

THE RUB – EL – HIZB PATTERNS OF PETRONAS TWIN TOWERS AS AN INSPIRATION ON BATIK DESIGN: AN ETHNOMATHEMATICS STUDY

Wan Norliza Binti Wan Bakar¹

Junaidi Awang²

Mazni Omar³

Nor Asmira Mat Jusoh⁴

¹College of Computing, Informatic, and Mathematics

^{2,3}Faculty of Creative Arts

⁴Academy of Contemporary Islamic Studies

Article history

Received date : 10-2-2025

Revised date : 11-3-2025

Accepted date : 3-4-2025

Published date : 15-4-2025

To cite this document:

Wan Bakar, W. N., Awang, J., Omar, M., & Mat Jusoh, N. A. (2025). The Rub – El – Hizb Patterns of Petronas Twin Towers as An inspiration on batik design: An ethnomathematics study. *Journal of islamic, social, economics and development (JISED)*,10 (71), 569- 578.

Abstract: *Petronas twin tower is the highest twin tower in the world. Standing at 451.8 meters tall, the iconic landmark features 88 stores with the sky bridge at 41st and 42nd floor. The inspiring skyline symbolizes the nation's ambition and potential to become a developed nation. This study focuses on the symbol of Rub el Hizb, the basis for the floor plan of Petronas Twin Tower, as the inspiration on batik design. The research was qualitative research with an ethnographic approach. Data obtained through observation, interview, literacy study and documentation, with the triangulation method as data validity. This research examined the mathematical concepts in the development of Rub el Hizb as the inspiration for batik design. The result showed that there were few mathematical concepts found.in the design of rub El Hizb on batik design. Future research can be explored to implement rub El Hizb patterns on different surfaces.*

Keywords: *Petronas Twin Tower, Rub El Hizb, Batik Design*

Introduction

The Petronas Twin Towers, located on Jalan Ampang in Kuala Lumpur, Malaysia, hold the title of the tallest twin towers in the world. Standing at 451.8 meters, the skyscrapers consist of 88 floors, with a sky bridge connecting the two towers on the 41st and 42nd floors. The architectural design of the towers is iconic, featuring a floor plan based on two interlocking squares that form an eight-pointed star. This shape is known as the Rub el Hizb, an Islamic symbol in the form of an octagram traditionally used to mark divisions in the Quran for easier recitation. In Arabic, “Rub” means a quarter and “Hizb” means a group, so Rub el Hizb represents a quarter of a group.

Rub El Hizb has been used as a motif on various surfaces. It has been used on emblems and flags (Boyutu, 2024). Muslims used it as a decorative motif on religious objects such as prayer cushions, prayer rugs and wallet amulets. It is also found on Islamic jewelry such as pendant, bracelets and cufflinks. Rub el Hizb also been used in brick paving along the river of life near Sultan Abdul Samad building in Kuala Lumpur, Malaysia (Limited, 2020). The design of rub el Hizb too has been implemented on the floor plan of Petronas twin tower at Kuala Lumpur. The unique design of the Petronas Twin Towers has made them a major attraction, drawing thousands of local and international tourists who marvel at their beauty and architectural novelty. However, as highlighted by a 2018 study by Fitri Rahmadani and Nurul Ain Shabir Ahmad, while many visitors appreciate the towers’ grandeur, they are often unaware of the detailed architectural design and cultural significance embedded within. This gap in knowledge presents an opportunity for researchers to delve deeper into the architectural details of the Petronas Twin Towers and share these insights with a global audience. By doing so, the beauty and cultural significance of the design, particularly the use of the Rub el Hizb symbol, can be better appreciated and potentially integrated into contemporary Batik designs. The importance of studying rubs el Hizb and its transformation into batik design is because it reminds the Muslims to always recite and understand the meaning of Quran in everyday life and a constant reminder to obey the following teachings of Quran. As clothes always being worn on humans’ body, so does the principles of Islam should be the pillars of Muslims heart.



Figure 1: Rub El Hizb

Sources: Mystic Expressions and Sufi Architecture: The Shrine of Hazrat Sachal Sarmast Dargah

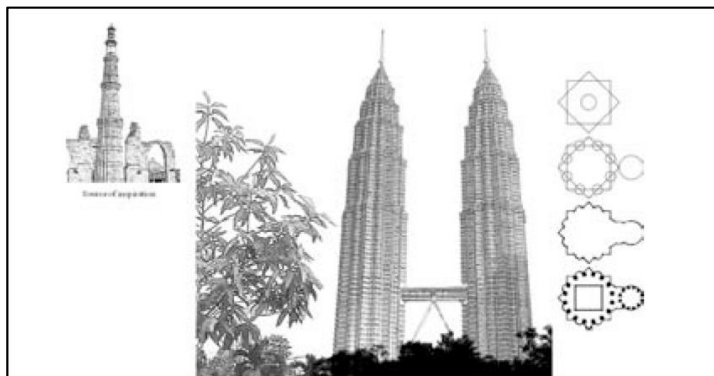


Figure 2: The Rub El Hizb as The Cross-Section Floor Plan of Petronas Twin Tower

Sources: Skyscrapers and placemaking: Supporting local culture and identity

DOI: 10.26687/archnet-ijar.v6i2.83

Literature Review

Islamic Motif

Islamic motifs are fundamental components in Islamic art, reflecting spiritual values, the philosophy of *tawhid* (the oneness of God), and an appreciation for the beauty of divine creation. Unlike other artistic traditions that often emphasize human or animal forms, Islamic art leans more toward abstract and non-figurative elements. This preference is not merely aesthetic but rooted in theological principles that avoid the depiction of living beings to preserve the sanctity of God's oneness (Grabar, 1992).

In Islamic art, geometric patterns, arabesques (vegetal or floral motifs), and Arabic calligraphy are the three dominant elements. Geometric motifs, for instance, feature recurring shapes such as squares, hexagons, or eight-pointed stars. This repetition symbolizes infinity and perfection, representing the boundless power of God (Critchlow, 1976). Each line and curve carry deeper meanings, functioning not just as decorative elements but as a form of visual meditation inviting the viewer to contemplate His creation.

Islamic architecture—such as mosques and madrasas—also plays a crucial role in showcasing the beauty of these motifs. Structures like domes, *mihrabs*, and minarets are adorned with repeating patterns that convey a sense of harmony and tranquility. Calligraphy is often used to embellish walls with verses from the Qur'an, turning art into a medium of spiritual reminder and religious expression.

Arabesques, another key motif based on plant forms, symbolize eternal paradise and the beauty of the natural world created by God. These elements are frequently found in ceramics, textiles, and architectural design, forming a visual unity that bridges the physical and metaphysical realms. In textile arts such as batik or weaving—especially in the Malay world and Andalusia—Islamic motifs are locally adapted while retaining core elements like geometry and repetition.

Although Islamic motifs originate from the beliefs and culture of the Middle East, their influence has transcended geographical boundaries, integrating into various cultures from Morocco to Indonesia. This reflects the adaptability of Islamic art, which can harmonize with local contexts without compromising its original identity.

However, one major limitation in the study of Islamic art is the lack of interdisciplinary approaches. Many scholars examine Islamic art purely from historical or aesthetic perspectives, with insufficient exploration into how these motifs relate to other fields such as mathematics, visual psychology, or modern education. In this context, an ethnomathematical approach could open new dimensions in understanding the geometric structures that were intuitively employed by artists of the past.

Rub el Hizb

The Petronas Twin Towers, standing at 451.8 meters, were the tallest skyscrapers in the world upon their completion in 1998. Designed by Argentine architect César Pelli, these iconic towers encompass approximately 21,800 square meters spread across 88 floors. The structure of the towers is a marvel of engineering, featuring high-strength concrete columns, a central core, ring beams, and steel floor beams that allowed for efficient and rapid construction. One of the notable features is the sky bridge connecting the two towers on the 41st and 42nd floors, which required careful consideration of wind behavior and damping to ensure stability.

The structural system of the Petronas Twin Towers is based on the tube design concept, pioneered by Bangladeshi American engineer Fazlur Rahman Khan. The towers are primarily constructed from reinforced concrete, with a façade of steel and glass designed to reflect motifs found in Islamic art, symbolizing the Muslim identity of Malaysia. The cross-sectional design of the towers is influenced by the Rub el Hizb symbol, modified with circular sectors to accommodate modern office space requirements.

The Rub el Hizb, an Islamic symbol, is an octagram formed by two overlapping squares. Its name derives from Arabic, where "Rub" means one-quarter and "Hizb" means a group, making Rub el Hizb translate to "quarter of a group". In Islam the symbol of Rub el Hizb is rooted in quranic verse that prophesies the presence of 8 angels flanking God's throne on the day of judgement correlating with the 8 points of the star.

Surah Haqqah verse 17:

وَأَلْمَلِكُ عَلَىٰ أَرْجَائِهَا وَيَحْمِلُ عَرْشَ رَبِّكَ فَوْقَهُمْ يَوْمَئِذٍ ثَمَنِيَّةٌ

Wal malaku ‘alaaa arjaaa’ihaa; wa yahmilu ‘Arsha Rabbika fawqahum yawma’izin samaaniyah

‘And the angels are at its edges. And there will bear the Throne of your Lord above them, that Day, eight [of them]’.

This octagonal structure serves as a distinctive emblem, signifying both protective qualities and guidance owing to its direct alignment with 8 cardinal directions. Moreover, this celestial symbol maintains a profound connection with number 8, a universally recognized symbol of significance and good fortune across diverse cultural landscapes.

The Muslims employed the Rub El Hizb as the tool for the recitation and memorization of Quran the symbol represents each quarter of a Hizb which designates within the Holy Quran. (Emna Esseghir, 2023)

According to some historians. The Rub El Hizb originated in a civilization that existed in Spain. This region was ruled by Islamic Kings, and it is said that they had an eight-pointed star as

their logo. This star could have been the early precursor for the Rub El Hizb symbol. (Dani Rhys, 2023).

The *Rub El Hizb* symbol is linked to ancient Tartessos, where it represented the sun with its eight rays during Neolithic times. In the Al-Andalus period in the Iberian Peninsula, it became a cultural symbol, often appearing on coins. The symbol has been widely used on flags, beginning with the Marinid Sultanate (1258-1659) and followed by its appearance on flags of Egypt (1793-1844), the Ottoman Empire (1844 onwards), and the Emirate of Afghanistan (1919-1926). The Rub el Hizb has also been used in brick paving designs.

The *Rub el Hizb* is an eight-pointed star symbol commonly found in Qur'anic manuscripts and Islamic art. It originates from the traditional division of the *mushaf* (Qur'an) into quarters, aiding in memorization. Beyond its function as a textual marker, the symbol also carries cosmological and spiritual meanings, including representing stability and protection through its eight directional points (Esseghir, 2023).

According to Dani Rhys (2023), the symbol dates back to the time of Tartessos and later evolved in Al-Andalus, where it adorned coins and flags of Islamic rule such as the Marinid Dynasty and the Ottoman Empire. This research highlights the historical continuity of the symbol; however, modern studies still lack in-depth analysis of the symbolic value of the *Rub el Hizb* from the perspective of contemporary Islamic art and philosophy.

Furthermore, the cosmological interpretation of this symbol is linked to Surah *al-Haqqah*, verse 17, which mentions eight angels bearing the Throne of Allah. This connection elevates the *Rub el Hizb* beyond a mere visual motif, positioning it as a metaphor for spiritual strength and cosmic balance within Islam.

Although the symbol has been widely applied in architecture—such as in the design of the Petronas Twin Towers, there remains a scarcity of academic research directly connecting its usage to the principles of ethnomathematics or education.

Ethnomathematics

Ethnomathematics is the study of how traditional societies utilize mathematical concepts in their daily lives, particularly in art. In traditional art forms such as batik, profound mathematical elements—such as symmetrical, repetition, and geometric transformations—are evident in the patterns they create. These mathematical concepts are beautifully translated into visual forms that reflect a community's understanding of geometry and spatial awareness.

For instance, in batik art, repetitive and symmetrical patterns reflect the community's grasp of mathematical principles such as geometry and space. A study by Gerdes (1999) revealed that many traditional cultures, including Islamic art, use geometric elements to represent the cosmos and the structure of the universe. The symmetry and geometric shapes used in batik not only create aesthetic appeal but also signify mathematical relationships intertwined with the community's spirituality.

Batik from Kalimantan, for example, features motifs that reflect geometric concepts like squares, circles, and triangles, all of which can be related to mathematics. Sudrajat et al. (2023), in their study of Kalimantan batik, demonstrated that these motifs can be applied in geometry

education in schools, using repetitive and symmetrical patterns to teach mathematical concepts in a practical way.

Through ethnomathematics, we gain insight into how traditional art not only decorates space but also holds deep mathematical meanings, creating a harmonious connection between culture, art, and knowledge.

Batik Applications

Batik is not only a cultural textile heritage but also an effective medium for teaching mathematics. A study by Sudrajat et al. (2023) suggested integrating batik into elementary school geometry instruction through question-and-answer sessions, observations, and student presentations. This demonstrates the pedagogical value of art in conveying abstract concepts.

However, most studies have focused only on specific regions or motifs (such as those from Kalimantan or Bali), without expanding the scope to include Islamic patterns, which are also rich in ethnomathematical value. Additionally, there remains a lack of a systematic pedagogical framework for using batik as a teaching medium at the national or international level.

The use of the *Rub el Hizb* symbol as a motif in contemporary batik, for instance, could serve as a platform to be explored through a contextualized ethnomathematical approach that is rooted in local cultural identity.

Methodology

The research objective is to study the *Rub el Hizb* symbol, as represented in the floor plan of the Petronas Twin Towers and explore its potential as an inspiration for Batik design. To achieve this, an ethnomathematical approach is employed, involving observation, interviews, and analysis.

A designer from the Faculty of Art and Design selected the *Rub el Hizb* symbol and developed various patterns based on it. The patterns have been sketched freely by the designer's imagination and transformed it into reality by using the Adobe Illustrator software. The research included an analysis of these geometrical designs, examining aspects such as shape, size, arrangement, and symmetry of the *Rub el Hizb* symbol. This analysis was conducted on multiple sets of patterns to ensure thorough examination.

Data collection was conducted through both primary and secondary sources. Primary data involved direct observation and interviews. During the observation phase, the focus was on the geometrical properties of the *Rub el Hizb* design, analyzing its structural elements repeatedly across different patterns. Secondary data was gathered from books, journals, and previous studies by other researchers, providing a broader context and supporting information for the research.

The study's conclusions were drawn from this comprehensive analysis, offering insights into how the *Rub el Hizb* symbol can inspire new Batik designs, integrating traditional Islamic geometric motifs with contemporary artistic expressions.

Result and discussion



Figure 3: Rub El Hizb

Sources: Mystic Expressions and Sufi Architecture: The Shrine of Hazrat Sachal Sarmast Dargah

Rub El Hizb is an 8-pointed star which has a geometric shape formed by the intersection of 2 squares typically with one square rotated at 45 degree and the circle that is in the square itself. The squares can be depicted by the four sides which have equal length, the opposite sides are parallel and the four angles which have the same measure. The characterization of circle can be identified by its plane figure bounded by one curved line and such that all straight lines drawn from a certain point within it to the bounding line are equal. In Islam, the 8-pointed star is called as the Khatim Sulayman or seal of Solomon which is associated with the biblical king Solomon who is a prophet in Islam. The star is also believed to be the number of angels carrying the throne of Allah in heaven. (Leslie, Blau2023)

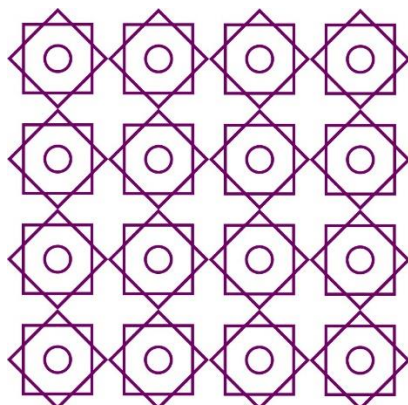


Figure 4: Rub El Hizb Arranged Together in Tessellation

Figure 4 showed Rub El Hizb shape, an Islamic symbol in the shape of octagram, arranged together in tessellation, which means that the arrangement of closely fitted together without gaps.

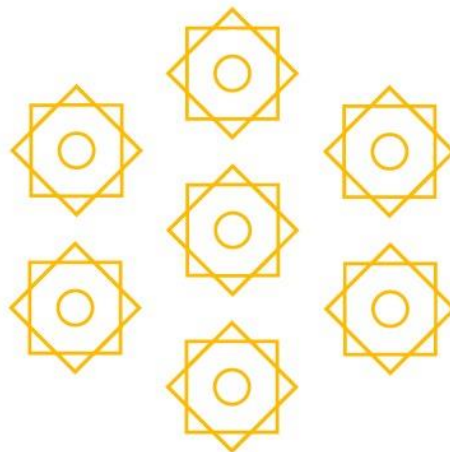


Figure 5: Rub El Hizb Arranged Together in Rotation

Figure 5 shows that Rub El Hizb was arranged together with rotation that is in the act of rotating about an axis. The philosophy of the design is elucidated by Emma Clark in the art of Islamic Garden (2004) that Rub El Hizb symbolizes the god 's throne. The symbolism is rooted in quranic verse those prophesies in the presence of angels flanking god's throne on the day of judgement correlating with the 8-pointed star.

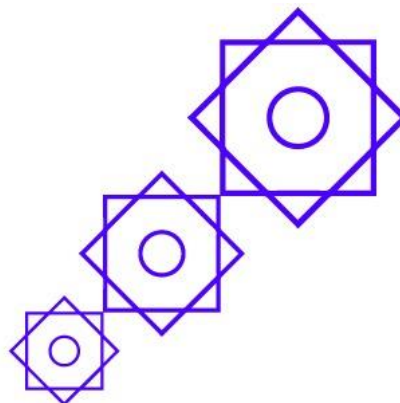


Figure 6: Rub El Hizb Arranged Together in Enlargement

Figure 6 depicted Rub El Hizb shape in enlargement where the shape is in the state of being enlarged.

Conclusion

Petronas Twin Tower is the symbol of Malaysian nations ambition and potential to becoming a developed nation. The inspiring skyline used to convey a powerful message that Malaysian can achieve the goal of a developed nation which is within reach. The design of Rub El Hizb on the cross section of the floor plan is the unique identity of Petronas Twin Tower. It can be illustrated on the batik design as the symbol of Malaysian identity that shows the attraction of positive energies, the spiritual healing and the facilitation of manifestation.

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