

TRANSLATING LOCAL GEOMORPHOLOGY INTO TACTILE RELIEF: OFF-LOOM HAND-TUFTING AS A MODERN INTERPRETIVE MEDIUM FOR PLATEAU STATE LANDSCAPE ART

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Abstract

This study addresses the need for modern textile practices to interpret and promote Nigeria's natural heritage, specifically the unique landscapes of Plateau State. Despite the area's rich geomorphology, its artistic documentation through contemporary textile techniques and exploration, such as hand-tufting, remains limited. Furthermore, the aesthetic values of these natural sites are increasingly threatened by issues like illegal mining (Ada & Ayodele, 2010). The primary goal of this research is to produce hand-tufted rugs that are directly inspired by Plateau State's landscape formations using the off-loom technique. The study utilizes a qualitative, studio-based participatory approach, focusing on the visual analysis of five distinct locations. The core of the methodology involved developing a systematic protocol for translating 2D photographic data into 3D tactile textile forms through precise control of yarn density and pile height. The findings successfully demonstrate that off-loom hand tufting is a highly effective expressive medium and can be used by manipulating pile height to create textural variation, the technique accurately renders volumetric effects and atmospheric perspective, thus, transforming the textile from a flat surface into a high-relief artwork. This work validates hand-tufting as a fine art medium for cultural preservation and promotes an innovative approach to Nigerian craft and design.

Keywords: Hand-Tufting, Tactile Relief, Geomorphology, Textile Interpretation, Modern Craft.

Introduction

The history of textiles is inseparable from the history of human culture. Traditional textiles, such as the ancient Pazyryk rug and the renowned Persian rugs are highly valued not only for their utility but also as complex visual narratives. In contemporary design, there has been a significant shift in perception, recognizing the rug and tapestry as a form of fine art, often displayed vertically on walls rather than horizontally on floors (Brouwer, 2020; Woodcock, 2022). This evolution provides a powerful opportunity for textile artists to engage with profound themes, moving beyond purely decorative patterns to create high-focus, textural artworks (Kennedy, 2024). The off-loom hand-tufting gun has been instrumental in this shift, offering speed and flexibility that allows the technique to function as an expressive artistic medium.

Plateau State is often referred to as a tourist destination, largely due to its unique geological formations and temperate climate. The region's defining feature is the Jos Plateau, a vast highland area where elevations can reach up to 1,829 meters in the Shere Hills (Plateau State ICT Development Agency, 2021). These landscapes including distinct rock formations, volcanic mountains, and unique traditional architecture represent irreplaceable aspects of

Nigeria's natural and cultural heritage. The state's scenic beauty is a vital asset, providing inspiration and attracting tourists (Tribune, 2022).

However, the continued aesthetic and cultural value of these sites is fading away due to Illegal mining, coupled with security concerns, leading to environmental degradation and a decline in tourism (Ada & Ayodele, 2010). This poses a severe threat to local geomorphology and the potential economic development that a thriving art and tourism sector could bring. It is against these backdrops, the documentation and artistic interpretation of these landscapes become not just an aesthetic endeavor, but an act of cultural preservation and socio-economic advocacy.

1.1 Statement of the Problem

A significant gap exists in the artistic representation of Plateau State's unique geographical and landscape features within the modern textile art space. While the hand-tufting technique offers the necessary technical versatility, there is a lack of documented, replicable design methodologies tailored to translate the complexities of local geomorphology into this medium. This research addresses the problem of the limited exploration of the hand-tufting technique in authentically depicting Plateau State's landscape formations.

The aim of this study is to employ off-loom hand-tufting techniques in textile to produce high-relief rugs that are inspired by the landscape formations of Plateau State, thereby establishing a new methodology for artistic and cultural interpretation.

1.2 Objectives

The research was guided by the following objectives:

1. To develop a design methodology for translating the two-dimensional (2D) features of selected Plateau State landscapes into simplified, expressive forms suitable for hand-tufting.
2. To utilize the off-loom hand-tufting technique and strategic pile height variation capable to successfully create a three-dimensional (3D) tactile relief effect in the resulting textile artworks.

2.0 Literature Review

2.1 The Historical Context: From Utilitarian Craft to Fine Art

The transformation of the rug from a purely utilitarian floor covering to an esteemed wall-mounted artwork is essential to understanding this study. Historically, pieces like the Persian rug were functional and portable, valued for their material composition, complex knotting (WordPress, 2012), and cultural symbolism. The technical demands of traditional rug-making often restricted artistic freedom, prioritizing pattern repeatability and structural durability.

However, the advent of faster, more flexible manufacturing tools, particularly the hand-tufting gun, has shifted this dynamic. Artists like Alexandra Kehayoglou demonstrate how modern techniques can be used to create highly sculptural, one-of-a-kind textile landscapes that blur the line between craft and fine art (Sierzputowski, 2016). Contemporary exhibition practices now acknowledge these works as textural artworks that demand the viewer's full attention (Brouwer, 2020), legitimizing the artistic objectives of this research.

2.2 Technical Principles of Three Dimensionality in Textile

The core technical challenge in translating a 2D photograph of a landscape into a 3D textile is creating a visible, tangible sense of depth and volume a technique known as tactile relief (Woodcock, 2022). This is accomplished entirely through the manipulation of the textile's surface structure, or pile. Details the fundamentals of carpet structure, where the pile can be created using wool (Crawshaw, 2011) or synthetic fibers, in various forms:

1. **Loop Pile:** Where the yarn forms uncut loops, generally creating a uniform, durable surface.
2. **Cut Pile:** Where the loops are sliced, creating upright tufts that reflect light differently and feel softer.
3. **Pile Height and Density:** The length of the yarn loop (or cut tuft) and the density of tufts per square inch are the two primary variables that define the resulting texture and volume.

In artistic applications, these variables are controlled to create atmospheric perspective, the visual effect where objects in the distance appear less detailed, lighter in colour, and less defined. By translating this to a rug, elements intended to be "distant" are rendered with a shorter, lower pile, while foreground elements are given a significantly higher pile height, effectively creating a 3D map of the landscape on the wall.

2.3 Colour and Aesthetic Translation (The 'Painterly Effect')

The successful artistic rendering of a landscape in yarn relies on achieving a "painterly effect," a term used to describe the nuanced, almost brush stroke-like application of colour that is characteristic of painting (See Figure 1). Natural landscapes present a spectrum of colours, and translating these into a limited palette of coloured yarns requires strategic blending. Durgan (2017) highlights that colour variation is crucial in tufted landscapes, particularly in creating subtle gradients, reflections, and shadows.



Figure 1: Illustration of the Painterly Effect.

Close up of tufted yarn demonstrating optical blending, where individual yarn colours simulate the fluid brushstrokes of a landscape painting

Source: Author's fieldwork (2024).

The off-loom tufting technique facilitates these painterly approaches. Unlike traditional hand-knotting, which often requires a precise colour map, the tufting gun allows the artist to rapidly switch between colours and place them in close proximity. The near field colour placement exploits the viewer's eye, which optically blends the distinct colours of the yarn tufts, creating the smooth, continuous colour transitions necessary to depict sky, water, or the subtle changes in geological strata.

Methodology

The research design adhered strictly to the principle of studio-based exploration, where theoretical concepts from industrial design and art are tested through physical creation (Vaughn & Jacquez, 2020).

3.1 Research Design and Scope

A qualitative, explorative, developmental, and studio based participatory research design was employed. The approach allowed the researcher to act as the primary instrument, systematically testing technical variables and artistic solutions (Vaughn & Jacquez, 2020). The study was delimited to five subjects carefully chosen to represent the range of aesthetic and technical challenges presented by Plateau State:

1. **Riyom Rock:** A powerful geological formation requiring the depiction of rugged volume and complex shadows.
2. **Kerang Volcanic Mountain:** Requires the use of atmospheric perspective and varied greenery to convey height and distance.
3. **Rayfield Holiday Resort:** Presents the challenge of translating fluidity (water) using a static, fibrous medium.
4. **Seri Architecture:** A cultural subject requiring the technical distinction between architectural textures (walls, roof).
5. **Marabou Stork:** A local fauna element requiring high contrast, stylized realism to achieve dramatic 3D relief.

3.2 Visual Analysis and Design Translation Protocol

The translation of the two-dimensional (2D) landscape into a 2D textile design template followed a three-step procedure that addressed the first objective:

- Step 1: Field Photography and Documentation: High resolution images of the five sites were captured, serving as the foundational reference material. Emphasis was placed on capturing light, shadow, and colour, which are essential for generating the final 3D effect.
- Step 2: Charcoal Sketching: The photographic data was simplified through charcoal sketching, these was a critical step in adapting the complex, chaotic lines of nature into shapes manageable by the tufting process. The technique required reducing the subject to its fundamental geometric forms and outlines, thus creating the distinct colour regions needed for the final tufting template.



Figure 2: Charcoal Sketching Process

From complex photograph to simplified, design outline.

Source: Author's fieldwork (2024).

- **Step 3: Poster Colour Swatching:** To achieve the desired "painterly effect," small swatches were painted using poster colours that precisely matched the dominant and secondary hues identified in the site photographs. These qualitative processes ensured that the final synthetic acrylic wool colours selected would accurately render the mood and realism of the landscapes, despite the limited number of yarn colours available compared to an artist's palette.



Figure 3: Poster Colour Swatches

Images showing the qualitative process of matching site-specific hues from plateau state to poster colours, which served as guide for selecting synthetic acrylic yarn.

Source: Author's fieldwork (2024).

3.3 Studio Production: Materials and Equipment

The choice of materials was crucial for balancing artistic intent with durability.

1. **Primary Backing Fabric:** Jute cloth (often referred to as primary tufting fabric) was selected for its strength and grid-like structure, which provides a stable tensioned surface for the tufting needle.
2. **Yarn Selection:** Synthetic acrylic wool was used. While wool is the traditional fiber (Crawshaw, 2011), synthetic acrylic offers a wider, more accessible range of saturated colours necessary for the "painterly effect" and possesses suitable durability and volume for creating high-relief texture.

3. Equipment: Hand needle (big size) was used for all yarn insertion.
4. Wooden table
5. Tape measure, permanent marker.
6. Nails thumb tacks, and hammer.
7. Sewing thread
8. Scissors
9. A warping reel
10. Adhesive (evostik gum) and
11. A backing fabric (cotton).

3.4 Technical Tufting Protocol for 3D Relief

The practical execution directly targeted the second objective: creating 3D tactile relief. This was managed through a highly controlled tufting sequence:

1. Fabric Mounting and Tensioning: The jute backing was stretched tautly over the custom-built wooden table to ensure consistent pile length and prevent distortion.
2. Design Transfer: The final, colour coded design was traced onto the tensioned backing.
3. Yarn Insertion and Pile Control: The tufting needle was used to insert the yarn in a systematic. The technique relied heavily on regulating the pile depth.
4. High Pile Zones: The piles were controlled to create long, dense loops (or cuts) for foreground areas, such as the Marabou Stork's body or the protrusions of Riyom Rock.
5. Low Pile Zones: A shorter, tighter loop was created for distant elements, such as the Kerang mountain backdrop or the water surface, to achieve a flatter, more abstract texture conveying distance and fluidity.
6. Finishing: The process concluded with the application of an adhesive (latex gum) to permanently lock the tufts, followed by curing, trimming, and applying a secondary backing.

4. Results and Discussion: Achieving Tactile Geomorphology

The five completed rugs served as the core results, demonstrating the successful translation of 2D design into 3D textile art. The discussion analyzes on how the specific technical solutions applied to each landscape to fulfill the study objectives.

4.1 Case Study 1: Riyom Rock - Rendering Volume and Ruggedness

Design Challenge: Riyom Rock required the creation of extreme geological volume and the impression of rugged, weathered surfaces.

Technical Solution: The high relief effect was accomplished by using a gradient of brown and ochre tones, tufted with widely varying pile heights across the rock face. Foreground vegetation was rendered with the maximum pile height to contrast sharply with the rock. The sky employed a gradual colour transition (atmospheric perspective) with a lower, more uniform

pile, pushing the background further away. The technical solution for rendering the volume of Riyom Rock aligns with contemporary 'tactile relief' practices seen in the work of Kehayoglou (2016), who uses hand-tufting to recreate geological formations as portable landscapes. Furthermore, the use of varying pile heights to create ruggedness is a recognized method in carpet manufacture to achieve 'sculptured' effects and visual depth (Whitefoot, 2009). By adopting these techniques, the study successfully translates the physical mass of the granite boulders into a three-dimensional textile form.

Aesthetic Outcome: The multi-tonal, multi-height tufting successfully captured the inherent dimensionality and geological complexity, making the rock appear to jut out from the wall. This confirmed the effectiveness of pile height variation (Objective 2) for depicting solid, voluminous forms.

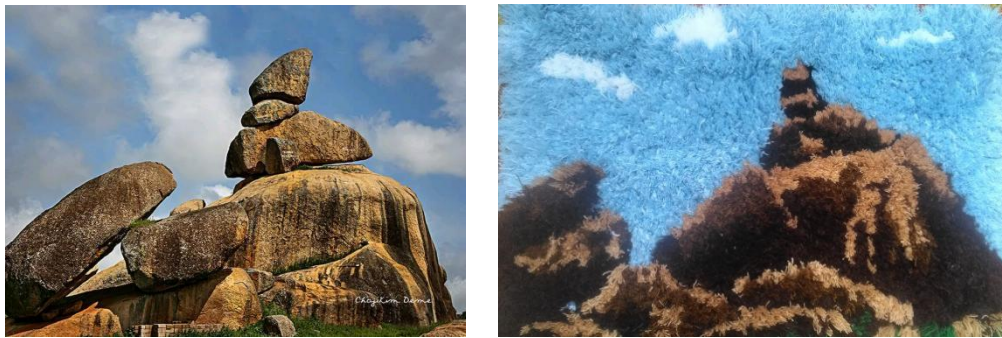


Figure 4a: Translation of Riyom Rock into Tactile Relief.

Left: Original field photograph showing the granite formation of riyom rock. **Right:** Author's fieldwork (2024).

Source: Left: Famous Rock. by K. Choji, (2024).

Retrieved from:

<https://www.facebook.com/100017189793085/posts/pfbid0Wj9JsQmXBU6erCcYwN7xtiZxnGZpzWHbm67Hs6fwzgtTeYLS7Vhs9pUT958fG6aol/?app=fbl>.

4.2 Case Study 2: Kerang Volcanic Mountain - Distance and Atmospheric Perspective

Design Challenge: The Kerang Mountain piece required a focus on distance and the subtle colour shifts of atmospheric perspective, which suggest height and scale.

Technical Solution: Unlike Riyom Rock, a flatter, more consistent pile was used across the majority of the mountain face to avoid overwhelming the viewer with texture. Instead, distinct green shades were used in conjunction with varying pile height to define the mountain's rugged contours. The sky area was executed with very low, uniform loops and extensive colour blending to simulate the fading effect of the atmosphere.

Aesthetic Outcome: The technique effectively differentiated the near-field (distinct contours) from the far-field (blended sky), creating a profound sense of depth and scale, validating the use of the technique for translating atmospheric perspective.



Figure 5: Translation of Kerang Volcanic Mountain into Tactile Relief.

Left: Original field photograph showing the Kerang Volcanic Mountain. **Right:** Complete hand tufted rug.

Source: Kerang Volcanic Mountain (n.d.), **Right:** Author's fieldwork (2024).

4.3 Case Study 3: Rayfield Resort - Interpreting Fluidity

Design Challenge: The most abstract challenge was translating the fluidity and reflection of the water at Rayfield Resort using a static, fibrous medium.

Technical Solution: The water surface was tufted using a consistent, very low pile height. This flat texture was chosen specifically to minimize shadows and highlights caused by varying yarn lengths. The realism was instead achieved by relying entirely on the painterly effect: utilizing thin yarn and a complex blending of blues, whites, and yellows to simulate surface ripples and reflections. The focus element (e.g., a duck or boat) was then rendered with a slightly higher pile to break the surface tension and provide a point of focus.

Aesthetic Outcome: The final piece demonstrated that for fluid forms, the technical solution lies not in pile height variation, but in meticulous colour management and minimal texture, proving the versatility of the translation methodology (Objective 1).



Figure 6: Translation of Rayfield Holiday Resort into Tactile Relief.

Left: Original field photograph showing the Rayfield Holiday Resort. **Right:** Complete hand tufted rug.

Source: Author's fieldwork (2024).

4.4 Case Study 4: Seri Architecture - Cultural and Textural Contrast

Design Challenge: The Seri Architecture piece required the successful translation of cultural meaning through distinct, contrasting textures specifically separating the rough, earth-based walls from the smooth, stylized lines of the roof.

Technical Solution: The walls were executed using a taller, less uniform pile to suggest roughness and volume, giving the structure a sense of permanence and solidity. The roof was tufted with a tightly controlled, uniform loop pile, emphasizing the linear perspective and cultural pattern. Colour gradation was strategically applied to the base and ground area to create a sense of distance and shadow below the structure.

Aesthetic Outcome: The tactile contrast between the architectural elements provided a compelling cultural interpretation, validating the ability of the tufting technique to convey subtle cultural narratives through texture (Objective 2).

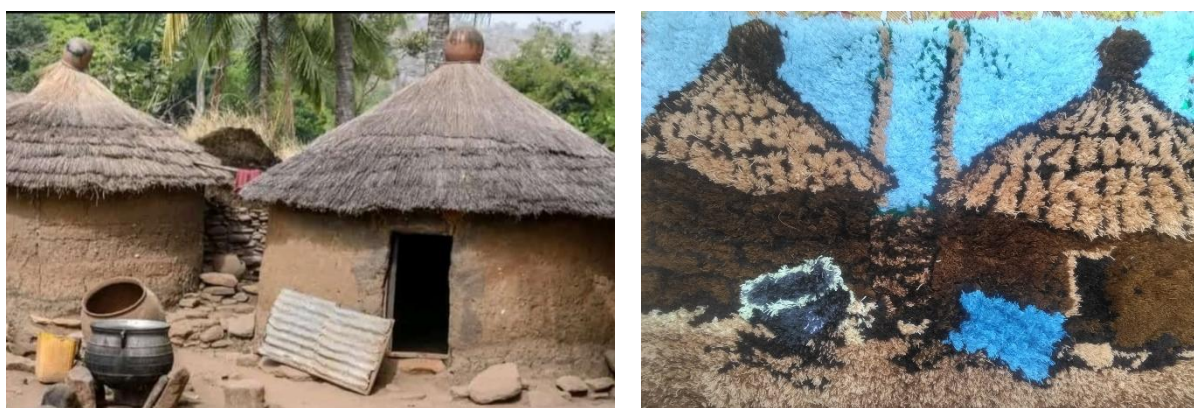


Figure 7: Translation of Seri Architecture into Tactile Relief.

Left: Original field photograph showing the Seri Architecture, **Right:** Complete hand tufted rug.

Source: Photograph by Goleng (2024). **Right:** Author's fieldwork (2024).

4.5 Case Study 5: Marabou Stork - Stylized Realism and Dramatic Relief

Design Challenge: The Marabou Stork required stylized realism and a powerful visual break from the background to achieve maximum 3D relief.

Technical Solution: This piece was the clearest test of the three-dimensional (3D) objective. The bird's body, wings, and head were tufted using the maximum possible pile height for a dramatic, high-relief effect. The background was kept comparatively simple and flat, using contrasting colours and a lower, uniform pile. This sharp juxtaposition of textures and colours (the painterly effect) created a strong, volumetric separation.

Aesthetic Outcome: The final piece demonstrated the highest level of 3D tactility among the five works, confirming the research hypothesis that systematic pile height variation is the key technical tool for achieving dramatic sculptural effects in hand-tufted art.



Figure 8: Translation of Marabou Stork into Tactile Relief.
Left: original field photograph showing the Marabou Stork. **Right:** Complete hand tufted rug.
Source: Author's fieldwork (2024).

Contribution to Knowledge

This study makes a significant contribution by providing

- i. a detailed, studio-based protocol for the artistic translation of complex geological forms into textile relief.
- ii. It validates hand-tufting as a fine art medium for cultural preservation
- iii. Promotes an innovative approach to Nigerian craft and design, offering a replicable method for artists worldwide to engage with their local environments.

5. Conclusion and Recommendations

5.1 Conclusion

This study established off-loom hand-tufting as a modern method for interpreting and translating the specific geomorphology and cultural scenes of Plateau State, Nigeria into an important design ornamental piece by formalizing a Design Translation Protocol (Objective 1) and meticulously manipulating Pile Height Variation (Objective 2), the research successfully achieved expressive, high-relief (3D) tactile textile art. The work validates the fusion of a traditional craft with modern tools to achieve complex aesthetic goals, transforming the rug into an effective cultural archival and fine art medium.

5.2 Recommendations

Curriculum integration: Educational institutions must formally integrate modern textile techniques, such as off-loom hand-tufting, into design and fine art curricula to preserve local themes while equipping students with innovative, high potential skills.

Cultural archiving and conservation: Government and cultural institutions are strongly encouraged to support and promote these textile artworks for cultural tourism and interior design. These pieces serve as a valuable, high-value method for archiving, promoting, and preserving Nigerian cultural heritage alongside other significant environment environmental resources.

Industry collaboration and ethical practice: Future researches should focus on developing sustainable business models for these high-value art forms, fostering collaboration between academic researchers, local artisans, and the tourism industry. All future work should adhere to ethical guidelines regarding the use of cultural motifs and environmental sustainability in material sourcing.

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