

ISLAMIC GEOMETRIC PATTERN DESIGN OF STATE MOSQUE IN MALAYSIA

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Abstract—Islamic influence has played a major role in the formation of the visual arts of Islam in Malaysia. Some elements of visual art have been designed to meet the elements of Islamic art. Through the architecture of the mosque, there are three entities of Islamic art that highlighted which is Calligraphy, Arabesque and Geometric Pattern. Each entity has its own strength. The study relates to the use of Islamic geometric patterns found in mosque in Malaysia. The mosque is a symbol of Islamic Identity while mihrab, Pulpit, minaret and dome are four keys characteristic that exist in every mosque. The aim of the research on the 13 state mosques in Malaysia is to identify, analyse and review the manufacturing process design geometric patterns of Islamic using Gestalt Theory and Concept of Haqiqah and Ihsan. The design of this study used a qualitative approach and data collected through observation, interview and visual Photo during field work session. Result showed that the design of geometric patterns of Islamic mosque for each state in Malaysia is different. This is because some state mosques in Malaysia do not emphasize the element of Islamic architecture in the construction of the mosque. According to findings of the data obtained only eleven states of mosque using Islamic geometric pattern on the dome, pulpit, minaret and mihrab. Eleven geometric pattern have been identified consisting of geometric patterns Square, looping 2x rectangular, looping rectangle ‘rhombus’, looping 2x square/octagonal, looping 2x square/ octagonal ($2x4=8$), hexagon and square ‘kite’ and looping 2x hexagon ($2x6=12$), triangle and decagon. The study also found the most respondents in interviews less understand, especially in Islamic geometric design. In conclusion the results show that the design of geometric patterns in Islamic architecture of state mosques in Malaysia can be developed and applied, by this study it can be as a guideline and reference to the public.

I. INTRODUCTION

How great is the science achieved and will be achieved by humans, but it is still slightly compared to the vastness and breadth of the universe that has not been widely known and explored by humans (Zamir, 2008). Meanwhile, the existence of art science arises as a result of human nature that loves the beauty of the world became the main feature of the arts from an Islamic perspective. The concept of beauty means a sense of excitement, pleasant, satisfying and appreciating without exceeding the boundaries of Islamic law (Kulaz, 2010).

The study was conducted to identify, understand the design and Islamic geometry designed in the architecture of state mosques in Malaysia. One of the key features of Islamic architecture is the uniqueness and beauty of placing angle for geometric design, khat and *arabesques*. The concept of Islamic geometry

design leads to the skills in artistic integrity where geometry is the science that paves the way to one of the scientific gates which became the cause and foundation of mathematical knowledge (Jarlah, 2006). According to her, these knowledge have no relationship with religion. It is knowledge based on proof (*burhan*) dalil and evidence.

Today, Islamic geometry designed is universally applied to metals, wood, ceramics, textiles, carpets, miniature and as a decoration or interior design with clearly defined and incorporating composition adaptation systems that enable variation and innovation diversity.

For Muslim around the world and especially muslim in Malaysia, the word of mosque ‘masjid’ is not a stranger in every life. This is because the mosque is an institution that serves as a place to practice prayer and places of social and community activities. According Ali (2003:3), The word mosque means the place of prostration, the place where to perform worship and to express sincere devotion to Allah s.w.t as the only god worthy of worship.

The architecture of the mosque in general, can be interpreted as a design of architecture that symbolizes a culture based on Islam. But it is not from the architecture of a city or a place. It is a result of various places and cultures. If noticed, almost all the mosque architecture around the world has the same characteristics especially geometric design (Hamdan, 1992). Therefore, the scope of the research for this study revolves around the process of identifying technical design and geometry patterns in the interior design of mosques in Malaysia.

II. PROBLEM STATEMENT

For Muslim in Malaysia, the word mosque is always associated with the place of worship. However, the mosque actually serves as a place to carry out religious, educational and community activities. Mosque institutions have long been in existence since the time of the Prophet Muhammad s.a.w and have become formal in Medina when he was to the city of Medina in the Hijrah.

When we refer to the interior design of Islamic geometry in the mosque, we often think how the earnings process is happening and what is implied behind each geometric design. Creativity in producing it, is a processing of the result of Islamic geometry design that will give a certain and different meaning as a message to be conveyed to visitors who are present in

the mosque. At the same time, from early field analysis, almost all mosque staff that had been interviewed for Islamic art, had little knowledge to explain about Islamic geometry. As a result, it is increasingly difficult for Islamic art practitioners and tourists to find out all infomercials related to Islamic art in Malaysia, especially the design of Islamic geometry.

In this study, researchers wanted to identify the truth of the use of Islamic geometric designs in every state mosque in Malaysia, from the angle of its aesthetic values, layout and the elements used in the design and geometric patterns. In this study, the researcher will identify the messages that will be delivered to audience based on pattern design that has existed for many years around the interior of the mosque. This is because the geometric designs found in every mosque are not merely to enjoy its beauty or to be viewed solely but the beauty of the design and the geometric patterns need to be understood and explored. Today, Islamic geometric patterns of mosques are increasingly growing as well as the use of khat such as: khat Nasakh, Thuluth, Kufic, Riqa 'and arabesque.

III. PURPOSE OF THE STUDY

This study aims to identify, analyze, and identify the design processes of geometric patterns in state mosques Malaysia.

a. RESEARCH OBJECTIVE

Overall, this study has three main objectives as follows:

1. To Identify the design and patterns of Islamic geometric in the architecture of mosques in Malaysia.
2. To analyze the design of Islamic geometric patterns used in the architecture of the state mosque in Malaysia.
3. To identify the process designing Islamic geometric patterns in state mosque, Malaysia.

IV. RESEARCH QUESTION

In order to achieve the three objectives of this research, some research questions are as follows:

1. What is the design of geometric patterns found in the architecture of state mosque in Malaysia?
2. What is the design of Islamic patterns geometry used in the architecture of state mosques in Malaysia?
3. How is the process to produced Islamic geometric patterns in the architecture of the state mosques in Malaysia?

V. THEORETICAL FRAMEWORK RESEARCH

Theoretical framework can be seen in the figure 1.1, it was built to obtain the data to answer the question of

the study. The theory used in this research is Gestalt Theory and Concept of Haqiqah and Ihsan, there are several principals in the theory and concept has been designed to make sure the reseach will go smoothness.

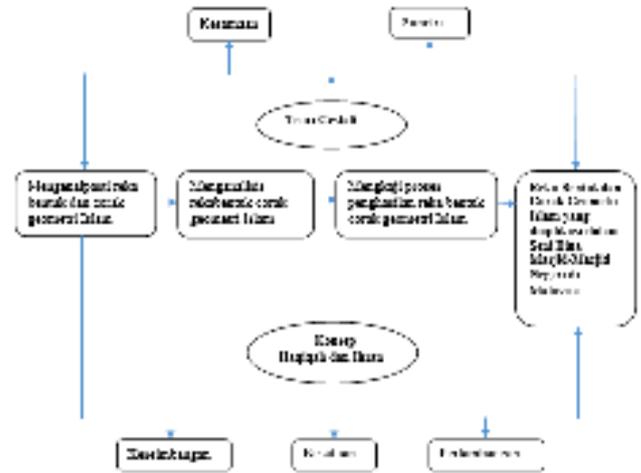


Figure 1 Theoretical Framework.
Redesigned from Gestalt Theori and Nakula : 1990

VI. THE IMPORTANCE OF RESEARCH

The results of this study can show how the design and pattern of Islamic geometry are produced and applied in state mosques in Malaysia. Additionally, with the discovery of this data, it can create a sense of interest and at the same time provide new input among designers, scholars, researchers, Islamic art enthusiasts and students in increasing Islamic art in Malaysia especially for future generations. The study is expected to assist the Ministry of Education in enhancing Islamic studies or Islamic history at schools. In addition, this study can help the school to uphold the art literacy culture in Islamic design. Where, designs such as geometry, arabesque, and khat can be included in the syllabus of junior high schools and daily religious schools, especially in such subjects; Visual Arts Education, Technical Drawing, Living Skills, Islamic Education, History, Science and Mathematics. However, the initial disclosure of the design process should be applied to educators before they can be taught and applied to students in school.

Overall, there is still less research conducted in the field of Islamic art especially in Malaysia. This suggests that this study and writing material may provide a clearer picture of the role of the existing Islamic geometry design.

VII. LIMITATION OF STUDY

Generally, studies related to the geometric designs of state mosques in Malaysia are still not widely and profound among researchers in institutions of higher learning. Therefore, there are some limitations that can not be avoided during the field research conducted by

researchers. Sample selection for this study is limited to the following factors:

i) The research sample (geometric design) is limited to thirteen state mosques in Malaysia. The selected mosque are the mosque at; Johor, Melaka, Negeri Sembilan, Selangor, Pahang, Wilayah Persekutuan, Perak, Pulau Pinang, Kedah, Kelantan dan Terengganu, Sabah and Sarawak. In addition, the state mosque has unique architecture with its own style. In fact, each mosque has its own features and elements of Islamic geometric design.

ii) Mihrab or known as 'maqsurah' is chosen because it is an important structure in a mosque and is constructed in front of the main prayer hall which marks the direction of the qibl which lead to the house of Mecca. Mihrab also helad the place of the imam to lead the Friday prayers. The existing design illustrate the beauty, as well as showing the majesty Almighty in every aspect of Islam. In this research, researcher only made selection of geomtric patterns that were not merged entirely with arabesque patterns and khat.

VIII. SCOPE OF THE RESEARCH

The scope of this research refers to the propotion of the three types of geometric design as follow:

- i) Geometric Pattern rectangular repeat unit $\sqrt{2}$,
- ii) Geometry Patterns of the hexagon Repeat Unit
- iii) Combination of Geometric Patterns between Hexagons-polygon

Islamic geometric patterns are very easy to recognize based on the four-dimensional geometric designs, hexagon, octagon or twelve. These patterns can be seen inside or outside the mosque. Danby (1995), the principle of Islamic geometric patterning as a system whereby geometrical grids from the framework of identical units that are regularly repeated.

IX. DATA COLLECTION

This research was built using qualitative approach. This study was conducted by analyzing each of the designs of Islamic geometric patterns in each selected mosque as described in Chapter 1. The finding results are to answer all questions in the study. This data is divided into 4 objectives and 4 questionnaires.

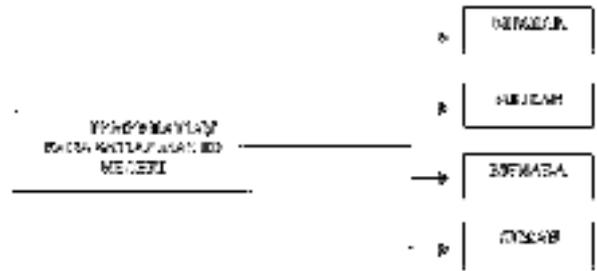


Figure 2. Elements of Observation

X. DATA COLLECTION METHODS

The function of data collection techniques is to answer the research questions. The following is the data collection matrix used by researchers in the research process.

i) MATRIX OF DATA COLLECTION

For the smooth running of data collection, this research involved many parties, including the Sultan Idris Shah Education University (UPSI), the Imam of the State Mosque for each mosque in Malaysia as well as the administrative officers of the mosque and the National Archives. Systematic data collection procedures are required for the smoothness of each of the research processes carried out among them as follows.

The first researcher has to apply for a letter of authorization to reasearch from Universiti Pendidikan Sultan Idris Shah (UPSI). It is to facilitate the process of field visits and fieldwork to be carried out. After obtaining a letter of authorization from the university, the researcher should apply for permission to research from the state mosque. In addition, researchers need to apply for time permissions, and the appropriate time for field visits and field sessions. For National Archives, researchers only need to apply for additional information regarding the state mosque for example apply for permission to read journals or articles related to state mosques in Malaysia.

Field survey was conducted to collect data for each question. After completing the data collection, the process of analyzing the data will be carried out, where the researcher will analyze the data obtained from the field study. Collecting data from observations, visuals and interviews will be collected in order to provide concrete data. Each data obtained will be analyzed, and then the researcher will make a comment on all the data obtained.

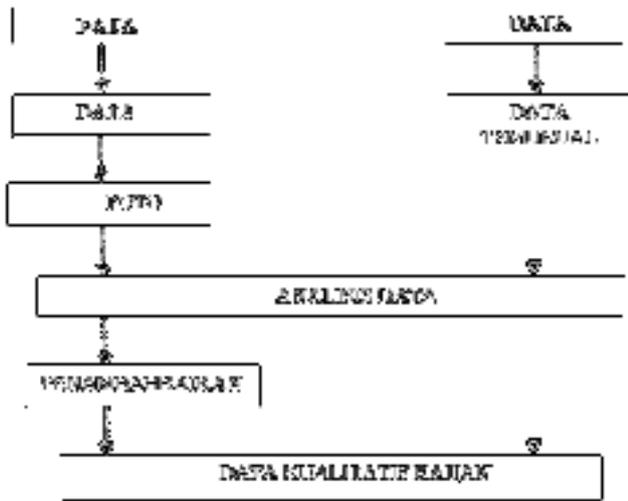


Figure 3. Data collection procedures

XI. TERMS OF DEFINITION

The use of terms in this research are: geometri Islamic patterns, balance, and harmony requires an explanation in terms of its operation. The term and its definition of operations are as follows:

(a) Islamic Geometric Patterns

The most important advantage of the Islamic geometric design is production was originally done using only the compass. According to Issam (1993), "... this involvemnet developed alongside his understanding of the essence, beauty, perfection and harmony found in the Islamic arts and architecture, irrespective of region or era to reconstruct their elements." Abd Rahman (2012), states that 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.

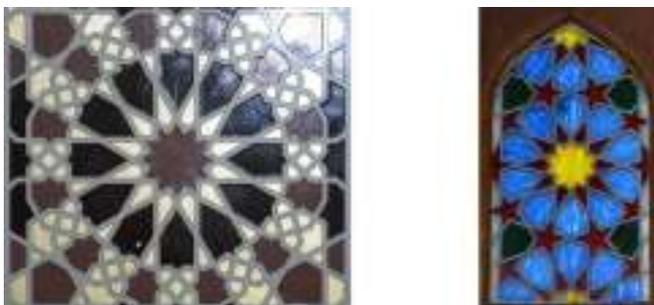


Figure 4. Geometric patterns of twelve and ten located in the mosque of Al-Taqwa, Selangor and the mosque of Sultan Ismail Petra, Kelantan.

Geometry became highly important in the Islamic world as its figures and constructions were permeated with symbolic, cosmological and philosophical significance. Geometrical designs based on a grid

system and broken down into identical units which are repeatead in regular sequence. Basically very simple, constructed with only a compass and a ruler and the knowledge of certain procedures which produce triangles, squares, hexagons, stars, etc.Wilson (1988:15)

The study of Islamic geometric patterns focuses on three types of Islamic geometric patterns ie: i). geometric pattern of rectangular units ii). Geometric patterns based on hexagons repeat units, and iii). Geometric pattern repeat two hexagons-polygon patterns

(b) Balance

The balance principle involves elements such as form, appearance, colors, spaces, and lines(Chee 2000). The balance occurs when various art elements are distributed equally in producing arts work. Knobler (1985) asserted that balance is a necessary condition to produce a satisfying aesthetic composition. Balance in 3-Dimensional art work, is physically weighted or lightweight. For 2-Dimensions, the balance is based on visual considerations. There are two types of balance: the symmeritical balance and asymmetrical balance. The symmetry balance affects the stable, static, strong, robust and harmonious aspects of an arts work. Symmetry balance exists when the left and right sides are the same. Symmetry balance is often used in the production of Islamic geometric designs.

For this research, the balance in the design of Islamic geometry is defined as a symmetrical balance. Design production is implemented in a digital application approach (Adobe illustrator software).

(c) Harmony

Harmony is the principle of visual reactions in the world of artwork, which combines various elements such as color, line, space, shape, and appearance. This integrity factor creates effects such as comfort, fitness, uniformity, serenity and unity (Rahmat 2004). Chee (2000) defines harmony as an appropriate set of art elements in a composition to produce an interesting artwork. In Islamic geometry design, harmony and balance are interconnected. This includes determining the various elements of art that exist especially the lines and appearance. Harmony can be applied in 2-Dimensional or 3-Dimensional artworks. For example: harmony in catanism (such as color, shape, arrangement, space, balance).

For this research, harmony in the Islamic geometry design is defined as one of the principles emphasized other than the principle of balance. The production of geometric patterns is implemented in a digital application approach (Adobe illustrator software).

XII. Mosque – State mosques of Malaysia

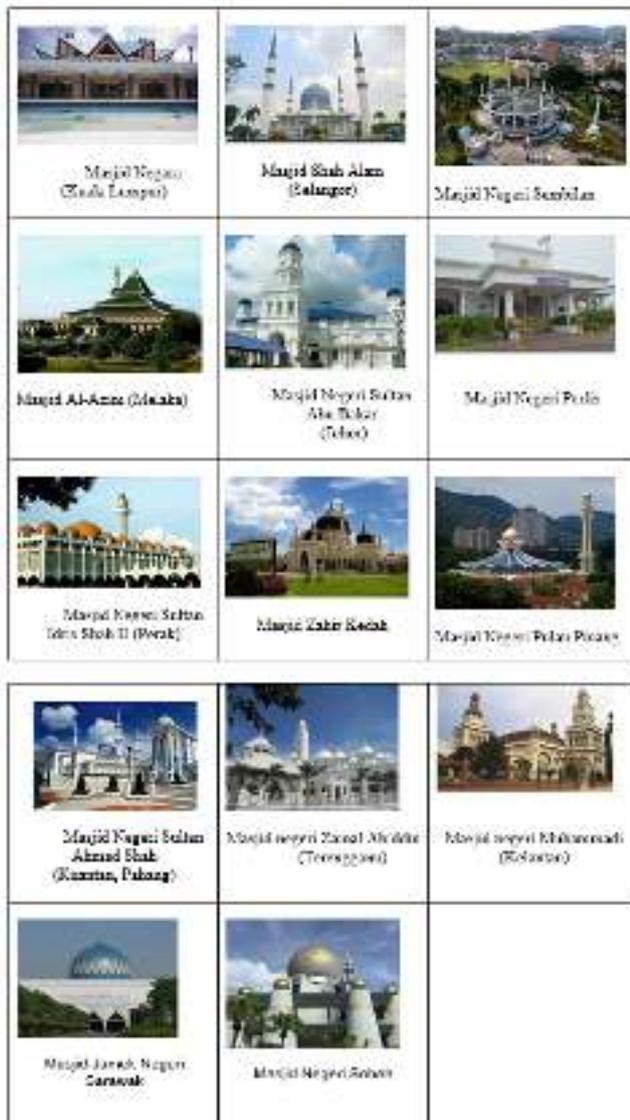


Figure 5. State mosques of Malaysia

XII. CONCLUSION

Islam contains the ways in which mankind can see the nature of the diversity and unity of principles that can reflect the unity of religion itself. Mastering basic geometry techniques will equip us with practical skills that are useful in the design field, even in digital era. However, to understand the techniques and processes of design, it is necessary to produce own geometric designs. An Islamic geometric pattern is so well known in architecture artworks and it starts with the appearance of circle geometry and line sketches using only compass equipment. This statement has been adopted and became the direction of travel by scholars and Islamic artists in the cultivation of ideas and creativity while designing patterns (arabesques, geometry, and khat) in the mosque architecture.

Among countries around the world that still have the Islamic geometric pattern to this day are in the country; Sepanyol (Cordoba & Alhambra mosque), Tunisia (Kairouan Mosque), Itali (Cappella Palatina - Sicily), Iraq (Baghdad), Syria (Damascus mosque),

Turki (Esrefoglu mosque), Afghanistan (Herat mosque), Mesir (Masjid al-SalihTala'I& Masjid al-Nasir Muhammad), Pakistan, Morocco (Qarawiyyin mosque), Iran (Rashid al-Din – Tabriz), China and Arab Saudi. However, Malaysia found some geometric patterns designated based on the original geometric patterns.

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