

From Motif to Structure: An Analysis of Artistic and Technical Variables in Mehraban Double-Weft Carpet Productions

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Abstract

This study investigates the technical, structural, and aesthetic characteristics of carpet weaving in the Mehraban region of Hamadan Province. Historically recognized as a prominent hub for the carpet trade, Mehraban's weaving tradition is a unique synthesis of the carpet-weaving culture of Turkic and Kurdish ethnicities. Using a descriptive-analytical approach combined with field observations and historical documentation, this research examines the evolution of the region's carpet industry from the Safavid era to the present. The findings reveal that while Mehraban carpets, particularly the double-weft "Kurd-baf" varieties, maintain a high structural standard characterized by a symmetrical (Turkish) knot and a specific density ranging from 20 to 45 Raj, the industry currently faces a critical transition. Analytical results show that the aesthetic landscape has shifted from traditional "mental weaving" and geometric motifs toward complex curvilinear designs, specifically the "Se-Gol" (Gol-Farang) and "Khorshidi" patterns, which demonstrate a stylistic convergence with the Bijar school of weaving. Furthermore, the study identifies a qualitative decline due to the replacement of natural fibers with acrylic-cotton blends and synthetic dyes, reflecting market adaptations. Socially, the data confirms that 71% of the current workforce consists of rural women, establishing the craft as the primary socio-economic pillar of the region. The research concludes that preserving the indigenous identity of Mehraban carpets requires a strategic return to natural dyeing processes and the formal documentation of "Owrank" (traditional design templates) to ensure the continuity of this artistic heritage in the modern global market.

Keywords

Mehraban Carpet, Hamadan Weaving, Characteristics of Design and Motif, Double-weft Carpet, Technical Analysis.

Introduction

In the Iranian cultural landscape, carpet weaving is regarded not only as an authentic art form but as an inseparable component of the people's culture and lifestyle. In the western regions of the country, carpet weaving has consistently maintained a prestigious status, serving as a symbol of creativity, indigenous beliefs, and social traditions. This art form, shaped within the context of daily life, has historically fulfilled significant socio-economic functions alongside its aesthetic values, playing an effective role in preserving cultural identity and transmitting it to subsequent generations.

Among the prominent centers of carpet weaving, the historical region of Mehraban in Hamadan Province holds a significant position. The region's climatic conditions, characterized by extensive pastures and the husbandry of the Mehraban sheep breed, have provided the ideal foundation for producing high-quality woolen yarn (Khamseh), natural dyeing, and ultimately, the formation of a long-standing tradition in carpet weaving. Mehraban carpets, with their unique characteristics, manifest the visual and artistic identity of this territory. Analyzing these features is not only essential for understanding the aesthetic principles of these handwoven textiles but also plays a decisive role in preserving authenticity, ensuring production continuity, and enhancing their commercial standing.

Technically, Mehraban carpets are categorized into two groups based on their weaving method: "Single-weft" and "Double-weft", each following specific traditions and patterns. Among these, double-weft carpets hold particular importance due to their more complex structure and distinct visual attributes. However, developments in recent decades and the interaction between this region and adjacent weaving centers, particularly Bijar, have led to changes in the motifs and structure of double-weft carpets. While this socio-cultural and artistic interaction has resulted in certain formal convergences, it has simultaneously led to a decline in the presence of some authentic indigenous motifs of Mehraban. Nonetheless, many visual and technical elements in Mehraban's textiles remain distinct, exhibiting clear differences from Bijar's weaves, differences that reinforce the independent identity and the specific weaving style (Qalam) of the Mehraban region.

Based on the aforementioned context, the primary research question is formulated as follows: How can the double-weft carpets of the Mehraban region be categorized in terms of type, compositional structure, and visual elements, and what are the defining components of their designs and motifs? To address this question, authentic samples from the region were collected and subjected to an analytical study. In this process, the classification of designs, examination of the overall structure, analysis of formal characteristics and motif arrangements, along with an investigation into the technical and technological dimensions of the weave, were comprehensively pursued. The primary objective of the present research is to provide a precise recognition of the design and structural capacities of Mehraban's double-weft carpets. Such an undertaking can play a significant role in better understanding the region's artistic heritage, strengthening indigenous aesthetic principles, and maintaining the status of this art in cultural, artistic, and commercial arenas

Literature Review

Previous studies indicate that although various research projects have been conducted on carpet weaving in Hamadan Province, a comprehensive and independent investigation into the design, motifs, and technical aspects of Mehraban double-weft carpets, specifically from a structural perspective, has received less attention. This scholarly gap is evident across much of the existing literature, highlighting the necessity of the present study. Significant contributions to this field include the work of Beh-azin (1965), titled *The Persian Carpet*, which introduces various weaving regions and refers to the carpets of Kabudarahang as "Alieh." Jazmi (1984), in *Indigenous Arts in Bakhtaran Handicrafts*, emphasizes the pivotal role of the Dareh-Jozan region in Malayer in shaping the motifs of Hamadan Province. In the seminal work *The Persian Carpet*, Edwards (1989) categorizes Hamadan carpets into two distinct geographical zones: the

Northwest and the Southeast. Similarly, Yassavoli (1991), in *An Introduction to Persian Carpets*, identifies Jozan and Manizan as primary centers for high-quality production and notes Tusk as a center for small carpets featuring embossed motifs. Further technical analysis is provided by Souresrafil (1996) in *The Book of Hamadan Carpets*, though the focus remains primarily on weaving techniques rather than a direct analysis of motifs. Dadvar (2001), in *A Study of Hamadan Province Floor Coverings in Terms of Design and Color*, classifies regional motifs into botanical and animal categories, identifying the "Star," "Eight-Petal Flower," and "Mahi" (Fish) as the most prevalent patterns. Zorriyat-al-Zahra (2002) conducted a comparative study between the handwoven carpets of Hamadan and Zanzan, categorizing motifs into three levels: primary, secondary, and micro-motifs.

Sociocultural and semiotic perspectives have also been explored. Maleki et al. (2008) categorized motifs into six general groups and analyzed their visual origins through field data. Mohammadi (2008) examined the socio-cultural layers of Hamadan carpet motifs, while Rasouli (2011) adopted a semiotic approach, dividing motifs into botanical, animal, and geometric-abstract categories. While Jhouleh (2011) provides a broad overview of the structure of Persian carpets, information regarding Hamadan's specific motifs remains limited in his work. Jalilian (2013) demonstrated that rural motifs in Hamadan are predominantly derived from nature and symbols of blessing. More recently, research has focused specifically on the Mehraban region. Khanjani (2016) analyzed the aesthetics of form and color in Mehraban carpets and the influence of Kurdish weaving traditions. Sohrabi (2017) conducted an ethnographic study on Malayer carpets, examining the cultural components influencing the province's weaving. Notably, Khanjani and Khazaei (2017) analyzed symbols in single-weft Mehraban carpets, categorizing them into animal, botanical, and geometric groups. International scholars have also contributed to the documentation of regional styles. Sakhai (2008) described Malayer carpets with an emphasis on "Herati" and "Gol-Hana" designs and their unique color palettes. Similarly, Ford (1981) identified the "Mahi-Herati" design as one of the most distinctive features of Hamadan's weaving tradition.

Despite these valuable contributions, an in-depth and independent analysis of Mehraban double-weft carpets, particularly concerning their technical dimensions and weaving structure, remains overlooked. Consequently, the present research seeks to fill this academic void and provide a more precise understanding of the status and structural characteristics of double-weft carpets in the Mehraban region.

Methodology

The present study is categorized as fundamental research in terms of its nature and employs a descriptive-analytical methodology. Data were collected and analyzed using a qualitative approach, with a primary focus on evaluating the structure, composition, and visual elements of motifs. The data collection process utilized a triangulation of methods, including direct observation, analytical interpretation, library research, and fieldwork.

The theoretical framework and literature review were developed through an extensive review of written records and existing studies. Subsequently, the research samples were gathered through field investigations, communication with carpet collectors, and digital archives. To ensure the validity and reliability of the result, semi-structured interviews were conducted with a specialized group of experts, including sellers, producers, and designers active in the Hamadan and Mehraban carpet sectors. Furthermore, formal characteristics of the regional carpets were recorded systematically using observation cards specifically designed to capture variables related to design and motif components. The statistical population of this study consists of two distinct groups:

1. *Artifactual Samples*: This group comprises authentic carpets from the region with verifiable and documented designs. Through a purposive (non-probability) sampling method, 11 carpet specimens with confirmed regional authenticity were selected as the final samples for analysis.

2. *Human Experts*: This group includes experts in the carpet industry, such as sellers, producers, and designers. Initially, 12 individuals were identified based on their professional backgrounds and in consultation with provincial authorities. Ultimately, two key experts (one seller and one designer) who expressed willingness to participate were selected for in-depth interviews.

The primary centers for double-weft carpet weaving in the Mehraban region include the villages of Jeganloo, Maran (Aylanloo), Kahriz, Mahmoudabad, Chorsokh, Ozun-Darreh, and Aliabad. All these locales are situated within the northern districts of Kabudarahang County. Several significant challenges were encountered during the research process. Due to the marked decline in carpet weaving activities in the region over recent decades, the acquisition of authentic and antique samples proved exceedingly difficult. Consequently, a portion of the visual data was necessarily retrieved from reputable internet sources and virtual archives.

A primary limitation of this study was the lack of systematic documentation regarding regional carpet production in previous decades. This historical gap complicated the precise identification and tracking of older weaves. As a result, many carpets currently available in the market are marketed under the generic label "Mehraban" without reference to their specific village of origin or distinct characteristics. Furthermore, in some historically significant weaving villages, verifiable samples are no longer available, which imposed constraints on conducting a comprehensive localized analysis.

Historical Background and Etymology of Mehraban

Kabudarahang County consists of three districts: Central, Gol Tappeh, and Shirin-Su. The region located in the northwest of this county is known as Mehraban, which is divided into two sub-regions: "Olya" (Upper) and "Sofla" (Lower). Rather than being a single village, Mehraban is an expansive territory that, according to reports, encompasses more than 60 villages (Sabahi, 2014). The historical prosperity of this region dates back to the Ilkhanate era, specifically coinciding with the period when Soltaniyeh served as the Ilkhanid capital. The contemporary inhabitants of Mehraban are primarily descendants of the Qashqai and Afshar tribes who eventually adopted a sedentary lifestyle in this area. They predominantly engage in animal husbandry, particularly the breeding of the "Mehraban sheep," a breed that has gained transregional and even global renown (Khanjani & Khazae, 2017). From an etymological perspective, the name "Mehraban" is a compound of "Mehr" (meaning Sun) and the locative suffix "van/ban" (signifying place); thus, it is interpreted as the "Place of the Sun" or the "Abode of Mithra/Sun." There are several perspectives regarding the toponymy (etymology of the place name) of this region:

Some scholars believe the name is derived from the "Village of Mehraban," which served as the central hub (Bolook) of the region in the past, eventually leading to the application of the name to the entire district. Another viewpoint suggests that the name may be rooted in the "Mehran Dynasty," a noble family that governed the region during a specific historical period. Furthermore, considering the root of the word "Mehrvan" and its connection to the concept of Mehr, some researchers have proposed a potential link between the name Mehraban and the ancient tradition of Mithraism (Abolghasemi, 2013).



Figure 1: Map of Hamadan Province
Divided by Counties (ResearchGate. n.d.)

The State of Carpet Weaving in the Mehraban Region

Although the Mehraban region is situated within Kabudarahang County, there is a lack of documented information regarding its carpet-weaving history prior to the Safavid era. Nevertheless, Eyn-ol-Saltaneh, in his memoirs, describes Kabudarahang as a "large town" and highlights the significant prosperity of the carpet trade in the area. He reports that Kabudarahang carpets were once of premium quality, with daily transactions estimated between thirty to forty thousand Tomans during the peak of its weaving flourish. Over time, however, this prosperity declined, and the economic vitality of carpet weaving in Kabudarahang decreased substantially (Salvar, 1995).

Carpet weaving in the Mehraban region has been shaped under the influence of two distinct carpet-weaving spheres: the Turkic and Kurdish ethnic weaving traditions. The most people of this region are of Kurdish ethnicity, and their presence has established a deep-rooted heritage in the craft; specifically, the double-weft carpets of the Mehraban region are widely known and celebrated as "Mehraban Kurd-baf" carpets. While the region is predominantly inhabited by Turkic-speaking populations in some sectors, the proximity to the Bijar region has led to a profound technical cross-pollination. In sectors influenced by Kurdish traditions, local weavers, regardless of their own ethnic background, have adopted Kurdish techniques, specifically the "Kurd-baf" style. This results in characteristics such as exceptional durability, structural fineness, and the double-weft structure typical of region textiles. Conversely, in the traditional Turkic-influenced sectors, carpets align more closely with the conventional rural weaves of Hamadan, typically being single-weft, more coarsely woven, and possessing a different texture compared to the adopted Mehraban Kurd-baf samples.

Currently, carpet weaving in Mehraban continues only in a limited and scattered manner, lacking its former extensive prosperity. Based on statistical data compiled between 2015 and 2024 by regional industrial organizations, approximately 71% of the region's weavers are rural women, while men account for less than 29% of the workforce (Table 1). Although carpet weaving was historically a primary source of household income, the current general stagnation of the national carpet industry and diminished economic profitability have significantly reduced weavers' incentive to remain active in this field. Nonetheless, a group of weavers persists in producing carpets with authentic local motifs or a blend of traditional and adapted patterns, thereby preserving the region's artistic and cultural heritage.

The production of carpets in Mehraban is primarily organized into two frameworks: "Employer-led" (Contractual) and "Self-employed." At present, the majority of production is conducted under the supervision and guidance of employers. Key institutional employers include Jihad-e Sazandegi, the Ministry of Industry, Mine and Trade, and the Iran Carpet Company. Additionally, some large-scale private producers maintain organized, decentralized networks by entering into direct contracts with rural weavers. This structure indicates that despite the serious constraints facing Mehraban's carpet industry, potential remains for its continuity and revival, provided that appropriate support policies and high-quality raw materials are made accessible to the weavers.

Table 1: Statistical Population of Weavers in the Mehraban Region (Authors)

Gender	% Percentage
Female	71%
Male	29%

1. Common Designs and Motifs in the Mehraban Region

Historically, the carpet production process in the Mehraban region was predominantly based on a traditional model known as the "Owrank" (Figure 2 and Figure 3). An Owrank is a fragment of an antique carpet or a pre-woven partial pattern created by a master weaver. Based on visual memory and design expertise, it serves as a primary template for other weavers.

These templates are often named according to their place of origin, designer, or patron. For instance, "Taherlou Owrank" or "Qurban-leh Owrank" are named after specific villages, while "Hadigheh-Saltaneh Owrank" and "Rakhshandeh Owrank" refer to the original designer or weaver. In some cases, the naming reflects the patron or the inspiration behind the design, such as "Safi-Allah Owrank" (Khanjani & Khazae, 2017). This nomenclature system reflects the indigenous cultural identity of the region's weavers and plays a vital role in the intergenerational transmission of technical knowledge. Two distinct design styles are prevalent in Mehraban carpet weaving: the Geometric style and the Curvilinear (Floral) style. Historically, the dominant style was characterized by geometric motifs and "mental weaving" (weaving from memory without a paper map). However, in recent periods, curvilinear and floral patterns have gained prominence and become the central style across most areas. While the quality of contemporary production has diverged from the descriptions found in historical texts and reports by European travelers and British merchants, certain villages, including Jeganloo, Maran (Aylanloo), Kahriz, Mahmoudabad, Chorsokh, Ozun-Darreh, and Aliabad, continue to produce fine and high-density carpets. This suggests that if weavers are provided with premium raw materials, such as high-quality wool and natural dyes, there remains a potential to reclaim the historical prestige of Mehraban carpets.

According to Yassavoli (1996), common designs in the Mehraban region include Lachak-Toranj (Medallion and Corner), Afshan (Overall Floral), Kaf-Sadeh (Plain Field), Qarehdaghi, Gol-Piazi, and Gol-Farang. Within the specific vicinity of Mehraban, motifs such as small and large Mahi (Fish), Khamseh, Dastgahi, and Dasteh-Goli (Bouquet) are frequently employed. Furthermore, Stone (2012) asserts that regional designs are primarily medallion-based, often decorated with scattered floral bouquets or diamond-shaped forms. In a general classification, the primary designs of Mehraban double-weft carpets are divided into two main categories:

1. *Lachak-Toranj (Medallion and Corner)*

2. *Kaf-Sadeh (Plain Field)*

The specific motifs used in these carpets are further categorized into: 1: Mahi (Fish) Motifs. 2: Transitional Motifs, which include the "Khorshidi" (Sun) motif and the "Se-Gol-e Bijar" (Three-Flower Bijar) motif (Table 2).














Figure 2: Owrank (Authors)



Figure 3: Owrank (Authors)

Table 2: Technical and Formal Specifications of Mehraban Double-Weft Productions (Authors).

Linear Analysis	Reverse Side View	Carpet Details	Description	Type	No
			The design of this carpet is the "Se-Gol-e Bijar" (Three-Flower Bijar), which is also known as the "Gol-Farang" design in the Bijar region.	Mehraban (Kurd-baf Style)	1
Linear analysis No. 1. (Authors).	Back view of the carpet (Authors).	Cushion-sized (Poshti), Knot density (Raj): 35, Se-Gol-e Bijar design (Authors).			

			<p>Most carpets in these areas are influenced by Kurdish weaving traditions, particularly the Bijar region. They are double-weft and possess a superior and more durable structure compared to other areas in Kabudarahang.</p>	<p>Mehraban (Kurd-baf Style)</p>	<p>2</p>
<p>Linear analysis No. 2. (Authors).</p>	<p>Back view of the carpet (Authors).</p>	<p>Ru-Korsi dimensions (0.8 x 1.4 m), Knot density (Raj): 38, Se-Gol design (Authors).</p>			
			<p>The structure of this carpet is modern, featuring a contemporary city-weaving style. It is a newly woven sample.</p>	<p>Mehraban (Kurd-baf Style)</p>	<p>3</p>
<p>Linear analysis No. 3. (Authors).</p>	<p>Rug dimensions (Qalicheh), Se-Gol design, Knot density (Raj): 30 (Authors).</p>				
			<p>The structure of this carpet is modern with a city-weaving style; however, it is considered a lower-quality production of the region.</p>	<p>Mehraban (Kurd-baf Style)</p>	<p>4</p>
<p>Linear analysis No. 4. (Authors).</p>	<p>Back view of the carpet (Authors).</p>	<p>Zar-o-Nim dimensions (approx. 1 x 1.5 m), Se-Gol design, Knot density (Raj): 25 (Authors).</p>			

1.1 The "Se-Gol" (Gol-Farang) Motif

The Gol-Farang design, widely known in the Mehraban region as "Se-Gol-e Bijar" (Three-Flower Bijar), is characterized by a "combination of traditional motifs with naturalistic representations of flowers such as the red rose and Damask rose. In terms of form, color, and dimensions, the execution leans toward a realistic depiction of nature. This design entered Iran during the Qajar era through interactions with foreign merchants and gradually gained popularity among Iranian weavers" (Daneshgar, 1997).

There is a scholarly debate regarding the introduction of this motif into Mehraban carpets. Designers from Malayer argue that the pattern is modeled after the "Three-Flower Twist" (Se-Gol-e Pich) of Jozan, whereas Bijar designers maintain that it originates from the "Three-Flower Bijar" style. Following a comprehensive analysis, the authors conclude that while the historical roots of the "Se-Gol" motif initially trace back to Malayer, contemporary structural modifications have made these motifs more closely resemble the Bijar style (Figure 5 and Figure 6).

However, this resemblance is not absolute, and distinct variations remain visible in the motifs. For instance, certain "Se-Gol" designs in Bijar are known as "Dar-Gol" (Figures 4), named for the interconnection of the three-flower motifs through scrolling stems or vines (Band). This structural connectivity is notably absent in Mehraban samples; instead, the motifs are typically rendered as isolated elements, whether placed inside a vase or arranged freely across the field. Furthermore, technical differences in weaving, such as the type of knot and the quality of wool used, clearly distinguish the two regions.

The use of bold, vibrant colors, particularly "Laki" (crimson/deep red), holds a prestigious place in this design within the region, creating a dynamic and visually striking effect. In Mehraban, these motifs are executed in two primary arrangements:

1. *Vase-based*: Where the flowers are predominantly designed within a vase.
2. *Scattered/Free*: Where the motifs are rendered in an open or decentralized layout.

The diverse variations of this design found across different regions (including Bijar) include Medallion Gol-Farang (Gol-Farang-e Toranj-dar), Armband (Bazoobandi), Bouquet (Dasteh-Goli), and Mostofi styles.



Figure 4: Linear Analysis of the "Se-Gol-e Bijar" Motif in Mehraban Kurdish Carpets (Authors).



Figure 5: Reverse Side View of the Sample (Authors).



Figure 6: Rug with "Dar-Gol-e Se-Gol-e Bijar" Design, Knot Density (Raj): 45, Aged 50 Years (Authors).

1.2 The "Khorshidi" (Sun) Motif

"Carpet weaving in rural and nomadic regions is among the most significant fields where mythological beliefs associated with the Sun and the tradition of Mithraism can be identified. Mythological manifestations of the Sun and Mithra appear in these carpets in the form of faunal, floral, and abstract motifs" (Mousavi-Lar & Rasouli, 2010). The "Khorshidi" (Sun) motif is a well-known pattern in contemporary carpet weaving in Western Iran, with its roots tracing back to the Bijar region. "This design was originally created by the prominent carpet designer, Master Asghar Lak, and subsequently gained popularity among local weavers" (Qasemi, 2025). Initially, the pattern was recognized as the "Asghar Lak Design," directly referencing its creator. Over time, following technical developments and shifts in market preferences, the motif underwent several modifications and redesigns.

In contemporary versions, the pattern has been recreated using modern carpet design technologies, particularly computer-aided design (CAD) software. During this redesign process, while the general structure and curvilinear nature of the motif were preserved, adjustments were made to the details and overall composition to better align with the tastes of the modern market. Today, due to the geographical proximity to Bijar, this motif has become customary in the Mehraban region, where it is designed and marketed under the name "Khorshidi" and serves as one of the prevalent patterns in local carpet production. [Figure 7, Figure 8 and Figure 9: Examples of the Khorshidi motif and its modern iterations].

The study of this pattern's evolution demonstrates both the individual creativity of designers and the impact of modern design tools on the continuity and revitalization of traditional motifs. This process reflects the synthesis of indigenous traditions and modern technologies within the evolutionary framework of the Iranian carpet art-industry.

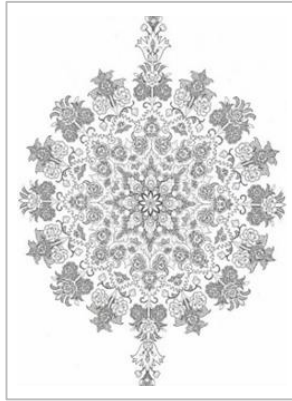


Figure 7: Linear Analysis of the Khorshidi Motif (Authors).



Figure 8: Reverse Side View of the Sample (Authors).



Figure 9: Carpet with "Do-Zar" Khorshid (Sun) Design, Knot Density (Raj): 37, Jihad-baf Mehraban (Authors).

1.3 The "Mahi" (Fish) Motif

One of the most prevalent and ancient motifs in Persian carpets is the "Mahi-dar-Ham" (intertwined fish), also known in scholarly literature as the "Herati" design. The origin of this motif traces back to the city of Herat. Historical evidence suggests that during the Timurid period, it was employed not only in carpet weaving but also in architectural ornamentation. While the term "Herati" is considered the formal designation, "Mahi-dar-Ham" is a later, more colloquial term whose exact period of emergence remains unclear (Hassouri, 2010).

According to Jhouleh (2011), the Herati motif is rooted in ancient Iran and the tradition of Mithraism, maintaining a direct connection with the element of water. Based on ritualistic texts and evidence, Mithra (Mehr) is born from water and rests upon a lotus flower, a flower that eventually manifested as the "Shah-Abbasi" motif in Iranian arts. In this mythological narrative, Mithra is brought out of the water by a large fish (possibly a dolphin), explaining the presence of fish in Iranian imagery. In the "Mahi-dar-Ham" design, this element appears prominently and repetitively. Over time, the fish depicted in these motifs gradually transformed into leaf-like shapes; the term "Mahi-dar-Ham" is believed to have originated from this formal metamorphosis. Historically, the primary roots of Herati motifs are linked to these ancient traditions (p. 31). This authentic design is found extensively in carpets from various regions, including Sarough, Farahan, Arak, Sanandaj (Senneh), Bijar, Zanzan, Hamadan, Mehraban, Tabriz, Khoy, Mashhad, Birjand, and Doroksh, as well as among the Qashqai tribes. Its recurrence in Safavid-era carpets, particularly those attributed to Herat, led to the use of various titles such as "Mahi-dar-Ham," "Riz-Mahi" (Small Fish), and "Mahi-Herati." Despite diverse naming conventions and geographical spread, the fundamental structure of the motif has remained unchanged. Variations primarily appear in the scale of components or the addition/omission of secondary elements; in some instances, the fish motif is replaced by a leaf or represented in a different scale (Vakili & Eftekhari, 2003).

Jhouleh further notes a significant shift in the scale of this motif across Iran's geography: from east to west, the size of the fish motifs gradually decreases. For example, in carpets from Torbat-e-Jam and Qaen, the fish motifs appear in larger dimensions, whereas in western regions like Kurdistan, they become finer and more delicate (Jhouleh, 2011). Conversely, Mansourzadeh and Atrgiran (2014) argue that the Herati design is essentially a "Vagireh" (repeat-unit) pattern that originated in Eastern Iran and evolved across the plateau. Weavers implemented this design repetitively across the length and width of the carpet, adjusting the number of repeat units based on the overall dimensions.

Collectively, the Mahi motif is one of the most widely used and distinctive patterns in Mehraban double-weft carpets (Figure 10, Figure 11, and Figure 12). Rooted in Iran's ancient weaving traditions, this motif is depicted in Mehraban carpets in various forms, including repeat-units and Lachak-Toranj (Medallion and Corner) compositions.

The presence of the Mahi motif in this region is notable not only for its frequency but also for its quality of execution. The intricate detailing in rendering these motifs causes Mehraban double-weft carpets to bear a significant resemblance to Bijar weaves in terms of precision and technical craftsmanship. Thus, the application of the Mahi motif in Mehraban reflects a synthesis of indigenous traditions and the influence of adjacent weaving centers, which, while maintaining local identity, has enriched the artistic and aesthetic value of these textiles.

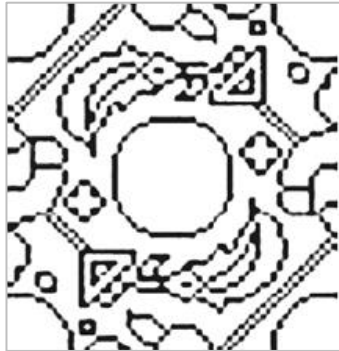


Figure 10: Linear Analysis of the Mahi Repeat-Unit (Vagireh) in Mehraban Double-Weft Carpets (Authors).



Figure 11: A Clearer View of Sample No. 12 (Authors).



Figure 12: Rug with "Mahi" (Fish) Design, Knot Density (Raj): 40, Aged 70 Years (Authors).

2. Color Palette of Mehraban Double-Weft Carpets

Regarding the dyeing practices in the Mehraban region, it is documented that the villagers, specifically in the central village of Mehraban, utilized a unique method for dyeing with Madder (Runas). According to Edwards (1989), this technique was also common among the inhabitants of Bijar, Mehraban's neighboring region. In this method, the yarn was first immersed in a mixture of yogurt-whey (Doogh) and alum (Zaj-e Sefid) for three days, a process that had to take place under direct sunlight. After a thorough washing, the yarn was boiled in a cauldron containing madder. Once the dye was sufficiently absorbed, the cauldron was removed from the heat. Subsequently, a specific amount of bovine urine was added to the solution, and the yarn remained immersed for approximately 15 minutes. Finally, the yarn was washed again and dried in the sun.

The predominant colors in Mehraban carpets are deep madder red (Ghermez-e Runasi) and indigo blue (Abi-e Nili). The high quality of the raw materials used in dyeing, particularly the wool and natural pigments, results in a dense, durable, and uniform texture in the final weaves. Consequently, the rugs, runners (Kenareh), and the limited number of full-sized carpets from this area have historically been recognized in the market as some of the finest products of the Hamadan region, often commanding higher prices (Edwards, 1989).

Nasiri (2010) suggests that two primary types of carpets are produced in Mehraban:

1. Traditional styles featuring geometric designs, typically in Do-Zar dimensions with wide borders.
2. Long, narrow runners that bear a striking resemblance to the rugs known as "American Sarouk".

Nasiri evaluates the quality of the fibers and dyes as relatively high and notes that while dark red and blue are the dominant colors, the use of other shades such as golden yellow, beige, and light blue has also been prevalent (Nasiri, 2010). Similarly, Daneshgar (1997) emphasizes that Mehraban weaves are generally characterized by their simplicity, reliance on madder red and indigo blue, and the use of indigenous wool. Despite their simplicity, these carpets possess an artistic and striking quality.

Furthermore, Azarpad and Heshmati Razavi (2004) state that the distinguishing features of Mehraban carpets, in addition to their high durability and density, include the use of authentic colors like madder red and indigo blue, which bestow a unique aesthetic appeal to these textiles.

3. Techno-Physical and Structural Characteristics of Mehraban Double-Weft Carpets

The tools and weaving techniques employed in the Mehraban region reflect a profound synergy between tradition and innovation. The looms (Dars) are predominantly vertical and metallic, manufactured by craftsmen from Hamadan and Kurdistan. This highlights the interregional position of the carpet industry within a network of production centers. While historical evidence suggests the past prevalence of wooden looms, their replacement by metallic structures signifies a transition toward increased tension control and structural durability. Auxiliary tools, such as the heavy comb-beater (Dafteh), shears, and knives, function similarly to those in other weaving centers in Hamadan. Interestingly, in the past, large Karkits were used for beating thick wefts, while finer Daftehs were used for thin wefts, indicating high technical precision in the Mehraban weaving process.

The warping (Chelleh-keshi) in this region is performed entirely using the Turkish (Tabriz) method, a technique common in Kurdistan and Azerbaijan. This choice underscores the technical and cultural affinity between these regions. Regarding raw materials, a significant transition has occurred: historically, warp threads were primarily cotton or wool; however, today, acrylic-cotton blends with S and Z twists (12 to 15 plies) are widely used.

The thick weft is similarly composed of an acrylic-cotton blend (9 to 12 plies), usually color-coordinated with the carpet's field. In contrast, the thin weft typically consists of single-ply acrylic thread (Qarqareh) (Qasemi, 2024). While this substitution reflects market adaptations and resource constraints, it may impact the long-term durability compared to traditional organic samples.

The pile fibers remain wool; however, the shift from hand-spun local yarn to industrial mill-spun yarn is evident. The knots are generally executed using the Symmetrical knot, which further clarifies the link between Mehraban weaving and the traditions of Bijar and Kurdistan.

The knot density (Raj) of Mehraban carpets typically ranges between 30 and 45. This density places Mehraban textiles in an intermediate category, neither coarse nor exceptionally fine, yet with a structural integrity and aesthetic refinement that allows them to compete with prominent centers like Bijar.

The side-bindings (Shirazeh) are fully attached and woven with woolen fibers. The number of warp threads used in the Shirazeh varies according to the carpet's fineness, with colors coordinated to match the borders. The flat-weave ends (Gelim-baf) are usually executed in a plain weave (canvas) style using cotton-acrylic yarn, typically measuring 1 to 2 centimeters. Notably, Mehraban carpets generally lack elaborate fringe finishing or specialized decorative arrangements at the warp ends, reflecting a minimalist approach to the weaving process.

The analysis of the technical structure and raw materials indicates that while Mehraban remains committed to certain ancient traditions, such as the symmetrical knot, fine knot density, and woolen piles, it has been forced to adapt to industrial materials. These changes, while affecting the ultimate tactile quality, have preserved the authentic identity and overall structural framework of Mehraban carpets. Thus, Mehraban weaving represents a crossroads of tradition and modernity; a current that, if supported by economic and cultural policies, could revitalize this heritage and enhance its competitive capacity in contemporary markets (Table 3).

Table 3: Technical Specifications of Mehraban Carpet Production (Authors).

No.	Feature	Detail
1	Production Dimensions	Poshti or Makhtameh (0.7 * 1.04 m), Zar-o-Nim (1.04 * 1.60 m), Do-Zar or Rug (1.20 * 2.08 m), Padari (1.7 * 2.5 m), 6-Square Meter (2 * 3 m)
2	Weaving Tools	Heavy comb-beater (Dafthin), shears, and carpet knife
3	Loom Type & Material	Vertical loom (Dar), constructed from metal

4	Warping Method	Turkish (Tabriz) style
5	Warp (Warp Yarn)	Acrylic-cotton blend / S and Z twists / 12 to 15 plies / Color: White.
6	Thick Weft	Acrylic-cotton blend / S and Z twists / 9 to 12 plies / Color: White.
7	Thin Weft	Acrylic yarn / Single-ply / Color: Coordinated with the field color.
8	Knot (Pile)	Material: Wool / Type: Symmetrical (Turkish) / 1-ply.
9	Knot Density (Raj)	20–45 Raj.
10	Weave Structure	Lool (Fully depressed warp structure).
11	Side-Binding (Shirazeh)	Attached / Material: Wool / Color: Coordinated with the border color.
12	End-Finish (Gelim-baf)	Plain weave (Canvas style), Cotton-acrylic blend, 1–2 cm in length.
13	Fringe Decoration	None (Simple finish).
14	Shearing (Finishing)	Performed manually by the weaver upon completion.

Discussion

The present study conducted a comprehensive analysis of the carpet-weaving tradition in the Mehraban region of Hamadan Province, focusing on its historical evolution, technical structures, and aesthetic motifs. The findings reveal that Mehraban occupies a unique position as a cultural and artistic crossroads. Historically, as noted by travelers like Eyn-ol-Saltaneh, Mehraban was a thriving center for the carpet trade. This study confirms that the region's distinct identity is rooted in the presence of Kurdish ethnic groups, whose double-weft carpets established a high standard of structural integrity.

The technical analysis shows that these types of carpets, utilizing the "Kurd-baf" technique and a symmetrical (Turkish) knot with a density (Raj) of 20 to 45, are superior to many other rural weaves in Hamadan, allowing them to compete with renowned Bijar products. However, a critical finding is the increasing reliance on synthetic-cotton blends (acrylic) in the warp and weft. While this ensures production continuity, it poses a challenge to the material prestige that historically defined Mehraban textiles.

Furthermore, the aesthetic landscape has evolved from "mental weaving" and geometric motifs toward more complex curvilinear designs. The adoption of the "Khorshidi" and "Se-Gol" motifs exemplifies the region's ability to adapt external influences while maintaining a local flair through specific color palettes, such as deep madder red and indigo blue. Despite the transition toward institutionalized production models, the high participation of rural women (71%) between 2015 and 2024 underscores that carpet weaving remains a vital socio-economic pillar.

Conclusion

In conclusion, the Mehraban carpet is not merely a commercial commodity but a living heritage that embodies the technical skill and cultural memory of its Kurdish and Turkic weavers. This research demonstrates that the indigenous identity of the region, particularly the prestigious Mehraban Kurd-baf weaving tradition, faces a duality of persistence and qualitative decline due to modern market constraints.

To revitalize this industry and bridge the quality gap between contemporary and historical productions, the following measures are recommended:

1. Revitalizing Organic Materials:

Encouraging the return to natural dyes and hand-spun wool to reclaim the "premium" market status of Mehraban Kurd-baf textiles.

2. Structural Support:

Providing institutional support for self-employed weavers to reduce dependency on low-quality industrial materials.

3. Preservation of Motifs:

Documenting and archiving the traditional "Owrank" templates and indigenous designs to prevent the loss of artistic identity in the face of rapid modernization.

By harmonizing these traditional values with modern support policies, the Mehraban region can ensure that its carpets remain a competitive and cherished component of Iran's artistic heritage.

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