Journal of Positive School Psychology
2022, Vol. 6, No. 4, 5055–5073

The design possibilities of Hand tuft carpets in expressing the aesthetic values of fine arts (practical models)

Ismail Ibrahim Mahmoud [1]
Prof, Art Education Department, College of Education, King Faisal University
*P.O Box: Al-*Ahsa, *31982, Kingdom of Saudi Arabia*
Email: iiali@kfu.edu.sa

Hanaa Kamel Hassan Alseaidy[2,3]
Prof, Art Education Department, College of Education, King Faisal University
*P.O Box: Al-*Ahsa, *31982, Kingdom of Saudi Arabia*
Email: halsaedi@kfu.edu.sa
Prof. High Institute for Applied Arts. 6th October City[3]

Abstract

Hand tuft is a method used in the creation of pendants and floor furniture. The basic elements of carpet design examined in all of their production processes, as well as how to balance the design space, lines, shapes, and colors. Hand tuft carpets characterized by a high level of flexibility, complete freedom in production processes and color selection, and no constraints on aesthetic effects within a single piece of carpet. The two researchers looked at ways to use Hand tuft carpets' technical capabilities and design elements to express the aesthetic ideals of the plastic arts. The researchers looked into the methods for delivering design concepts that are appealing to consumers' tastes and that keep up with the language of the times with new visions in order to arrive at unique design solutions that are pleasing to the eye. The plastic arts' creative ideas and aesthetic ideals can used to help carpet and tapestry makers increase their visual awareness. Kandinsky, one of the pioneers of abstract art, was the inspiration for painting models. The design capabilities of Hand tuft carpets used to do geometric analysis of Kandinsky's paintings and to present contemporary visions borrowed from Art Nouveau schools. The two researchers introduced new aesthetic influences that can used to create carpets and textile hangings that are technically and functionally compatible with abstract art subjects.

Keywords: Hand Tuft Carpets, Aesthetic values, Fine arts, design elements.

[1] Ismail Ibrahim Mahmoud, Professor, Department of Art Education, College of Education, King Faisal University, KSA. iiali@kfu.edu.sa

[2] Hanaa Kamel Alsaedy. Professor, Department of Art Education, College of Education, King Faisal University, KSA. halsaedi@kfu.edu.sa

1. Introduction:

Carpet used as one of the competing solutions for floor covering. There are three basic types of carpets: knotted, woven and tufted, knotted, woven, and handmade. Of these three types, 90% of the carpets produced today made in the rug style. The reason for this is due to its high production rate (**Crawshaw, 2016).**

A carpet is a three-dimensional woven structure consisting of threads or fabric back to which the pile threads perpendicular. Pile yarns used to obtain heavyweight, firm fabrics. The use of pile threads perpendicular to the surface of the floor fabric achieves aesthetic shape, comfort when walking, sound absorption and heat insulation **(Choubisa B. et al, 2020)**.

They are characteristic of carpets. Carpets used for two main purposes, one of which is utilitarian, represented in covering the floor, and the other is aesthetic. Carpet designers need to renew from sources of inspiration for designs for carpets and textile hangings. Abstract art (Kandinsky's paintings) can used to achieve artistic alignment with themes of abstract and functional art using the design possibilities of Hand tuft carpets.

Modern art characterized by its renewal and departure from the usual rules. The structure of modern art confined to its philosophical entity in many sects and artistic trends that have entered with their expressive aesthetics the crucible of human conflict through eras of history. Modern art was able to re-visit the ancient arts again from a different point of view, and multiple artistic schools emerged, abstraction being one of the most important. No matter how different the manifestations of the arts, its basis is abstraction, where the abstract style combines surfaces, shapes, color values, and plastic relations in a distinct style. Expressionist abstraction is one of the most important liberation movements and one of the most important structural foundations of modern and contemporary art.

Abstraction remained the goal that many artists seek to reach, because they found in it the expressive tool, and the expressive abstract school is described as an expression of feelings stored in the subconscious in an automatic way through distortion and creation of forms(1p). Modern art, its trends, schools, and the aesthetic values it contains are a source of creativity and innovation in the field of arts in general and in the field of design in particular.

1.1. Research problem:

Carpet designers of various types face a problem represented in the difficulty of presenting renewable design ideas that meet the tastes of consumers and keep pace with the language of the times. There is a need to provide new insights to reach distinct designs that can applied to aesthetic values. Here the question arises about how to take advantage of the creative ideas of plastic arts in developing the production of carpets and textile hangings while maximizing their advantages.

The research problem summarized in the following questions:

1- What are the advantages and design capabilities of hand tuft carpets compared to other methods of carpet production?

2- What is the effect of employing the technical and technical capabilities of the hand tuft carpets in showing the aesthetic values of abstract art (Kandinsky’s paintings as an example)?

1.2. Research importance:

1- Providing design solutions, innovative and contemporary ideas for carpets and textile hangings and benefiting from the design capabilities and technical advantages of the Hand tuft carpets production method in

expressing the aesthetic values.
2- The link between the artistic methods of the abstract school and the fields of carpet design and textile hangings by integrating, updating and drawing inspiration from Kandinsky's paintings as one of the pioneers of abstract art.

2 .Terms Used:

- Hand tuft carpet: It is one of the methods used in the production of carpets and pendants. The production of hand tuft carpets requires a special quality of fabric for the floor texture. The terry surface added in a style that more embroidered than woven. The pile surface formed by using a special tool called a pistol that stitches the pile threads into the surface of the floor fabric. This method results in the possibility of producing carpets and pendants according to the designer's desire. The Hand tuft woven hangings are a woven art pattern that allowed hanging on the walls. It contains an artistic plastic treatment.
-Aesthetic values: It is a term that refers to the value that lies in the artwork, whether in its content or form, and it depends on the value and level of the work itself. Ahmed, Nakhla, (2016).It is defined as what the work contains of artistic and aesthetic features and elements that distinguish it from others as a result of the use of technical means and methods that highlight the aesthetic aspect. (Ibrahim, Irene, 2007).
- Fine Arts: The arts that depict the emotional state of man and embody it in a work of beauty that achieves the theoretical enjoyment of its viewers. This done by adapting colors, spaces, lines, and other formal features of objects. It includes a wide range of arts such as sculpture, drawing, and photography, in addition to the applied arts rich in creativity and formal beauty. (Bouzar, Habiba, 2014).
-Design elements: The artwork consists of a group of elements such as line, color, shape, space, and texture, and they linked with flexibility that makes them capable of merging and unification to form a form of artwork, the artist's awareness of which helps in evaluating and developing his design.

3. Literature review:

The beauty and artistry of handmade carpets reflected in its paintings. The most famous are Iranian hand-knotted carpets, which have designs that are so perfect that they may express messages and extract events. In their modern designs, mechanical carpet designers draw influence from classic models of Iranian, Turkish, and other carpets. Hand tuft carpets moved away from the tradition of Iranian and classical carpets in order to transform it into an artistic direction that aims to express aesthetic values Mahjoubi, S. Depending on the variables of producing these types of carpets, in a more effective way than other methods can vary(Mahjoubi, S, 2017).
The pile tufts manually or mechanically planted to generate the pile surface of carpets. A handmade carpet takes longer to make than a machine-made carpet, but it has a different aesthetic appearance. Handmade items are helping to pique the attention of antique and handicraft collectors, allowing them to retain a significant portion of the antiques and collectibles market. Lint threads inserted into a layer of fabric to create tuft. The thread count made up of two, three, or four thread counts that fed simultaneously. The pile threads cut to the desired, predetermined length after inserted into the backing fabric. To reach specified pile heights, the blade length can modify. Bera, (2019). is an upcoming event. A semi-hand tuft carpet is the name for this design. The final look and feel of each of the primary methods of carpet creation will differ because of the diverse manufacturing processes.

3.1. Durability, shape retention, and life:

Several academics have looked into the factors that influence carpet performance. The carpet's

qualities determined by the amount of thickness lost following static and dynamic loads, as well as the force necessary to pull the pile threads from the floor fabric, i.e. the weft pulling force. The appearance of the carpet also affected by the decrease of carpet thickness. The static load represents the influence of furniture and movables on the pile, whereas the dynamic load represents movement, walking, and running. When the carpet laid on the stairs, the pile tufts can be detached from the carpet. Erdem Koc et al, (2005). Conducted a study. The amount of carpet thickness loss was determined using different types of pile yarn, and it discovered that the thickness recovery increases as the recovery time increases. In terms of sustained static stress, wool carpets were the best and acrylic carpets were the worst. As the pile density rose, the thickness loss reduced. Due to its greater ability to resist static load, wool-polypropylene (PP) mixed pile carpets may be preferred to generate heavier and sturdier carpets, depending on the end usage. An acrylic pile carpet, on the other hand, may not be suited due to its inability to handle static loads. (Dayiarya et al, 2010).

There is a link between increasing the density of the pile and reducing the loss in thickness. The type of material used and the qualities of the pile yarn have an effect on the compressibility and thickness recovery, according to Nilgün Zdil, (2012). The coarser and denser the pile threads are, the less thickness is lost under moving and static loads. Different carpet structure factors that have an impact on carpet performance researched by Emel Önder et al, (2001). The type and density of the pile material had a significant impact on the carpet's longevity, and the abrasion resistance rose as the pile density grew. The type of yarn knot mostly determines tuft's pull strength, though more research needed in this area. Dubinskaite et al, (2008). Discovered that pile height and density had an impact on a carpet's end-use qualities. When the pile height was low, the amount of deformation that not recovered was highly dependent on the pile density. The basic parameters of carpet construction, according to Tabatabaei et al, (2014). Are pile height and knot density. Gupta et al, (2017). Found a substantial association between knot density and the number of yarn layers in compressive strength behavior of hand knotted wool carpets. The stress behavior was determined to be more essential than the pile threads' torsion level.

The type of material and the number of threads have a considerable effect on the average variation in thickness and the percentage of loss in it, according to a study by Nihat Celik and Erdem Koc, (2010). The majority of research Bhavna Choubisa et al, (2020). P.C. Patni, (1996). Found that pile density and pile height were the most important factors in determining carpet performance. There were fewer researches (R.K. Arora et al, (1999).F. Liu et al (2002), KK. Goswami, (2009). On tuft pulling strength in Hand tuft carpets. For optimal performance of knotted carpets, most carpet specifications contain minimum tuft pulling force criteria. Liu F, Maher AP, Lappage J, et al, (2002). In addition, others. It is impossible correctly predict the life lifetime of produced carpets because other elements, the most important of which is pile retention, interfere with assessing their age and worth. For cut pile carpets, the minimum average pulling force of the pile yarn must not be less than 10 Newton's (1.02 kg). As a bearing strength standard, gupta, S.K. et al, (2017). Is used. One of the evaluation components is the technical aspect, which determines the age and worth of the carpet, as well as the global trend of aesthetic taste. The handmade value, originality, and uniqueness of the production, as well as the fact that it does not reach mass production, remain a competitive advantage that raises the value of handmade carpets. This is not the case with Hand tuft carpets, and they never gain the status of legacy since they lack the historical characteristics. The handwoven rug Mahjoubi, S., (2017). The best

choice for those who want to buy a rug that has increased in value over time despite its use in home décor. Those who choose hand tuft carpets can be content with the lovely touches and pleasant additions to their home décor.

3.2. Hand Tuft Production Method:

Hand tuft carpet production process is completely different from the traditional way of carpet production. It based on the implantation of strands of thread using a mechanical device that is manually controlled. These tufts planted through a layer of fabric that is primed and stretched onto a frame to match the area required for the Bera, (2019). Carpet. It is including the possibility of changing the height of the pile, and its shape, with the production of unequal pile on both sides in the form of the letter (J) with great flexibility this machine's operation based on the employment of a single hand tuft needle that powered by an air force system. While penetrating the layer of Goswami, (2009). Supported fabric, the pile threads supplied via the hollow of the needle. The knot planter allows a worker to plant 10,000 knots per day on average Cascio, (2006). We can compute the time it takes the worker to conclude production using the carpet's size and density, as well as the typical amount of production. Rugs with intricate designs and detail can cost up to twice as much as basic designs, and the machine can sew at any speed between 50 and 1400 stitches per minute. A jet of air pushed through a valve after the needle reaches its maximum travel in the forward position, pushing the suture threads through the hollow needle.

3.3. Characteristics and Benefits of Hand Tuft Carpet:

Hand tuft rugs made to a variety of specifications, distinguished by a high level of flexibility, and complete freedom in terms of production processes. The number of knots in the measurement unit can varied between carpets with dense knots and carpets with fewer knots as needed. Various varieties of pile fibers, with varying precision, number of thread layers, continuous or discontinuous nature of the fiber structure, and pretreatments, employed. Different yarns can used to create one kind of carpet Cascio, (2006). Depending on the desired impact.

The following features can see in Hand tuft carpets:

- The number of massive color combinations that can used is limitless.
- For threads up to 6 mm and spinning direction, other threads can used.
- Carpets can create in vast areas with lengths of up to 30 meters, and many heights in the length of the pile can used and controlled according to the design requirements for the same carpet.
- Any geometric shape of carpet can made to the customer's specifications (rectangle, square, circle, oval, or any other shape).
- With this approach, hand drilling employed to give the carpet a unique appearance.
- The ability to combine natural and industrial textile raw materials (wool, silk, cotton, and various synthetic fibers) in a single carpet.
- Depending on the application, a square meter of produced carpet might weigh anywhere from 1000 grams to 10 kilograms.

Hand tuft carpets can have a cut pile surface or buttonholes that not cut. It is feasible to make a single carpet with two types of pile and loops, which is difficult or impossible to create using mechanical methods.

3.4. The carpet's structural and aesthetic aspects are as follows:

Design principles and foundations represent the essential concepts of any configuration, which utilized to organize and structure the design elements. It can be used to individual elements

of the carpet design or to the entire design as a whole. For designers to know how to employ these concepts and apply them to carpet design, they must develop a visual awareness. These items represent the axes that the researchers study. Carpets can made by varying the basic design elements, which are the most important considerations when designing carpets. Carpet manufacturing procedures provide varied degrees of inventiveness in the precise lines of shapes, colors, values, textures, and space, as well as the illumination of carpet design spaces and the mass of visual elements.

3.5. Aesthetics of abstract art in carpet and chandelier design:

Abstractionism is a modern art movement that began towards the end of the first decade of the twentieth century, when Russian artist Wassily Kandinsky displayed his first abstract paintings. Artists who were enthusiastic about the idea of searching for an abstract form that is devoid of details and has no direct connection to nature or a specific expressive subject appeared as a result, as they found greater freedom and broader experiments in formation, technique, understanding, and expression in this new concept of art, Hassan, (1991). The term "abstraction" encompasses a wide range of techniques and beliefs, and many artists have their own interpretations. (Bassiouni M., 1982). Explores all geometric abstraction, expressionism, organicist, and optical illusion in his work. Despite the fact that there are numerous abstract schools, they all adhere to the same philosophy: art is not a simulation, but rather a form of creativity, expression, and means of communication between the masses in a language that the artist feels and transmits to others.

3.6. Kandinsky's artistic style:

Kandinsky was a pioneer of abstract art who pushed for the artist's freedom from traditional painting methods and the importance of gaining this freedom so that he may represent it in his works. Kandinsky known for his vibrant color palette and strong emotions. Kandinsky's abstract paintings progressed through three stages, which can classified into three periods. **(Herbert reads, 1985).**

3.7. Kandinsky's artistic development:

Early Russian art affected Kandinsky, and he consistently stressed the influence of medieval Russian icons on his work. In the flexibility of her vision, the powerful brushstrokes, the choice of simplified subjects, and scenes centered on a specific portion, he was familiar with Impressionism and Pre-Impressionism. He loved powerful, clear colors and depended on space over touch, and he painted extremely freely without any limits, influenced by Brutalism. In a number of his paintings, he distinguished by integrated geometric and balanced designs, and he tended to reduce the elements of forms and balance the composition in terms of the horizontal and vertical orientation prevailing on a few basic elements of the form, as well as diversity in one form Moszynska Anna, (1990). He reintroduced plastic elements into his work, and his compositions became more classical, calmer, and simpler in terms of formal organization Allam, Rania, (2012). Kandinsky subsequently blended the tight design with geometric shapes and lines, his forms lost their geometric sharpness and became more organic, and his formations became lighter and more romantic, with primary and geometric symbolic forms sprinkled around the artwork (Allam, Nemat, 1983).

As a result, the researchers believe that drawing on the philosophy and thought of one of the abstract school's founders (Kandinsky) could help Designers build with an aesthetic vision that is appropriate for today's cultural and artistic atmosphere.

4 .Methods:

The research employs a descriptive

experimental design. Following an examination of the literature, a list of basic characteristics through which the aesthetic values of carpet design might communicated compiled. Carpet manufacturing procedures enable for innovation in 1- the shapes' specific lines, 2- the colors, 3- the values, textures, and space.

4.1. Study aid:

4.1.1- A list of criteria for carpet aesthetic values and structural capabilities:

As one of the requirements for reaching aesthetic values, the two researchers created a list of structural design alternatives for constructing carpets and textile hangings. For the three primary methods of carpet production, the list consists of (18) phrases distributed across three axes (handmade carpets, mechanical carpets, and Hand tuft carpets). For the purposes of comparison, they answered on the Triple Likert scale as follows: (available without limits = three degrees), (limited or restricted = two degrees), (not available = one score) (general lines and shapes - freedom to choose the number of colors and materials - textures and artistic effects). The instrument provided to experts in order to decide whether it could use. The legitimacy of the list confirmed by the arbitrators' apparent honesty, taking into account the arbitrators' observations, and the statements that agreed upon were less than (90 percent) excluded, making the content valid. Cronbach's alpha coefficient was used to verify the scale's stability; the coefficient in the overall score was (0.89), and the reliability coefficient was (0.89) using the split-half approach (Spearman) (0.86).

4.1.2 -2- A note card describing Kandinsky's artistic values:

The sample members asked to respond to the second question on the possibilities of drawing inspiration and applying abstract art (Kandinsky's paintings) in creating modern visions for the design of carpets and textile hangings using the observation card. The researchers wanted to produce coherence and unity in the artwork as a whole by finding harmony and coherence between the background and the design components in one entity. Some effects and textures added using a computer program.

5 .Results and discussion:

According to the findings of Gupta & Dasgupta, (2021), the two researchers investigated the use of carpets' technical and design capabilities, particularly Hand tuft carpets, to represent the aesthetic qualities of fine arts. In addition, the connection between paintings from modern art schools and carpet design to present contemporary Hand tuft carpet dreams. With the development of aesthetic effects that can be used to create technical and functionally compatible carpets and textile hangings.

5.1. To answer the first question, what are the design capabilities of Hand tuft carpets and how may they used to represent plastic arts aesthetic values?

The two researchers analyzed and contrasted the design features and capabilities of several carpet production processes; including manual, automated, and Hand tuft carpets. Table 1 summarizes the criteria used to divide the elements of conveying the aesthetic values of the fine arts into three basic axes. The first axis is composed of general lines and shapes; the second axis is composed of the freedom to choose the quantity of colors and materials; and the third axis is composed of textures and aesthetic effects.

5.1.1. The first axis made up of basic lines and shapes:

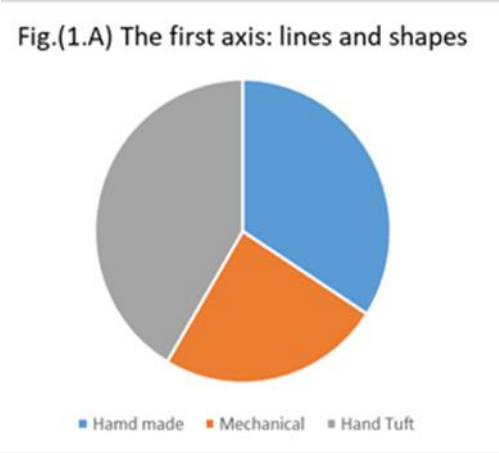
This axis-involved research on a set of design features, including Design detail restrictions. - Flexibility to choose the design space. - Production of carpets in unrestricted sizes and spaces. - The ability to make carpets in any shape (rectangular, square, or free form). - The ability to regulate the weight of the carpet. - The

ability to change the knot density per unit the same rug measured twice.

Table (1) the design elements to express the aesthetic values of the carpet

Type	Hand tuft			Mechanical			Hand made		
Verification degree	Unavailable (1)	Constrained(2)	Available (3)	Unavailable (1)	Constrained(2)	Available (3)	Unavailable (1)	Constrained(2)	Available (3)
The first axis: lines, shapes and specifications									
Design details without restrictions		√			√				√
Choose any design space			√		maximum 5M				√
Carpet size and space without restrictions			√		maximum 5M		√		
Producing carpets of any shape (rectangular, square or free-form)			√	√			√		
Easy to control the weight of the carpet			Up to 10kg		√		√		
Change knot density/unit for the same carpet			√	√			√		
Total	0	2	15	2	8	0	0	8	6
Average	17/18 = 94.4%			10/18 = 55.5%			14/18 = 77.8%		
The second axis: the number of colors and materials									
Unlimited number of colors used			√		Up to 7 color				√

gradient effect		√			√				√
Threads of different thicknesses			√	√					√
Different twirl directions filament			√	√				√	
Different types of materials in the same carpet			√	√					√
Pile with different color effect			√	√			√		
Total	**0**	**2**	**15**	**4**	**4**	**0**	**1**	**2**	**12**
Average	**17/18 = 94.4%**			**8/18 = 44.4%**			**15/18 =83.3%**		
The third axis: texture and aesthetic effects									
pile of different height			√	√			√		
Loop pile			√		**Related to machine**		√		
Pile length control			√	√				√	
Low and high pile in the same rug			√	√				√	
Unequal sides pile			√	√			√		
Cut & loop pile in the same carpet			√	√			√		
Total	**0**	**0**	**18**	**5**	**2**	**0**	**4**	**4**	**0**
Average	**18/18 =100%**			**7/18 = 38.9%**			**8/18 = 44.4%**		
Total summation	**0**	**4**	**48**	**10**	**16**	**0**	**5**	**14**	**18**
Total percentage	**52/54 = 96.3%**			**26/54= 49%**			**37/54= 68.6%**		



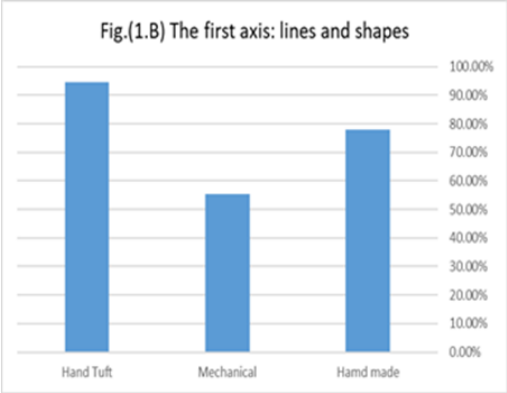
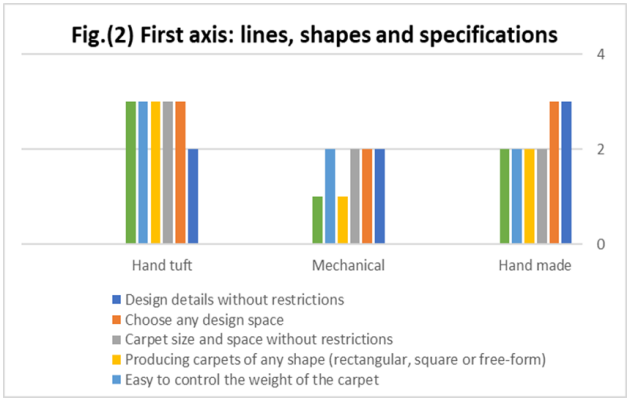


Table (1) and Figure (1.A) , (1.B) show that the percentage of Hand tuft carpets for this axis reached 94.4 percent, followed by hand knotted carpets at 77.8 percent, and mechanical carpets at 55.5 percent. **Figure (2)** depicts the data collected for each of the first axis' six components. In terms of the first factor, the limitations on implementing any details in the design, it is apparent that producing carpets using conventional manual methods came in first as the most liberated method in terms of the ability to implement any design without limitations.

This is owing to the freedom with which any operational details that limit visibility can placed. The mechanical carpet emerged in third place, not because of its incapacity to exhibit design features, but because of the endless design possibilities available thanks to the capabilities and capacities of the jacquard devices charged with the decoration events.



In terms of the second element, the freedom to choose the design space, it is clear that this is available without restriction for both manual and semi-automated carpets, but it is limited for mechanical carpets, as the size of the executed carpets is determined by the width of the machine produced and is limited to a maximum of 5 m. The results of the third element, which is related to the ability to implement any carpet of any area and size, show that it is available without restrictions for Hand tuft carpets, as it is possible to use a cylinder to produce any length required, whereas it is limited for each of the last two methods. Because mechanical carpets can only be produced in traditional rectangular and square shapes. Circular shapes require special processing operations, and shapes in the shape of roses or free forms are not possible in any case. Hand tuft carpets came in the realization of the fourth element related to the implementation of carpets in any form, whether square, circular, or free forms.

Rugs usually classified as geometric or freeform in terms of shape. The room's proportions and size must take into account, as well as the shape of the furniture placed within it. Adding one of the related shapes can help to create harmony and balance, however adding too many distinct shapes might lead to confusion.

The first hand tuft carpet appeared in the sixth element, which is concerned with managing the carpet's weight, since it is possible to manufacture any desired weight without constraints, up to a weight of 10 kg per square meter. It is clear from the table that changing the pile density for the same carpets is possible without restrictions for hand tuft carpets. However, not for mechanical carpets and only to a limited extent for manual carpets, because the feeding needle can be fed with any type of thread with simple adjustments to suit the industrial process with the new material.

Table (1) and Figure (2) show that the Hand tuft carpet has the biggest advantages in terms of the ability to implement any pattern without regard to total area or design constraints. Horizontal lines help to provide a sense of security. Vertical lines generate a sense of freedom and power, and they provide the idea that the room is taller on a functional level, thus the horizontal and vertical lines should properly combined so that the user does not feel comfortable. Lines that are diagonal, zigzag, or curled show dynamism, create energy and movement, and keep our attention for longer. For Hand tuft carpets, these options are more open than for other types of rugs.

5.1.2. The second axis is to decide how many colors and materials to use:

This axis contained six elements related to the design's color treatments and the freedom to choose the number of colors. the possibility of achieving a gradient effect, the use of tiger threads and different twisting directions that affect the appearance of the threads and the reflection of colors, different types of materials in the same rug, Pillow with a different color effect.

Fig(3.A)The second axis: the number of colors and materials

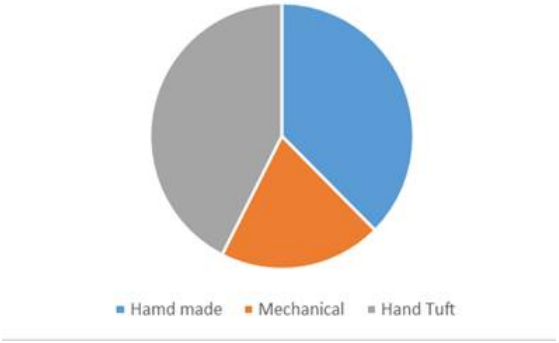


fig.(3.B)The second axis: the number of colors and materials

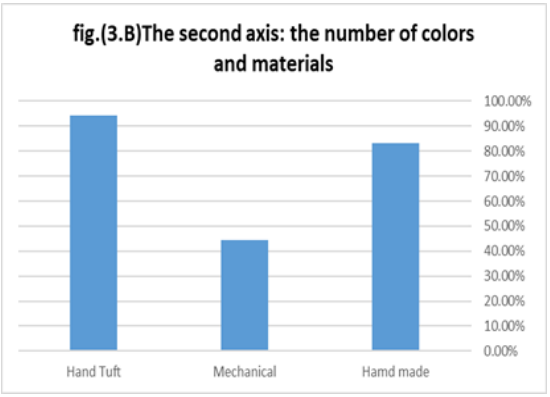
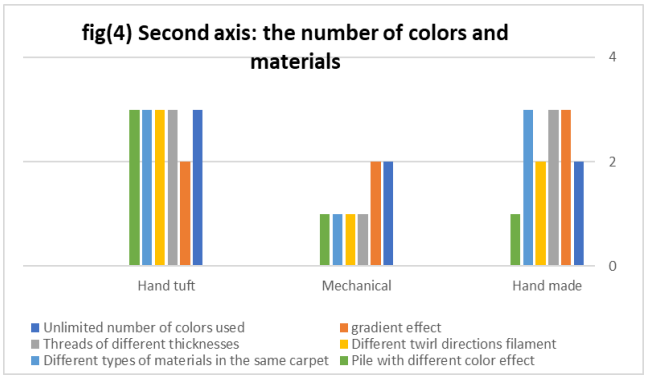


Table (1) and Figures (3A) , (3B) show that the greatest percentage reported for this axis was 94.4 percent for Hand tuft carpets, followed by 83.3 percent for manual carpets, and 44.4 percent for mechanical carpets. Figure (4) also demonstrates that the mechanical carpet obtained a high percentage of all elements of this axis except the color gamut, but the mechanical carpet did not achieve any full ratio of any of the elements of that axis.

fig(4) Second axis: the number of colors and materials



Color is an unavoidable deciding aspect in carpet design. The variety of hues piques the

viewer's interest in carpets and is a reflection of the designer and maker's culture, art, and creative talent. The following are the results for each of the six elements of the second axis, as shown in Figure (4).

In terms of the first element, it is apparent that handcrafted and semi-handcrafted carpets came first in terms of the freedom to create any design with an unlimited number of colors. According to the experts, utilizing an endless number of colors in Hand tuft carpets allows for an integrated color scheme with rich color qualities. Tones (red, green, blue, and so on), tonality (bright and dark), and intensity are all employed in a system that demonstrates how colors interact, and poly chromatics gives color processors contrast, harmony, and contrast. This, according to the researchers, is due to the tremendous flexibility in the usage of pile threads of various colors, as the worker chooses the suitable color in the design throughout the contract without any limits. For Hand tuft carpets, the needle of the stitching machine can be fitted with the proper color with each new color space, allowing any color detail to place without executive limits that limit its appearance. The mechanical carpet's design was limited since the maximum number of colors that could employed in the design was only seven. This, according to the researchers, is due to the fact that the theory of color appearance relies on filling each color space with all colors so that only one color is picked according to the design, and the other six colors are hidden until another color space appears, and so on.

As a result, producing a carpet in a group of seven colors requires doubling the number of threads in the measuring unit to seven times the actual number of threads required for operation, resulting in enormous numbers that not supported by implementation possibilities and limiting color choice. As a result, the researchers believe that this is the primary reason why mechanical carpets do not have complete color freedom. Designers and manufacturers are attempting to address this flaw. The designer uses various methods, such as blending colors, to obtain a bigger number of hues, but the results are not nice or ideal. Figure (5) shows how to increase the number of colors in mechanical carpets by combining two colors to make a third. Because of the scattering of the color space and its overlap with adjoining regions, aesthetic qualities not fulfilled.

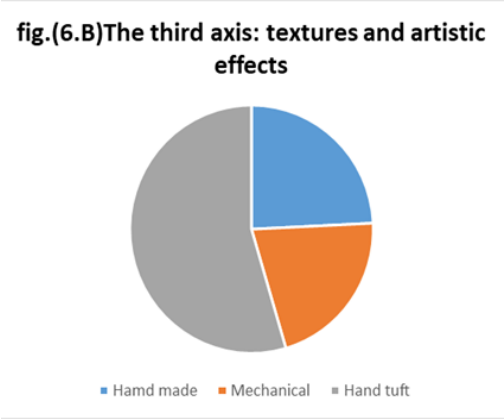
Figure (5) Ways to increase the number of colors of mechanical carpets

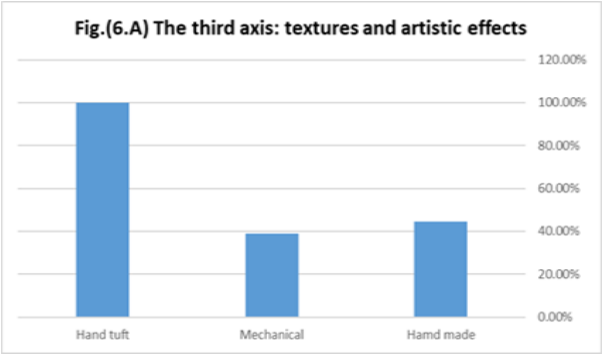
In terms of the second element, which is the ability to obtain a color gradation, it is evident that this is possible without restriction for handmade carpets, but not for mechanical or Hand tuft carpets. Each knot can manage in the handmade carpet's implementation, as can the usage of several colors to achieve color gradation. This characteristic limited by the ability to use a large variety of colors in mechanical carpets. The operator's talent, not the quantity of colors that can utilized, is the limiting factor in getting the color range of Hand tuft rugs. Because the diameter of the threads used for the pile varies, the thread number expresses the number of hairs in the width of the thread. Sutures that have been inflated or tiny sutures can employed. The thread number, which reflects the mass of

fibers per unit length, gives an indication of the product's nature. The results of the third element, which concern the ability to use yarns of various thicknesses in the same carpet, demonstrate that they are available without restriction for both hand-made and Hand tuft carpets, but not for mechanical carpets. This ascribed to the ability to choose the pile without implementation limits or technical considerations, whether in terms of colors, type, or thickness, according to the researchers. The achievement of the fourth element, the ability to use threads with multiple spinning directions, resulted in the creation of the first Hand tuft carpet. Mechanical carpets can only made using one-way threads; otherwise, the threads will twist and tangle due to their multiple directions, making the production process difficult to complete. In the sixth factor, which connected to the potential of using multiple types of materials in the same rug, hand rugs and semi rugs are equivalent. The pile needle can fed with any type of raw material to fill a specific area and change the type of material to another area without difficulty, whereas mechanical carpets can only use one type of raw material due to the different tension on them during the manufacturing process and the difficulty in adjusting it.

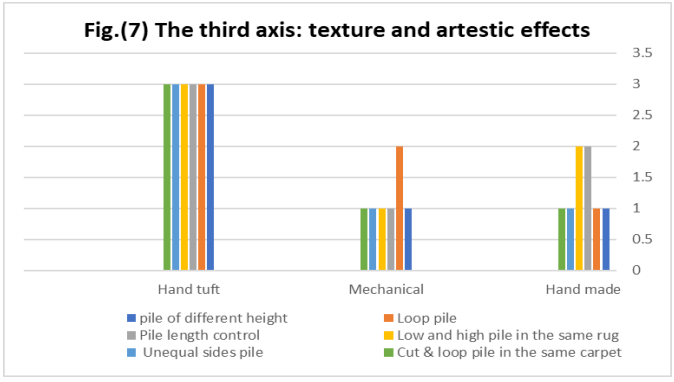
5.1.3. The third axis: Touches and aesthetic effects:

Producing a pile carpet of different heights, a pile surface in the form of buttonholes, controlling the length of the pile, a prominent and sunken pile surface in the same carpet, producing a pile with unequal sides, and a pile surface consisting of cut pile and loops in the same rug were all part of this axis. Table (1) and Figures (6A), (6B) show that the highest percentage recorded for this axis was for Hand tuft carpets, where the full mark was recorded at 100 percent, followed by knotted carpets with 44.4 percent, and mechanized carpets with 38.9%. Figure (7) shows that Hand tuft carpets have attained the full degree of all items on this axis, although the other two types are far from competing with those benefits.





The results for each of the six components of the third axis shown in Figure (7). The first feature, which related to the ability to create a pile surface with varied heights, is only possible with Hand tuft carpets. The key reason, according to the researchers, is the ability to implement without technological constraints, which is impossible to achieve with mechanical or hand-made carpets.



In terms of the component of producing carpets with uncut loop pile, it is possible to produce Hand tuft carpets by omitting the shearing knife's work, but it is impossible to

do so using the manual carpeting method and it is difficult to produce mechanical carpets, but it requires special machine equipment and reduces production quantity by 50%. The researchers believe that the third element, controlling the pile height, can only accomplished with Hand tuft carpets because it is possible to produce different areas within the design as separate units of properties, which is impossible with mechanical carpets and difficult with handmade carpets.

For the fourth element, it is possible to adjust the pile height and achieve a prominent and recessed look for Hand tuft carpets, but mechanical carpets can only produce with some constraints and cannot done in any way. The researchers believe that hand tuft carpet production technique allows for the creation of an uneven pile surface without limitations, which aids in the creation of aesthetic effects due to the great flexibility in controlling the shape of the pile by making simple adjustments to suit the industrial process, which is not possible with the traditional method. Both mechanical and manual rugs can used. The ability to obtain a carpet with a pile and cut pile, which is the sixth element of this axis, can only obtained by semi-handcrafted carpets, as this feature is not available for mechanical or handmade carpets.

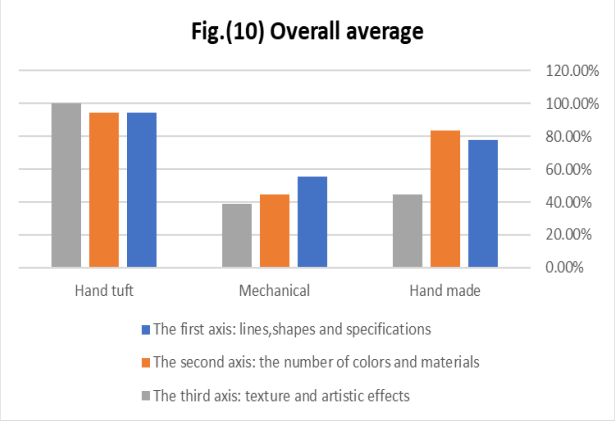
Figure (8) Texture aesthetic value

Figure (8) depicts some of the processes that lead to the creation of aesthetic values like texture and aesthetic impacts. Perceptible (actual) texture and illusory texture are the two forms of texture (visual). It is corrugated, gritty, granular, and mushy. The researchers believe that Hand tuft carpets might readily achieve this. Cut and loop knots used to create texture contrast. Varied heights utilized to create different illusion textures and proportions. The effect of processing procedures on generating smooth and rough textures shown in Figure (8). In carpets, spatial depth can created to achieve the representation of the third dimension, but it is illusory in flat works. The varying heights of the pile design elements in Hand tuft rugs can imitate the third dimension. Multiple heights of design pieces and units used to achieve this. This property confirmed by the fact that the drilling process allows for the acquisition of an embodiment of some units. Hand tuft carpet surfaces can made with knots, chopped pile (9) or a combination of the two, and their height can adjusted depending on the necessity and nature of use. Because of the differences in texture and height, as well as the type of pile, a range of aesthetic effects can achieved, increasing the competition of Hand tuft carpets with other textiles.

Figure (9) types of pile

5.1.4. Analysis of the whole design elements' results:

Hand tuft carpets are the most effective approach to reach the average total of the main foundations of carpet design, and the most ideal for applying designs freely. As shown in Table (1) and Figure (10) The proportion of time it takes to complete all design elements is 96.3 percent, with hand-made carpets coming in second with 68.6 percent and mechanical methods coming in last with 49 percent.



In order to explore technological implementation methods to achieve some aesthetic effects, the two researchers experimented with imitating some oil paintings by manufacturing carpets with a set of artistic effects (Figure 11). Due to the flexibility of handling all design elements, this is only possible with Hand tuft rugs. The chromatic distribution forms simulated by placing the pile implant in a random spot and changing the pile shape to produce two uneven sides. This resulted in a comparable effect to oil painting brushstrokes, as this method was the only way to create it.

Figure out (11) Researchers devised a method for simulating the color effect of oil paintings.

5.2. To answer the second question, how may abstract art (Kandinsky's paintings) used to create Hand tuft carpet-style rugs and textile hangings?

The note cards were unpacked with the help of sample members of the art professionals in order to determine whether abstract art (Kandinsky's paintings) could use to provide modern visions for carpet and textile hangings design, and it became clear:

5.2.1. Technical analysis of the executed designs:

The researchers concluded that the results of the observation cards show the suitability of the philosophy of the abstract school to textile

designs, where the abstract shapes and elements in their formations give musical harmony, in addition to the fact that the abstract artistic symbol, especially in the field of textiles, has a multi-faceted aesthetic value. Raw materials the method used in the implementation (half-hand carpets) ensures the achievement of aesthetic values in addition to the content, idea or emotion expressed by that symbol and it appears as follow:

5.2.1.1 The first design

The design represents the modern trends of carpet design, where the convergence between horizontal and vertical orthogonality created harmonious spaces. With the artwork's dependence on pairing between explicit geometric shapes, lines and curves. The researchers find the reduction in geometric shapes in a coherent composition. Through the juxtaposition of all work elements with each other, especially circles, And also the intertwining of straight lines, circles and curved lines, and the combination of hot colors and earthy colors to enhance the structural, poetic or lyrical aspect of the artwork, as well as relying on the communication between shapes and colors.

5.2.1.2. Second design:

The artist Kandinsky's painting (Painting on White) inspired the idea for this work; his abstract style of shapes taken advantage of in the form of simplified lines that give a sense of movement and diversity in the composition, with the use of adjacent color spaces, as well as balance in color spaces while creating harmony between colors.

5.2.1.3. The third design:

The design represents the artistic trends where the overlap and contrast between lines and color spaces. Without linked to defining a specific geometric shape, and taking into account clearly defining the shapes. (the shapes are not clear in the artwork), not separating the floor and the elements of the artwork, rather we notice that they are integrated with each other, the most colors The colors used are cold, in addition to the use of blue in its gradations

5.2.1.4. Fourth design:

The design based on the abstraction of geometric shapes without clarity of the features of the shape. The floor areas are wide, the colors are earthy in which grays were used in abundance, and the design was based on the presence and clarity of colors more than the clarity of the shape, the use of yellow gave lighting inside the painting.

A design that represents a depiction of human figures with different kinetic modes, pairing between the gradations of levels and sizes while maintaining monochrome (reddish brown to earthy beige). Exiting or starting from the circles as an essential element of the work and abstracting it into characters (persons) depending on the transformation of the circular shape to an oval shape with gradients in the levels of the shape, and black color added in the background to give more prominence to the abstract shapes in the composition.

6. Conclusion:

The research employed the elements of the foundations of textile design to achieve the aesthetic values of carpets and to clarify the difference between their features and characteristics. The main elements of carpet design analyzed and how to deal with the design space, lines, shapes and colors in a balanced way, which is the key to presenting pleasant aesthetic designs, and studying the strengths and weaknesses in its construction. The results showed the highest degree of integration of design elements and the aesthetic and functional compatibility of the Hand tuft carpets. Researchers to show the artistic and technical advantages of this style have produced samples of Hand tuft rugs with innovative technical effects. The mechanism of designing the models adopted with the help of models from the works of the artist Kandinsky after the engineering analysis of his paintings and the use of external lines for them.

7. Recommendations:

-The necessity of training carpet designers to deal with technical schools as one of the inspiring sources in design and to provide modern visions that keep pace with different changes.
-Maximizing the use of Hand tuft carpets and training to use all of its technical features when necessary to add aesthetic and attractive touches to its products.

8. Acknowledgments:

The researchers extend their sincere thanks to the **Deanship of Scientific Research at King Faisal University, Al-Ahsa, Saudi Arabia** for its material and moral support in financing this project no**. (NA000134).**

9. References:

- Ahmed, Nakhla Qadri, (2016). “The constructive and expressive values of Arabic calligraphy and how to benefit from them in enriching ceramic formation” Journal of Specific Education Research - Issue – 42.
- Al-Bassiouni, Mahmoud, (1982)."Art in the Twentieth Century", Dar Al-Maaref.
- G.H. Crawshaw, (2002). *Carpet Manufacture*, 1st ed. (Wronz Developments, Christchurch, , pp. 22–23
- Allam, Nemat Ismail, (1983)."The Arts of the West in Modern Times", Dar Al-Maarif.
- Allam, Rania Eleiwa, "Lyrical Abstraction in the Works of (Wassily Kandinsky and Paul Kelly"), Ph.D. Thesis, Faculty of Fine Arts, Helwan University, 2012.
- Bera, M. (2019). Study on Tuft Withdrawal Force and Compressibility of Hand-Tufted Carpet. J. Inst. Eng. India Ser. E 100, 175–181. https://doi.org/10.1007/s40034-019-00151-3
- Bhavna Choubisa, S K Sinha, & R Chattopadhayay.2020. Behavior of hand-tufted carpets: Part I–Effect of short-term static and dynamic loading Indian, Journal of Fiber & Textile Research Vol 45, June 2020, pp. 139-144 Compression.
- Bouzar Habiba, (2014). “The Status of Plastic Art in Algerian Society,” a cultural and artistic study, a thesis submitted for a PhD, University of Tlemcen.
- Cascio, (2006). Development of next generation carpet backings for facile recyclability, *Master of Science Thesis in School of Polymer*, Textile and Fiber Engineering, Georgia Institute of Technology, U.S.A, https://smartech.gatech.edu/bitstream/handle/1853/11541/cascio_anthony_j_200608_mast.pdf. Accessed 10 Dec 16
- E. Koc, N. Celik, M. (2005). Takin, *Fibers Text*. East. Eur. 4(52), 56–62.
- E. Önder, Ö.B. Berkalp, (2001). Text. Res. J. 549, 71.
- F. Liu, A.P. Maher, J. Lappage, E.J. Wood, (2002). J. Text. I 93(3), 276–282.
- Hassan Abdel-Fattah Hassan, (1991). "The Modern American Art of Painting between Extreme Realism and Absolute Abstraction" published research, Science and Arts Journal, Volume III, Issue III, AD.
- Herbert read, (1985). "A concise history of modern painting" ,thamesund ,Hudson, London,
- Ibrahim, Irene Abdel-Masih (2007). "The activities of color and its impact on the recipient through visual communication." Master's thesis - Faculty of Fine Arts - Alexandria University.
- IS 5884: 1993: Textile floor covering—Tufted carpets by Bureau of Indian Standards https://www.carpetinstitute.com.au/wp-content/uploads/2014/12/Carpets146_Technical_specification_v4pdf.pdf. Accessed 12 Feb 2018
- K. Dubinskaite, L.V. Langenhove, R. Milasius, (2008). *Fibers Text*. East. Eur. 16(3).
- KK. Goswami, (2009). Advances in carpet manufacture. Cambridge: Wood head Publishing Limited, USA, pp.237–239.
- Liu F, Maher AP, Lappage J, et al. (2002). The measurement of the tuft-withdrawal force in machine-made and hand knotted carpet. J Text Institute, 93: 276–282.
- M. Dayiarya, S.S. Najara, M. Shamsib, (2010). *J. Text.* I 101(6), 488–494.
- Moszynska, Anna, (1990)."Abstract Art", Thames and Hudson.
- N. Özdil, F. Bozdoğan, G. Özçelik Kayseri, G.S. Mengüç, (2012). *Tekst Konfeksiyon* 3, 203–221.
- N. Celik, E. Koc, (2010). Fibers Text. East. Eur. 18(1), 54–59.
- P.C. Patni, R.K. Arora, R.S. Dhillon, D.L. Bapna, (1996). *Indian J. Fiber* Text. 189–193, 21

- R.K. Arora, P.C. Patni, R.S. Dhillon, D.L. Bapna, (1999). Indian J. Fiber Text. 111–114, 24.
- Shravan Kumar Gupta, Betty Dasgupta, (2021). Performance of Hand Tufted Woollen Carpets. Journal of The Institution of Engineers (India): Series E 102:2, pages 299-310.
- S.M. Tabatabaei, M. Ghane, A. Zeinal Hamadani, H. Hasani, (2014). *Fiber Polymer*. 15(9), 1977–1984.
- S.K. Gupta, A. Majumdar, K.K. Goswami, (2017). *Indian J. Fiber* Text. 399–406, 42.
- Topalbekiroglu M, Kirec¸ci A and Du¨lger CL. (2005). Design of a pile-yarn manipulating mechanism. Pros IME B J Eng. Manufacture 219: 539–545.