-Sharif (Afghanistan)—this study analyzes their tile patterns and signature colors of cobalt blue, turquoise, mustard yellow, and white. The study demonstrates how modular fashion can preserve cultural heritage while providing modern functionality and global relevance. By combining traditional craftsmanship with innovative design, the research aims to bridge the gap between cultural storytelling and contemporary fashion systems, emphasizing sustainable design principles.*

I. INTRODUCTION

Modern fashion innovation is increasingly influenced by traditional craft techniques, particularly as the industry shifts toward design frameworks that prioritize environmental sustainability and cultural respect (Fletcher, 2014). Studies have shown that Islamic geometric tilework aligns well with modular design principles due to its mathematical ordering, repeated units, and strong geometric identity (Broug, 2013; Necipoğlu, 1995). Kashi Kari, a traditional form of tile art, has primarily been studied as a visual and cultural heritage, with attention given to its color systems, decorative logic, and geometric structures (Hoek, 2012; Seemi, 2023). However, this study extends its interpretation beyond religious symbolism and repositions these elements within a contemporary fashion context, treating them as artistic design tools rather than solely religious symbols (Clark, 2015).

The primary goal of this research is to examine Kashi Kari as a transferable design framework for modular fashion, emphasizing its aesthetic and material culture aspects rather than its religious significance. This study investigates the potential transformation of Kashi Kari's structural principles into modular fashion systems that promote reusability, adaptability, and longevity in garment functionality. To

achieve this, the research draws inspiration from four significant architectural landmarks: The Shah Mosque (Iran), the Sultan Ahmed Mosque (Turkey), the Blue Mosque of Mazar-e-Sharif (Afghanistan), and the Hassan II Mosque (Morocco). These buildings were selected for their unique geometric shapes, diverse tile patterns, and vibrant colors, which reflect the regional differences of Kashi Kari. The comparative analysis of these architectural traditions provides a broader understanding of how Islamic geometric systems can function as adaptable frameworks for contemporary fashion innovation.

Fig. 1: Shah (Imam) Mosque, Iran (Iran Tourism and Touring Organization NGO)

Fig. 2: Sultan Ahmed Mosque Istanbul (Turkey) (Oberazzi)

The study develops a framework for collecting and transforming motifs, gathering color palettes, and translating architectural patterns into modular garment components (Bloom & Blair, 2009; Golombek & Subtelny, 2007; O'Kane, 2006). Through qualitative visual analysis, digital reconstruction methods, Pantone-guided color extraction, and modular garment development, this research reinterprets cultural craftsmanship from a contemporary fashion perspective. Unlike previous studies that focus primarily on preservation and architectural analysis, this research investigates Kashi Kari as a functional system for modular garment construction and sustainable fashion development. This approach aligns with recent findings that modular fashion offers a sustainable strategy by enhancing user interaction, extending garment life, and reducing waste (Park & Kim, 2023; Zhang et al., 2024).

Fig. 3: Blue Mosque, Mazar-e-Sharif Afghanistan (Sgt. Kimberly Lamb, ZainShahid Wikipedia)

Fig. 4: Hassan II Mosque, Casablanca, Morocco (https://pixabay.com)

II. LITERATURE REVIEW

2.1 ISLAMIC KASHI KARI AND GEOMETRIC ART

Kashi Kari represents one of the most intricate forms of Islamic geometric design, characterized by complex mathematical patterns, symmetrical arrangements, and vibrant color palettes. Recent studies indicate that this tile art is an integral part of architecture in Iran (Figure 1), Turkey (Figure 2), Afghanistan (Figure 3), and Morocco (Figure 4), employing modular visual logic, proportional geometry, and repeating units (Hoek, 2012; Seemi, 2023). Beyond visual appeal, these patterns function as structured frameworks that govern design order, variation, and symmetry, reflecting underlying perceptual and construction

principles in Islamic art (Nasri, 2018). Patterns have also evolved regionally and over time, adapting local geometric systems across centuries while maintaining coherent visual rules (Abdullahi & Embi, 2013).

Colors such as white, mustard yellow, turquoise, and cobalt blue carry cultural significance but can be adapted for contemporary applications using standardized color-matching techniques (Nawaz et al., 2022). Beyond technical and aesthetic considerations, Islamic geometric patterns convey expressive meaning, encompassing both intellectual and cultural dimensions (Shaw, 2022). These insights clarify Kashi Kari's historical and architectural significance, highlighting its potential as a transferable framework for contemporary fashion applications, particularly in modular garment design, where structure, repetition, and symmetry can inform modern, sustainable, and culturally sensitive fashion practices.

2.2 INNOVATIVE CONCEPTS IN SUSTAINABLE DESIGN AND MODULAR FASHION

While modular fashion has gained increasing recognition within sustainable fashion research, and Kashi Kari in architecture has been extensively documented, the relationship between these two disciplines remains largely unexplored (Roxburgh, 2010). Existing studies on Islamic architectural ornamentation mainly focus on historical preservation, symbolic meaning, geometric construction, and ceramic craftsmanship rather than contemporary fashion adaptation (Broug, 2013; Hoek, 2012; Necipoğlu, 1995).

Similarly, current modular fashion research primarily examines garment adaptability, user interaction, product longevity, and waste reduction as sustainability strategies (Fletcher, 2014). Recent studies define modular fashion as a system of detachable and reconfigurable garment components that increase functional flexibility and extend product lifespan, thereby supporting circular design frameworks and reducing textile waste (Zhang et al., 2024). Research related to modular fashion and sustainability can be found in studies such as What is Modular Fashion: Towards a Common Definition and Fashion and Modular Design – Modularity as a Design Strategy for Sustainability (Necipoğlu, 1992). However, most modular fashion studies are centered on Western design methodologies and rarely incorporate non-Western architectural craft traditions or Islamic geometric systems as structural design frameworks (Khan, 2019).

By (1) analyzing Kashi Kari patterns across regions, (2) digitally reconstructing motifs through design software, (3) collecting Pantone-guided color palettes, and (4) applying these elements to modular garments with detachable and reconfigurable components aligned with sustainability principles, this study addresses these research gaps and proposes a new interdisciplinary framework connecting architectural heritage, modular design, and sustainable fashion innovation.

2.3 ETHICS, TRADITIONAL HERITAGE, AND CONTEMPORARY ADAPTATION

Recent literature highlights the importance of respectfully and culturally appropriately adapting old crafts in modern design (Hesar et al., 2015). Scholars emphasize that heritage-based design, while promoting creative advancement, must avoid religious or cultural appropriation (Clark, 2015). Geometric motifs can be transformed in the modern era when studied with transparency and cultural respect, as they are regarded in Islamic art studies as part of a universal design language that extends theological symbolism (Mignolo, 2011; Nasr, 1987). At present, there is a lack of research about the use of Kashi Kari in fashion design purely as a geometric and artistic influence, without religious implications.

Design-led strategies have been identified as a critical approach for ethically integrating traditional motifs into contemporary systems, ensuring cultural respect while promoting sustainability and resource-efficient fashion practices (D'Itria & Vacca, 2024). Furthermore, the interpretation and presentation of heritage-inspired fashion are shaped by the cultural and spatial context in which they are exhibited, emphasizing that audience perception and interaction with these garments must be considered as part of ethical adaptation (Lan & Liu, 2023). Further research is required to explore this ethical perspective within contemporary fashion design (Grabar, 1992).

2.4 RESEARCH GAPS

While modular fashion has grown in recognition and Kashi Kari in architecture is well-documented, the interaction between these two fields remains largely unknown. No comparative study exists that combines themes and colors from four significant architectural sites in Morocco, Turkey, Iran, and Afghanistan, nor is there research that adapts Kashi Kari's geometric principles into modular clothing systems. There is also no source material that defines tile-inspired color palettes for textile design using Pantone Fashion, Home + Interiors (FHI) at this time. Previous studies have given limited attention in earlier works about how to change historic architectural elements for modern fashion without losing their artistic history or significance to religion.

By (1) analyzing Kashi Kari patterns across regions, (2) transferring motifs using design software, (3) collecting Pantone-guided color palettes, and (4) applying these elements to modular clothing with detachable, reconfigurable components in line with sustainability goals, this study closes these gaps.

III. RESEARCH METHODOLOGY

This study investigated potential applications of architectural Kashi Kari in modular fashion design through a qualitative visual analysis methodology. The five steps in the approach included selecting architectural case studies, collecting visual data, finding motifs, getting color palettes, and making modular clothing (Park & Kim, 2023; Vaughan, 2018).

3.1 RESEARCH DESIGN

The study used a design-led, practice-based qualitative methodology, primarily utilizing visual analysis for analyzing geometric arrangements, architectural patterns, and color systems (Fehérvári, 1992). Qualitative visual analysis was selected because it allows detailed examination of geometric composition, ornamental structure, and chromatic relationships within architectural surfaces, which are essential for design translation in fashion research. This method is in the tradition of fashion and design research (Vaughan, 2018) because design aesthetic and structural evolution depend on visual data like motifs, proportions, and layouts. The design results came from modular construction, theme reconstruction, and digital experimentation done over and over again (Blair & Bloom, 1995).

3.2 SELECTING CASE STUDIES FOR RESEARCH IN ARCHITECTURE

Four case studies were selected: Shah Mosque Isfahan (Iran) (Fig 1), Sultan Ahmed Mosque (Turkey) (Fig 2), the Blue Mosque of Mazar-e-Sharif (Afghanistan) (Fig 3), and Hassan II Mosque (Morocco) (Fig 4). These architectural sites were selected due to their significant representation of Islamic geometric tile art, diverse ornamental compositions, complex symmetry systems, and distinctive chromatic identities, which collectively demonstrate regional interpretations of Kashi Kari across different cultural contexts (Bloom & Blair, 2009; Broug, 2013; Golombek & Subtelny, 2007).

The comparative selection of these case studies enabled the research to examine both shared geometric characteristics and region-specific visual variations within Islamic architectural traditions. In addition, the selected buildings provided a broad range of motif structures, proportional systems, and color arrangements suitable for modular transformation into contemporary fashion design. Their architectural diversity also supported the investigation of how traditional geometric principles can function as adaptable frameworks for modular garment construction and sustainable fashion development (Atasoy & Raby, 1989).

3.3 DATA COLLECTION METHOD

The data collection process included high-resolution photographs, architectural drawings, published research articles, museum archives, and verified online collections related to Islamic architectural tile art. Visual data was gathered from official cultural databases, heritage conservation materials, institutional archives, and peer-reviewed academic journals to ensure the authenticity and reliability of architectural references (Necipoğlu, 1995; O'Kane, 2006). Additional information regarding Kashi Kari, Islamic geometric design principles, ceramic craftsmanship, and traditional tile-making techniques was obtained from books, scholarly publications, and historical studies (Gill & Rehren, 2010; Hoek, 2012; Seemi, 2023).

The collected visual and textual materials were used to analyze geometric compositions, symmetry systems, motif repetition, and chromatic structures within the selected architectural case studies. Particular attention was given to the identification of repeatable geometric units, ornamental arrangements, and culturally significant color relationships that could be translated into modular fashion components. The combination of visual references and academic literature supported both the historical understanding and contemporary reinterpretation of Kashi Kari within a fashion design context.

3.4 PATTERN IDENTIFICATION PROCESS

Geometric patterns were extracted from each architectural case study through both manual tracing and digital reconstruction methods to identify repeatable motifs and structural design elements. Adobe Photoshop and Procreate were used to construct repeating units, refine visual edges, analyze proportional relationships, and identify underlying geometric frameworks within the selected tile compositions. The tracing process involved selecting motifs from architectural references, examining their geometric organization, reconstructing symmetrical units, and transferring refined vector forms for application in fashion design (Broug, 2013; Necipoğlu, 1995).

Particular attention was given to symmetry, repetition, modular division, and proportional balance, as these characteristics are fundamental to both Islamic geometric art and modular garment construction. The digital reconstruction process enabled the research to simplify complex architectural motifs into adaptable design units suitable for detachable and reconfigurable fashion components. This approach also supported the preservation of visual continuity between the original architectural references and their contemporary reinterpretation within modular fashion systems.

3.5 COLOR EXTRACTION PROCEDURE

The Pantone Fashion, Home + Interiors Cotton Passport and digital sampling tools were used to develop architectural color palettes for fashion application. To ensure color accuracy, chromatic samples were digitally extracted using

Photoshop's Eyedropper Tool and carefully matched with Pantone standards for professional color identification and communication. For consistency and systematic analysis, the color palette of each architectural case study was documented using three to five dominant colors along with their corresponding Pantone references.

Particular attention was given to culturally significant color relationships, including combinations of turquoise blue, cobalt blue, white, mustard yellow, and earth-toned neutrals commonly associated with Islamic architectural tile traditions. The standardization of colors through Pantone references enabled accurate translation of architectural chromatic identity into textile and garment design while maintaining visual consistency throughout the modular development process. This approach supported the application of architectural color logic within contemporary fashion systems and strengthened the connection between traditional cultural aesthetics and modern design practice (Nawaz et al., 2022).

3.6 DIGITAL TOOLS AND SOFTWARE

During the investigation, three primary digital software programs were utilized to support motif reconstruction, color extraction, and modular fashion development. Procreate was used for manual tracing, conceptual sketching, and the development of initial design ideas. Adobe Illustrator was used to reconstruct vector-based geometric patterns, refine symmetrical structures, and develop modular garment components. Adobe Photoshop was used for image refinement, color sampling, palette extraction, and layout composition (Vaughan, 2018).

The integration of these digital tools enabled the research to transform complex architectural references into adaptable fashion design elements while maintaining geometric precision and visual continuity. Digital reconstruction also supported experimentation with motif scaling, repetition, modular arrangement, and garment composition throughout the design development process. Practice-based fashion design methodologies emphasizing digital experimentation and iterative design processes have been widely discussed within contemporary design research literature, particularly in studies related to creative practice and visual methodology.

3.7 MODULAR DESIGN DEVELOPMENT

We developed modular components by translating architectural geometric systems into detachable garment structures. Each architectural case study informed the development of a complete modular outfit, consisting of a base garment and multiple attachable and detachable elements such as capes, sleeves, skirt panels, belts, and structural extensions. The modular design process involved the identification of geometric units suitable for subdivision, translation of architectural motifs into garment components, definition of attachment mechanisms, and iterative digital testing of structural variations.

To achieve the objectives of sustainable fashion design, the modular framework was guided by the principles of reusability, adaptability, and multifunctionality (Fletcher, 2014; Zhang et al., 2024). ensured that the garments were not only conceptually inspired by architectural forms but also aligned with contemporary circular design strategies that emphasize extended product lifespan and reduced material waste.

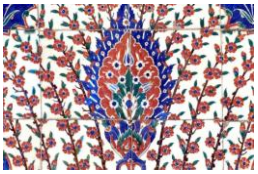
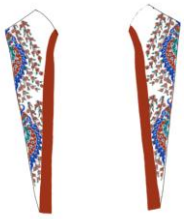
The design adaptation process was carried out with careful consideration of cultural sensitivity and respect for the historical, artistic, and cultural significance of Islamic architectural heritage. Rather than treating architectural motifs as purely decorative elements, the study approached them as structured design systems requiring contextual and ethical interpretation.

IV. RESULTS

Table. 1: Design translation from Shah Mosque, Isfahan, Iran

Building	Pattern Identification	Color analysis	Design Outcome	Modular Fashion
Shah (Imam) Mosque, Isfahan (Iran)	**1. Original tile pattern source**  The tile pattern was taken from the decorative surfaces of Shah Mosque. **2. Traced geometric tile motif**:  The mosque's tile motif was traced and simplified into a repeatable geometric design. **3. Dome pattern inspiration**:  **4. Arabesque pattern drawing**: 	 The color palette was extracted from the mosque's tilework. It includes deep blue, turquoise, golden yellow, orange, and white.	 The final design is a set of wide-leg pants with a tile-shouldered top. The garment translates the mosque's geometric and arabesque tile patterns into a contemporary fashion silhouette. The tile-inspired shoulder structure adds volume, while the printed bodice and waist details preserve the visual identity of the Shah Mosque.	**1. Shoulder module:**  Dome-shaped tile shoulder pieces inspired by Shah Mosque's semi-domes. They add volume and flexibility and can be used as an upper-body accent or capelet. **2. Arabesque pattern drawn**  The traced decorative pattern maintains visual flow, reflecting the mosque's design elements. **3. V-shaped waist panel:** The V-shaped waist panel  connects the bodice with the tile print. It can be styled in different ways, supporting modular and sustainable fashion while keeping the Isfahan tile aesthetic.

Table. 2: Design translation from Sultan Ahmed Mosque, Istanbul, Turkey

Building	Pattern Identification	Color analysis	Design Outcome	Modular Fashion
Sultan Ahmed Mosque (blue) mosque, Istanbul Turkey	**1. İznik Floral Tile Pattern**  İznik tile with stylized flowers and arabesque rhythm. **2. Traced Floral Motif**  Traced floral motif developed for garment panel placement. **3. İznik Rosette Medallion Tile Pattern**  Rosette medallion tile used as a central decorative element.	PANTONE® 19-4052 TCX Classic Blue PANTONE® 15-5519 TCX Turquoise PANTONE® 16-4530 TCX Aquarius PANTONE® 11-0602 TCX Snow White PANTONE® 16-3802 TCX Ash PANTONE® 18-1248 TCX Rust Cool blue tones dominate the design, while warm brown accents add structure and architectural contrast.	 A sleek column silhouette is built around a vertical turquoise İznik-inspired tile panel. The straight structure references mosque columns, while the patterned surface translates the mosque's ceramic tile language into wearable form. The gown balances elegance, clean structure, and freedom of movement. The central panel creates a strong visual axis, and the side accents introduce architectural depth without overwhelming the body shape.	**1. Modular Columns Dress**  The core column dress can be worn alone as a clean, refined garment with a vertical turquoise İznik-inspired panel. **2. Detachable side panel:**  Two removable overskirt panels add sculptural hip volume and architectural drama. They can also be styled as a cape, wrap skirt, or asymmetrical overskirt.

	4. Traced Rosette Medallion Motif  Traced rosette medallion motif adapted for repeat, scale, and symmetry. The motifs are arranged vertically to support the column silhouette and to echo the mosque's repeated tile surfaces.			**3. Architecture Shoulder Harness:**  A detachable shoulder-and-minaret harness frames the upper body with stylized domes and minaret forms. It creates a couture, armor-like silhouette and can be worn separately as a sculptural capelet over simpler outfits.

Table. 3: Design translation from Hassan II Mosque, Casablanca, Morocco

Building	Pattern Identification	Color analysis	Design Outcome	Modular Fashion
Hassan II Mosque, Casablanca (Morocco)	**1. Teardrop Motif** 	  The color palette is inspired by the mosque's turquoise tilework, deep blue detailing, golden ornamental borders, and soft white	 Three-Panel Architectural Skirt and Modular Dome-Cloak Set	**1. Dome Cape Modular**  The cape is inspired by the mosque's domed rooflines and green-tiled vaulting. It functions as a detachable outer layer that can be worn over formal, semi-formal, or ceremonial outfits. **2. Geometric Waist Module**  The waist module uses geometric repetition and star-rosette symmetry as a removable decorative belt. It adds structure to the garment while allowing the outfit to be

		architectural surfaces.		styled with or without the architectural detail.
	2. Stylized Floral Motif  **3. Minaret and Architectural Arches**  **4. Radial Rosette Tile**   **5. Diamond Accent Motif** 	These colors are translated into the garment through layered green tones, blue decorative accents, and gold outlines.  PANTONE® 14-0957 TCX Spectra Yellow PANTONE® 11-0602 TCX Snow White  PANTONE® 15-5519 TCX Turquoise	The final design translates the mosque's arched structures, dome forms, tile geometry, and ornamental borders into a modular fashion silhouette. The garment combines a three-panel skirt, decorative waist module, detachable side panels, and a dome-inspired cape to create a wearable adaptation of Moroccan Islamic architecture.	**3. Central Architecture Skirt**  The middle skirt panel forms the visual core of the garment. Its arch-shaped motif reflects the mosque's façade and creates a column-like effect within the three-panel skirt. It can also be detached and worn as an apron or overskirt. **4. Moroccan Arch Side Panel**  The detachable side panels are inspired by Moroccan arches and mosque ornamentation. They add volume and architectural depth to the skirt while allowing the outfit to shift between ceremonial and modern styling.

Table. 4: Design translation from Blue Mosque, Mazar-e-Sharif, Afghanistan

Building	Pattern Identification	Color analysis	Design Outcome	Modular Fashion
Blue Mosque in Mazar-i-Sharif (Afghanistan)	**1. Tile Panel for the Blue Front**  **2. Star-Rosette Motif**  **3. Arched Tile Window**  Tile Panel for the Blue Front **4. Geometric Tile Pattern**	 PANTONE® 15-5519 TCX Turquoise  PANTONE® 17-4432 TCX Vivid Blue  PANTONE® 16-4530 TCX Aquarius  PANTONE® 16-1364 TCX Vibrant Orange Palette inspired by the mosque's vivid turquoise tiles, deep blue panels, golden accents, and subtle white surfaces. Colors translate to dress panels, geometric	**Azure Geometry Modular Dress**  The design adapts the mosque's arched windows, tile geometry, and ornamental symmetry into a modular dress with detachable panels and a central decorative skirt.	**1. Modular Dome Unit**  The modular cape, inspired by a mosque dome, can be removed and worn as a raised collar or sculpted shawl, transforming from formal volume to a simpler shape

		motifs, and modular cape.		
	5. Arch Mosaic  **6. Diamond Accent Motif** 	 PANTONE® 11-0602 TCX Snow White  PANTONE® 19-0303 TCX Jet Black  PANTONE® 14-0935 TCX Jojoba		**2. Geometric Waist**  **Medallion Panel** The geometric waist medallion, resembling a belt, connects the top cape to the skirt modules and can be used as a separate decoration, reinforcing the modular design and creating a visual focal point.

V. DISCUSSION AND CONCLUSIONS

This study explores how the geometric structures, color systems, and pattern logic of Kashi Kari can be adapted into modern modular fashion. By analyzing four architectural examples from Iran, Turkey, Morocco, and Afghanistan, the research demonstrates that traditional tile motifs naturally support modular transformation and can be reinterpreted into detachable and reconfigurable garments through digital motif reconstruction and Pantone-based color extraction. The repeated geometric structures, symmetrical arrangements, and modular visual logic observed in Kashi Kari align closely with the principles of modular fashion, as both systems depend on repetition, adaptability, and structural organization.

The study positions Kashi Kari as an artistic and geometric heritage system to ensure cultural respect while exploring its contemporary design potential. Rather than treating Islamic architectural motifs solely as decorative elements, this research interprets them as functional design frameworks capable of supporting garment transformation and user interaction. The findings suggest that traditional architectural systems can successfully contribute to contemporary sustainable fashion practices without losing their cultural and artistic identity.

Through its cross-disciplinary method, combining architectural analysis, digital tools, motif reconstruction, and modular garment development, the research proposes a new framework for fashion innovation that preserves cultural authenticity while advancing sustainable design principles. The modular approach supports circular fashion strategies by encouraging garment adaptability, prolonged usability, customization, and reduced textile waste. In addition, the study contributes to fashion research by introducing Islamic geometric architecture as a structural and functional resource for modular garment construction rather than only as visual inspiration.

This work highlights the broader value of traditional crafts in shaping future fashion systems and demonstrates the potential of heritage-based design approaches within contemporary sustainable fashion research. The findings also suggest opportunities for future exploration, including collaboration with traditional artisans, experimental garment prototyping, biomaterial integration, computational modeling, and interactive digital fashion systems.

VI. LIMITATION AND FUTURE RESEARCH

6.1 LIMITATIONS

This study has several limitations related to scope, methodology, and practical implementation. First, the research is based on a limited number of architectural case studies, specifically four selected buildings from Iran, Turkey, Afghanistan, and Morocco. While these examples provide a diverse representation of Kashi Kari patterns, they do not cover the full range of regional variations within Islamic architectural traditions.

Second, the study primarily relies on qualitative visual analysis and digital reconstruction methods. Although these approaches are effective for identifying geometric patterns and color systems, they may introduce a level of subjectivity in motif selection and interpretation. The absence of quantitative validation or computational analysis limits the precision of pattern transformation.

Third, the modular fashion designs developed in this research remain at a conceptual and digital stage. Physical prototyping, material testing, and user-based evaluation were not conducted. As a result, the practical performance, durability, and wearability of the modular garments were not fully assessed.

Finally, the study focuses mainly on aesthetic and structural adaptation of Kashi Kari, while deeper cultural engagement, including collaboration with traditional artisans, was not included. This may limit the cultural depth and authenticity of the design translation process.

6.2 FUTURE RESEARCH DIRECTIONS

Future research can expand this study in several important directions. First, a broader range of architectural case studies from additional regions can be included to explore more diverse interpretations of Kashi Kari and related tile traditions. This would strengthen the comparative and cross-cultural framework and provide a more comprehensive understanding of geometric variation.

Second, future studies can integrate computational design tools, such as parametric modeling and algorithmic pattern generation, to enhance the accuracy and scalability of motif transformation. This would allow for more precise adaptation of complex geometric systems into fashion design.

Future studies may also investigate the psychological and emotional relationship between users and modular garments inspired by cultural heritage, particularly regarding personalization, identity, and long-term garment attachment.

Third, physical prototyping, material experimentation, and garment production should be conducted to evaluate the functionality, comfort, and durability of modular designs. User testing and feedback can provide valuable insights into wearability and practical application in real-world contexts.

In addition, collaboration with traditional artisans and cultural experts can improve the ethical and cultural integrity of the design process. Such partnerships would ensure that heritage elements are adapted with greater sensitivity and authenticity.

Additional research can explore the application of Kashi Kari-inspired modular systems within digital fashion environments, including virtual garments, augmented reality fashion presentation, and interactive wearable technologies.

Finally, future research can explore the integration of sustainable materials, including bio-based and recycled textiles, to further align modular fashion with environmental goals. The combination of traditional design knowledge and innovative material development offers strong potential for advancing sustainable fashion systems.

REFERENCS

[1] Abdullahi, Y., & Embi, M. R. B. (2013). Evolution of Islamic geometric patterns. *Frontiers of Architectural Research*, *2*(2), 243-251. https://doi.org/https://doi.org/10.1016/j.foar.2013.03.002

[2] Atasoy, N., & Raby, J. (1989). *Iznik: The pottery of Ottoman Turkey*. Alexandria Press.

[3] Blair, S., & Bloom, J. (1995). *The art and architecture of Islam 1250–1800*. Yale University Press.

[4] Bloom, J., & Blair, S. (Eds.). (2009). *The Grove encyclopedia of Islamic art and architecture*. Oxford University Press.

[5] Broug, E. (2013). *Islamic geometric design*. Thames & Hudson.

[6] Clark, H. (2015). *The fabric of cultures*. Berg Publishers.

[7] D'Itria, E., & Vacca, F. (2024). Shaping sustainable solutions in fashion through design-led strategies, approaches, and practices. *Discover Sustainability*, *5*(1), 409. https://doi.org/10.1007/s43621-024-00624-5

[8] Fehérvári, G. (1992). *Islamic art and architecture*. British Museum Press.

[9] Fletcher, K. (2014). *Sustainable fashion and textiles: Design journeys* (2nd ed.). Routledge.

[10] Gill, M., & Rehren, T. (2010). Material characterization of ceramic tile mosaic from two 17th-century Islamic monuments in northern India. *Archaeometry*, *53*(1), 22–36.

[11] Golombek, L., & Subtelny, M. (2007). *Timurid architecture and its decoration*. Mazda Publishers.

[12] Grabar, O. (1992). *The mediation of ornament*. Princeton University Press.

[13] Hesar, N. G., Kalantari, N. N. G., & Ahmadi, M. (2015). Study of sacred geometry in Islamic architecture. *Cumhuriyet Science Journal*, *36*(3), 41-52.

[14] Hoek, L. (2012). Materiality and meaning in Islamic tilework of South Asia. *South Asian Studies*, *28*(2), 145–160.

[15] Khan, S. (2019). Ethics of cultural adaptation in contemporary craft design. *Design Issues*, *35*(4), 32–45.
[16] Lan, L., & Liu, P. (2023). Exhibiting fashion on the heritage site: the interrelation between body, heritage space, and fashionable clothing. *Humanities and Social Sciences Communications*, *10*(1), 827. https://doi.org/10.1057/s41599-023-02373-8
[17] Mignolo, W. (2011). *The darker side of Western modernity*. Duke University Press.
[18] Nasr, S. H. (1987). *Islamic art and spirituality*. SUNY Press.
[19] Nasri, M. (2018). *THE VOCABULARY OF PERCEPTION AND DESIGN OF ISLAMIC GEOMETRIC PATTERNS* (Vol. 177). WIT Press. https://doi.org/10.2495/IHA180121
[20] Nawaz, H., Ahmed, T., & Saleem, S. (2022). Digital color extraction and standardization for textile applications. *Journal of Textile Science*, *18*(2), 55–66.
[21] Necipoğlu, G. (1992). The aesthetics of symmetry in Ottoman art. *Muqarnas*, *10*, 32–45.
[22] Necipoğlu, G. (1995). *The Topkapi scroll: Geometry and ornament in Islamic architecture*. Getty Center.
[23] O'Kane, B. (2006). *Timurid architecture in Afghanistan*. Brill.
[24] Park, J., & Kim, H. (2023). Digital reconstruction for sustainable fashion prototyping. *Fashion and Textiles*, *10*(1), 1–19.
[25] Roxburgh, D. J. (2010). Ottoman floral ornament and the language of tiles. *Muqarnas*, *27*, 121–146.
[26] Seemi, F. (2023). Multani Kashi Kari: Geometry, craft, and cultural identity. *The Arts Journal*, *9*(1), 1–12.
[27] Shaw, W. M. K. (2022). Islamic Geometries: Spiritual Affects Against a Secularist Grid. *Sophia*, *61*(1), 41-59. https://doi.org/10.1007/s11841-022-00905-4
[28] Vaughan, D. (2018). Digital craft: Retooling the handmade. *Journal of Textile Design Research and Practice*, *6*(1), 5–25.
[29] Zhang, X., Le Normand, A., Yan, S., Wood, J., & Henninger, C. E. (2024). What is modular fashion: Towards a common definition. *Resources, Conservation and Recycling*, *204*, 107495.