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Geometric in Islamic Art and Design: Infinite Point or Creativity through Compass and Digital

Geometri dalam Seni dan Reka Bentuk Islam: Titik Infiniti atau Kreativiti dengan Kompas dan Digital

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Abstract

The creativity of earlier artists and sculptors in designing geometric are extraordinary provided with only a compass. Indeed, geometric in Islamic art and design are unique and have their own aesthetic values. In order to further understand geometric, self-learning with the approach of hands-on would be appropriate. For this study, Islamic themed geometrics designed and created, concerning only; i). The Square Repetition Unit and √2, ii). The Hexagonal Repetition Unit and √3 and iii) Double Hexagon. The aim of this research is to evaluate the creativity of Islamic geometric patterns artworks, through Fundamental Arts and Gestalt theory. Data was collected using specific tasks, and this research intends to identify the difference of Islamic geometric between 21 conventional (compass) untitled selected geometric artworks and 25 digital untitled geometric pattern artworks method. The evaluation of creativity, colors, layout, pattern and unity is known to be of utmost importance, although there are differences in the conventional or the digital approach.

Keywords Islamic geometric patterns, gestalt, fundamental arts

Abstrak

Kreativiti reka bentuk geometri yang terawal telah dihasilkan oleh seniman dan pengukir Islam amatlah luar biasa sekali walaupun hanya dengan berbekalkan peralatan kompas sahaja. Reka bentuk paten geometri Islam yang pelbagai rupa segi ini mempunyai keunikan dan nilai-nilai estatiknya yang tersendiri. Untuk memahaminya dengan lebih mendalam lagi adalah dengan cara menghasilkan paten geometri tersebut. Bagi kajian ini, paten geometri Islam yang digunakan dan direka bentuk, memberi tumpuan hanya kepada tiga jenis paten geometri Islam iaitu: i). paten geometri berpandukan unit ulangan segi empat dan √2 ii). paten geometri berpandukan unit ulangan heksagon dan √3 dan iii). paten geometri berpandukan unit ulangan heksagon. Kajian ini bertujuan untuk menilai kreativiti paten geometri Islam dari aspek Asas Seni Reka dan teori Gestalt yang diterapkan di dalam tugasan yang diberi. Data dikumpul daripada tugasan dan kajian ini menilai perbezaan di antara 21 buah hasil seni tanpa tajuk paten geometri Islam secara konvensional dan 25 tanpa tajuk paten geometri Islam secara digital. Penilaian dari aspek kreativiti, warna, komposisi dan kesatuan antara yang paling penting diambilkira bagi pendekatan secara konvensional dan digital.

***Kata kunci**: Paten geometri Islam, gestalt, asas seni reka*

INTRODUCTION

Firman Allah s.w.t. maksudnya:

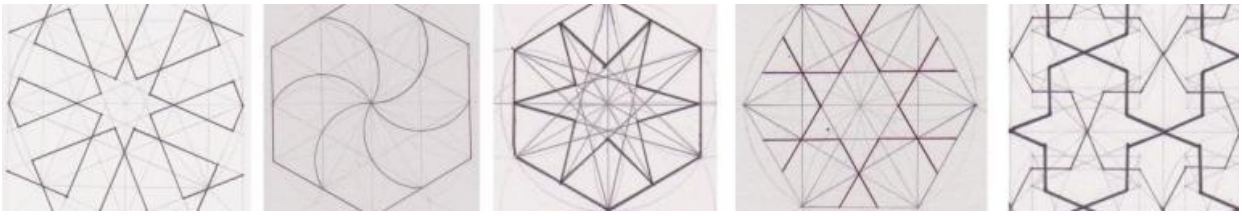
> *Dan Dialah yang menjadikan bintang-bintang bagi kamu supaya kamu berpedoman kepadanya dalam kegelapan (malam) di darat dan di laut. Sesungguhnya Kami telah jelaskan tanda-tanda kebenaran (Kami) satu persatu bagi orang-orang yang mengetahui.*
>
> (*Al-Qur'an, Al-An'Aam 6: 97*)

The creation of the sky, the earth, the world and the hereafter is closely associated with the greatness of the creation of Allah. In search of ideas and creativity on the other hand, by craftsmen and Islamic artists in the past concerning the formation of geometries is solely based on the Qur'an (the word of God). Meanwhile, the creation of nature for instance the existence of the sun, the moon and stars, leaves, flowers, bee's honeycomb, a cubic salt crystal, and sea snail was made a guide to ease the utilization of creating Islamic geometrics. The essence of Islamic art is that it is not supposed to imitate or represent the nature of human beings (Zahra, 2015). This led artists to develop stylized forms to great effect (Carey, 2012).

Early sketches of creating the square, hexagons and the combination of geometrics facilitates these Islamic artistes in the creation of a complex yet interesting in its perspective towards harmony, unity, balance and unending repetition at the same time also creating a 3D view over combinations of geometrics. The abilities of craftsmen in the past in creating Islamic geometrics was based solely on the shape of a circle lined only by a rope and wood. This would be due to the fact that the process of creating geometrics would be difficult to accomplish when the mathematical calculations of angle towards the upcoming design was taken into consideration particularly the angle value as well as the lines to be utilized. The usage of computer nowadays, calculators, set-squares and protractors has helped a lot in designing geometrics. The geometric patterns clearly demonstrate the fascination of Islamic artists with the visual principles of repetition, symmetry and continuous generation of patterns (Zahra, 2015). Meanwhile, Gestalt realizes that Islamic geometric patterns emphasizes the usage of patterns as a whole (entire figure: the whole is greater than the sum of its parts), not of individuality, for that entity differentiates concepts that is brought into the design of Islamic arts compared to European arts (Abed Rahman, 2011).

Fig. 1 (a) shows different sides of geometrics in the form of hexagons and octagons that acts as the main pattern in geometrics, designed with a compass, pencil and ruler before designing it into an Islamic geometric pattern. Fig. 1 (b) A process of using double hexagons and four triangles in designing geometrics of double hexagon and Fig. 1 (c) after designing geometric patterns of double hexagon by digital method, followed by arranging and repetition of each, along with the insertion of colors as to create a geometric pattern. The choice of colors, the change in size and where it shall be applied was determined solely by the designer himself, whether to be used as internal decorations for household or mosques, ceramics, carpets and others.

Islamic geometric patterns as on Fig. 2, 3 & 4 was of those geometric artworks that has been modified and recreated using Adobe Illustrator and drawn over plywood with pelaka as the medium. Indeed, the creativity that has been utilized differs in each, compared to the original design (Fig. 1). Fundamental Arts which is comprised of elements and art principles was used as the main reference in determining the geometric design being created. Fig. 2 was designed conventionally and digitally, demonstrating strict contrast principles that gives different effects in the creativity of designing geometrics pattern. Other than that, the choice of colors, a change in the geometric size and arrangement also determines how that artwork would turn up to be.



a

b

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c

Figure 1 Artwork (Compass & Ruler) and Digital (Illustrator) method to create Islamic Geometric Patterns

The design of Islamic arts is above all unique in its own whereby it cannot be separated from its main element, Allah the Great. Although the Qur'an never mention arts and design directly but ever refers to the beauty of which God created (Waijittragum 2012, 1154-1157). Moreover, the beauty that come from lines, shapes and combinations of different geometrics give out arranged characteristics, organized by applicable values considered acceptable by observers can be applied into the works of art, which would decipher the relationship between the true meaning and definition shown through techniques and materials (Ibrahim, 2000, 74-84).

Figure 2 Three artwork conventional 2014. Pelaka mural colour on plywood, 4' x 4' each

Islamic Geometric Pattern

Islamic geometric pattern are mostly recognisable, in such based on the geometric design itself that consists of those with squares, hexagon, octagon or double hexagons. The principle of Islamic geometric patterning as a system is where geometrical grids from the framework of identical units are regularly repeated (Danby, 1995). Muslim artists developed geometric patterns to a degree of complexity and sophistication previously unknown. These patterns exemplify the Islamic interest in repetition, symmetry and continuous generation of design. Patterns generated by the division of the circle into four, or multiple of four, equal parts. The square is used as a device and mensuration and hence it is called the root two ($\sqrt{2}$) system of proportion (the ratio of the side of a square to its diagonal = 1: $\sqrt{2}$) (Issam, 1993, Zahra 2015). Geometry is one of the gates that lead us to the essence of the spirit that lies at the root of every form of knowledge. Geometry a discipline to which the Islamic mind applied itself with extraordinary pertinacity, expresses this concept through the point, that simplest of all geometrical entities. From the point of view of the Muslim religion, this 'metaphysically' absolute and infinite point represents God, His motion determining or generating a space which did not exist prior to or outside Him (L. Mozzati, 2010, Zahra 2015).

The accuracy and the perfection in designing Islamic geometrics conventionally should not be debated although it was done only with a compass. Nowadays, with the aid of computerized technology, mathematical calculations in terms of angle calculations, lines, sizes and geometric shapes would not require anymore calculations that involve those of $\sqrt{2}$, and $\sqrt{3}$ proportions. There is no denial that there are other elements in abundance that need to be taken into consideration and appreciation such as the shapes, grids and patterns of: ten-fold rosettes, 12=pointed stars in the K=2 uniform grid of dodecagons, hexagons, squares and equilateral triangles, the Khatim Sulayman classic pattern and others. In order to understand the mathematical basis of Islamic pattern one must consider most carefully those primary

moves of geometry which are all too frequently passed over lightly, or simply taken for granted (C. Keith, 1995). To summarize, it would be appropriate to say that geometric design is the product of one dot from the end of a line in connection to a dot at the beginning. The aesthetic value and creativity of these designs is based on how one have the ability to understand, to decipher, to analyze and to apply what is concealed and hidden behind the existence of the geometrics designed. What would be the difference between a square, a hexagon and a double hexagon? The intricacy and artistry of the patterns seem to be almost beyond the powers of human ingenuity (Brough, 2008).

Methodology

This research intends to identify the difference of Islamic geometric design between conventional (compass) and digital method. Identify the geometric patterns and creativity of the geometric design through Fundamental Arts (Design elements and Design Principles) and Gestalt theory. The research methodologies are: an evaluation of 21 conventional untitled selected geometric artworks, and 25 digital untitled geometric patterns. Data analysis was based on the creativity, shape, pattern, color, unity, scale & proportion, balance, unity and layout of each geometric. This research would also involve the preparation of software as an interactive reference with accordance to Islamic geometrics design in order to help students, lecturers and educators at institutions in the teaching and learning process that involves Islamic arts and crafts.

Findings

As a whole, data findings from both samples, which is geometric design created conventionally or by digital shows that there is a difference in certain criteria which would be those of:

1. Creativity

The element of creativity in designing Islamic geometrics created would differ when practiced digitally or when practiced with conventional. For conventional, they would differ in terms of color choices, arrangement of geometric patterns, geometric positioning and lines, that would indeed develop results in both foreground and background artwork. Zahra (2015) said that, this new style with their optical effects of balancing the positive and negative areas became highly important in the Islamic arts; its geometric shapes had symbolic and philosophical significance to the Muslim artists. Other than that, the cultivation of idea in modifying geometric becomes a whole by which proximity or similarity from the Gestalt theory is proved accurate Fig. 3. The geometric design in Fig. 4 instead, shows elements of motion, arranged movements that creates designs. This proves that the design of hexagons succeeded in connecting each one geometric motive. In comparison with Fig. 2, the contrast principle (small size geometric patterns versus big size geometric) of fundamental arts was used in giving off variations in terms of its shape. Meanwhile, the design creativity of geometric pattern in Fig. 4 focuses solely on the choice of colors, although by definition geometrics would not require the need of colors for architectural interior designs in mosques. This would relate to use of the genuine geometric design itself. Even so, there are certain similarities in the choice of the main geometric patterns whether it would be of hexagons or double hexagons.

2. Colors

The choice for colors was quite fascinating and it was one of the elements that thrived in its usage. A variety of colors was applied in each geometrics designed. Basic colors, secondary and tertiary colors such as those of: red, green, blue, yellow and brown was used including gold, silver, black as well as white. According to Zahra (2015), blue symbolizes the feeling of infinity as it is the color of the endless seen of the sky and the sea. While green symbol in Islam as it represents paradise. The balance and harmony for each colors utilized indeed succeeds in differentiating each of those small parts as such on

Fig. 4. The gaps and spaces for each geometric design were filled in with different colors and this creates balance for each geometric design. An interesting fact of using colors over each geometric pattern would be that it gives off different effects as such: the pattern of a piece of *kain batik,* a flower garden, the view of an umbrella from atop and the harmony of the usage of monochrome colors. In reality, these elements of colors gives off countless inputs and effects beyond limitations for it focus straight on the elements of: balance, space, emotions, symbolism, emphasis, cold/warm colors, unexpected color combinations and colors of dominance. Indeed, the elements of colors play an important role in the design of digital geometrics applied with the use of Adobe Illustrator. Each one of the geometric patterns designed displays an infinite point, harmony, balance and unity in its arrangement. It is also proven that the design of Islamic geometrics is not only limited to that of interior designs for mosques, ceramics or carpets only.

Figure 3 Four conventional artwork 2014. Pelaka mural color on plywood, 4' x 4' each

3. Layout

The composition and arrangement for each geometric designs is of utmost importance. Incorrect judgment in defining where each geometric is to be placed will result in a failure of the design or in an uninteresting one. Indeed, geometric design with *pelaka* mural color as the medium on wood would be vastly whereby the arrangement was not limited compared to that of digitally designed geometric. The Gestalt theory and Fundamental Arts approach give off, much to determine the position of each geometric that is to be applied. The choice of wet medium as such was of no limit, where the choice of oil paint, poster colors or acrylics as medium can be used. For digitally designed geometric as in the Fig. 1 & 4, the arrangement would be close from one to another and was repeated in the same position whether observed or viewed horizontally or vertically. These arrangements give the effects of infinite point, harmony, unity, balance and beauty. Geometric patterns, applied would be that of different sides 6, 8, 10 and 12. The octagon was mostly used, which about fifteen times, compared to the hexagon used only for five times and double hexagons for four times and only once for decagon. These geometric can be found whether on the interior or the exterior of mosques as such: the altar, *mihrab,* the ceilings, tiles on the walls, columns, the dome, the entrance, windows, the gateway, airway or openings for sunlight to pass into the mosque. While in the composition of Fig. 4, shown dramatic and energetic style to the digital geometric design. There is no border or limitation of their movements for each geometric. Almost, each corner occupied to fulfill the open space. Beside that, the scale & proportion, colors, outlines, shapes, background and direction play a major role to give a strong layout of each design.

4. Pattern and Unity

Pattern is a term ubiquitous to design. Pattern can be intricate or simple, repetitive design and a dynamic way of capturing visual interest (Pentak & Lauer, 2013). As on Fig. 4, a variety of techniques and medias were used in creating geometric patterns which results in; creating visual interest, order and variety, similarities and differences. Patterns start with only one shape or motif which appears again and again. Fig. 1, 2, 3, & 4 shows examples of geometric design which results from repetition of units and motives that shapes a pattern, that gives an effect of balance or order, complex in its symmetry, repetitions and rotations. According to (Mohd Fauzi et al., 2013), repetition is an element that has no boundaries, which can be explored in any directions and with infinite variations. Through the form of similarity, repetition is a major strategy for producing emphasis, clarity, amplification or emotional effect. The overall pattern is

balanced and lends a series of stability to the design. There are many of those that can be associated with the design of geometrics in order to reach a level of unity which would be; harmony, Gestalt theory, proximity, grid, repetition, continuation, emphasis and abstract. Proximity in geometric Islamic pattern is the simplest way to achieve unity. For which actually unity in repetition is not limited only to Islamic geometric patterns but can also be applied to other types of geometric designs.

Figure 4 Six digital artwork design 2014. Print-media on paper, A2 size each

Conclusion

The outcome of this research for geometrics design whether by conventional (compass) or digitally done towards that of creativity, colors, layout, pattern and unity would have a relation in terms of the measured values whether with the use of *2* and *3* or one of it. The understanding of calculations in mathematics was needed for analyzing collected data, for that most of the geometric designs in the field was modified from the originals, but still based from the same source which is 2 or 3. Assessments done for creativity, colors, layouts, patterns and unity found out that the results was mostly significant, although there are differences in the approach of conventional (compass) or digitally as a whole. In the end, conventional or a

combination method is a moment of change and new forms were created, but at the same time still maintaining the isolation of the geometric patterns.

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