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Ethnomathematical Study of Historical Mosque Buildings in South Kalimantan

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ABSTRAK

Kalimantan Selatan kaya ragam kekayaan budaya seperti kerajinan tangan tradisional, permainan tradisional, dan kesenian tradisional (seni musik dan seni tari), serta bangunan bersejarah seperti museum dan masjid. Salah satu kekayaan budaya yang cukup terkenal adalah bangunan masjid bersejarah yang banyak dikunjungi oleh wisatawan, baik lokal, nasional maupun mancanegara. Penelitian ini akan memfokuskan pada tiga masjid bersejarah di Kalimantan Selatan, yaitu Masjid Sultan Suriansyah (Banjarmasin), Masjid Agung Al Karomah (Martapura), Masjid Keramat Al-Mukarramah (Banua Halat, Tapin). Penelitian yang dilaksanakan adalah penelitian kualitatif deskriptif, yang bertujuan mendeskripsikan hasil temuan/eksplorasi etnomatematika pada bangunan masjid bersejarah di Kalimantan Selatan, dengan pendekatan etnografi. Teknik pengumpulan data yang dilakukan peneliti yaitu dengan menggali informasi melalui studi kepustakaan, observasi, serta wawancara. Instrumen yang digunakan dalam penelitian ini peneliti sendiri (human instrument), pedoman wawancara dan lembar observasi. Teknik analisis data yang digunakan adalah analisis data kualitatif, yaitu data reduction, data display, dan conclusion drawing/verification. Hasil penelitian menunjukkan bahwa pada bangunan tiga masjid bersejarah di Kalimantan Selatan terdapat banyak konsep matematika di dalamnya. Secara garis besar ada dua konsep utama yang dominan ditemui pada ketiga masjid, yaitu konsep geometri dan konsep kekongruenan. Selain itu, ada konsep garis sejajar, konsep sudut, konsep transformasi geometri, konsep Pythagoras.

Kata kunci: masjid bersejarah; etnomatematika; Kalimantan Selatan

ABSTRACT

South Kalimantan is rich in various cultural wealth, such as traditional handicrafts, traditional games, traditional arts (music and dance), and historical buildings (museums and mosques). One of the most famous cultural wealth is the historical mosques, which are visited by local, national, and foreign tourists. The particular study focused on three historical mosques in South Kalimantan. They were the Sultan Suriansyah Mosque in Banjarmasin, the Masjid Agung of Al-Karomah in Martapura, and the Masjid Keramat Al-Mukarramah in Banua Halat, Tapin). It used a descriptive qualitative study with an ethnographic approach. It aimed to describe the findings/exploration of ethnomathematics in historical mosque buildings in South Kalimantan. The data collection techniques were literature studies, observations, and interviews. The instruments were the researcher himself (human instrument), interview guidelines, and observation sheets. The data analysis technique used data reduction, data display, and conclusion drawing/verification. The study showed that the buildings of the three historical mosques in South Kalimantan have many mathematical concepts. Generally, two main concepts are dominant in the three mosques, namely geometry and congruence. Also, it found the concepts of parallel lines, angles, geometric transformation, and Pythagoras.

Keywords: Historical Mosque; Ethnomathematics; South Kalimantan.

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1. INTRODUCTION

Ethnomathematics is an alternative approach in mathematics learning that aims to integrate cultural values and local wisdom from a particular community (Sulthoni & Handayani, 2025). Then, it is packaged into learning tools. Learning mathematics by linking culture to everyday life not only helps students understand mathematics but also makes students appreciate culture better and the differences between cultures (Cahyono & Budiarto, 2020; Roesdiana et al., 2025).

Through ethnomathematics, students are expected to better understand and recognize local culture in their area related to mathematics. At the same time, it instills noble values and character education in children from an early age (Wahyuni, Tias, & Sani, 2013; Riado, Turmudi, & Jarnawi, 2024). The cultural context is expected to stimulate students' knowledge so that they can easily remember and understand mathematical material through direct experience of life (Roehati, 2011; Karimah, Isnarto, & Munahefi, 2025). It hopes mathematics is no longer considered a difficult subject and is feared by students (Sunardi et al., 2019; Pramasdyasari, Aini, & Setyawati, 2024). Simply, topics of local wisdom or local culture are a concern in learning using ethnomathematics (Yudianto et al., 2021; Musliana et al., 2024) and a means of motivating, stimulating, and solving student boredom in learning mathematics (Sirate, 2012; Afriansyah et al., 2024).

South Kalimantan is rich in various cultural wealth, such as traditional handicrafts, traditional games, traditional arts (music and dance), and historical buildings (museums and mosques). One of the most famous cultural wealth is the historical mosques, which are visited by local, national, and foreign tourists.

Some of the historic mosques (masjid) in South Kalimantan are the Sultan Suriansyah Mosque, Masjid Jami Banjarmasin, Masjid Raya Sabilal Muhtadin, Masjid Jami Tuhfathurroghibin (Masjid Kanas) and Masjid Syekh Abdul Hamid Abulung. The historic mosques in South Kalimantan are Masjid Jami' Sungai Jingah Banjarmasin, Masjid Agung Al-Karomah Martapura, Masjid Baangkat (As Su' ada) Hulu Sungai Selatan, Masjid Pusaka Banua Lawas Tabalong, and Masjid Keramat Banua Halat (Al- Muqarromah) Tapin.

Several indicators are used to call a mosque a historic mosque. First, the age of the mosque is > 50 years. It is included in the criteria of Cultural Heritage Objects. Also, it is called an

old mosque whose authenticity has been maintained from generation to generation. Second, the shape of the mosque still characterizes a traditional mosque, namely predominantly made of wood and with a roof thatched, even though it has undergone several renovations. And, the history of the mosque is still related to the existence of the Banjar Palace (Aufa, 2010). The particular study focused on three historical mosques in South Kalimantan. They were the Sultan Suriansyah Mosque in Banjarmasin, the Masjid Agung of Al-Karomah in Martapura, and the Masjid Keramat Al-Mukarramah in Banua Halat, Tapin).

Not much research was found on ethnomathematics in South Kalimantan, especially examining mosques as a historic building. Generally, the research still discusses traditional houses, sasirangan cloth, and museums (Aufa, 2010; Nurhasanah & Puspitasari, 2022; Ja' faruddin, & Naufal, 2023; Aini, Hastuti, & Mariyati , 2023; Salsabiela & Nursanti, 2024; Fitriza, Hurriyah, & Hadaina, 2024; Lukman, Aunul, & Putri, 2024; Octaria et al., 2025). Meanwhile, research on ethnomathematics of mosques in South Kalimantan has indeed existed, such as conducted by Fajriah & Suryaningsih (2021). However, it still does not cover historic mosques in other districts in South Kalimantan, including Martapura and Rantau.

The study explored the ethnomathematics aspects of three Historic Mosque buildings in South Kalimantan. The conclusion becomes a source of reference and materials for further research, namely the development of mathematics teaching materials in the form of modules that integrate Cultural Values and Local Wisdom in Mathematics Learning. So, the research question is what mathematical concepts are contained in the architectural elements and ornaments of historic mosques in South Kalimantan?

2. METHOD

The research used a descriptive qualitative study with an ethnographic approach. It aimed to describe the findings/exploration of ethnomathematics in historical mosque buildings in South Kalimantan. It tried to describe, analyze, and interpret elements of a cultural group, such as thought patterns and others.

The data collection techniques were literature studies, observations, and interviews. The subjects were religious figures/leaders such as the imam, marbot (a person who guards the mosque) who understand the mosques (e.g. history, etc), historical traditional figures/cultural experts from the South Kalimantan Tourism Office, and other valid references. The object is the ethnomathematics aspect found in three historic mosque buildings in South Kalimantan, especially to explore the concepts, facts, and mathematical procedures.

The interview subjects for this study were 9 key informants selected purposively. These informants included mosque administrators (imams and caretakers), Banjarese traditional figures/cultural figures, and sources from relevant agencies. Informants were selected based on

their knowledge, experience, and direct involvement in the history and management of historic mosques in South Kalimantan. Interviews were conducted until data saturation was reached.

The instruments were the researcher himself (human instrument), interview guidelines, and observation sheets. The qualitative data analysis from Miles and Huberman (1984) was employed, including data reduction, data display, and conclusion drawing/verification. In qualitative research, the data analysis process is more focused during the field process along with data collection rather than after data collection (Sugiyono, 2015: 245).

In the data reduction stage, researchers selected and focused on data from observations and interviews relevant to ethnomathematics. For example, from observations of the ornaments and structure of the mosque, researchers identified geometric shapes such as squares, rectangles, isosceles triangles, rectangular pyramids, angles, and parallel lines. Descriptive data unrelated to mathematical concepts was eliminated. Interview results were also summarized into core statements. For example, an informant stated that "the roof is tiered and tapered upwards because it symbolizes the relationship between humans and God"

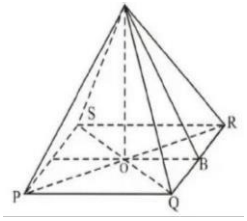
In the data presentation stage, the reduced data is presented in the form of ethnomathematics findings tables and brief narrative descriptions linking mosque building objects to corresponding mathematical concepts. Furthermore, interview quotes are selectively chosen to strengthen interpretations, such as the statement "the wall carvings are made repeatedly with the same size to create a balanced and neat appearance", which indicates the concepts of congruence and geometric transformation.

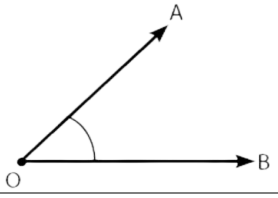
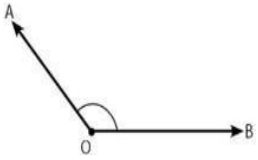
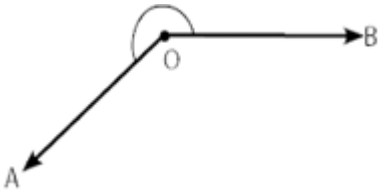
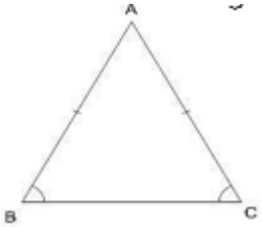
The conclusion-drawing and verification stage is conducted by examining the emerging patterns of findings and verifying them through source triangulation between observational data, interviews, and literature review. The conclusions show that the concepts of geometry and congruence dominate traditional Banjar Mosque architecture and serve not only structural functions but also reflect the cultural and religious values of the local community.

3. RESULT AND DISCUSSION

The ethnomathematics aspects found in the Sultan Suriansyah Mosque are as follows in Table 1:

Table 1. Example Findings of Ethnomathematics Aspects in the Sultan Suriansyah Mosque

Object	Ethnomathematics	Mathematics Concept
		Square pyramid 

Object	Ethnomathematics	Mathematics Concept
		Horizontal line
		Acute angle 
Roof of the mosque		Obtuse angle 
		Reflection angle 
		Isosceles triangle 

Many ethnomathematical aspects of the Sultan Suriansyah Mosque are found, such as a square pyramid, horizontal lines, acute angles, obtuse angles, reflex angles, and isosceles triangles on the roof. Also, the roof uses a square pyramid because it has a square base and tapers to one point so that upright sides are formed in the form of triangles.

Horizontal lines on the roof are lined in a horizontal position from right to left. An acute angle on the roof made the angle less than 90° . An obtuse angle on the roof has an angle of more than 90° . A reflex angle on the roof is more than 180° . Also, it found an isosceles triangle on the roof with three sides. The angles on the base side are the same size, and both sides of the legs are the same length.

Rhombus, rectangle, square, and the Pythagorean are concepts on the wall. Rhombus is found on ornaments/carvings of the wall with four sides of the same length with opposite sides parallel, but adjacent sides are not perpendicular. The wall ornaments/carvings also have a Rectangle as it has two pairs of parallel sides and right angles on all four corners. Moreover, Square is also found on wall ornaments/carvings as all four sides are the same length and right angles on all four corners. In addition, the Pythagoras concept is found on wall ornaments/carvings due to the ornament/carving is a right triangle where the legs are the two sides that form a right angle, and the hypotenuse is opposite the legs.

The odd number of steps on the front of the pulpit is 9 steps and the even number of steps on the front is 4 steps. Odd numbers are integers that will not be divisible by 2. While even numbers are integers that will be divisible by 2. Moreover, it is also found in Cubes, vertical lines, perpendicular lines, and straight angles of 180° . Cubes on the bottom of the pillars have a three-dimensional geometric shape bounded by six congruent side planes of squares. Vertical lines on the pillars are the lines straight from top to bottom. Perpendicular lines on the pole are the lines that intersect with other lines that form a right angle at their intersection. Straight angles on the pole have an angle of 180° .

Parallel lines and intersecting lines are found on the ceiling. Parallel lines on the ceilings are two lines that do not have an intersection point. Intersecting lines on the ceiling are two lines with an intersection point when the two lines meet. The photo frame has the concept of similarity and circles in calligraphy. The concept of similarity is in photo frames as corresponding sides that have the same value ratio. The corresponding angles are the same size. The circle in the calligraphy photo frame has a diameter that divides it into two balanced sides and a total angle of 180° . The block on the glass cabinet is formed by three pairs of squares or rectangles where one pair has different size. The concept of congruence is found in the size of the door because the carving has the same size of corresponding sides and angles.

A trapezoid is found in the floor motif. It has four sides where two sides are parallel but not the same length. Right angles, transversal lines, and geometric transformations are found on the fence.

The right angle is on the fence with the angle of 90° . Transversal lines are also found on the fence because the line intersects two or more lines on the same plane towards the intersection of the lines and the same angle size.

Moreover, there is a concept of geometric transformation in the carvings on the fence, namely rotation, reflection (mirroring), and transition (shift). Transition (shift) is the carving shifts by the same distance and direction. Reflection (mirroring) is the carving moves following the shadow of the object in a mirror. Rotation (rotation) is the carving rotates in a certain direction and angle to the center of rotation.

Ethnomathematic findings in historic mosques in South Kalimantan demonstrate that mathematical concepts did not emerge by chance, but rather are the result of traditional Banjar cultural and technological practices internalized in religious architecture. The concepts of geometry, similarity, and congruence found reflect how the Banjar people understand balance, order, and the sacredness of space.

a. The Cultural and Religious Significance of Geometric Shapes

The rectangular pyramid shape of mosque roofs, particularly those of the Sultan Suriansyah Mosque and the Keramat Al-Mukarramah Mosque, not only serves as a supporting structure and adapts to the tropical climate, but also has symbolic meaning. The roof's tapering upward shape is interpreted as a representation of the vertical relationship between humans and God, as expressed by an informant who stated that "the roof's shape is made to taper upwards as a symbol of devotion and prayer" (I1). Mathematically, this shape demonstrates the application of the concepts of pyramids, isosceles triangles, and angles, arranged symmetrically to maintain the building's stability.

The predominant use of square and rectangular shapes on the walls, windows, and floors reflects the concept of balance and order. In the Banjar cultural context, this order is related to the values of harmony in life and regularity in worship, which are then manifested in the similarity of the building's dimensions and angles. This indicates the community's intuitive understanding of congruence, even without a formal mathematical formulation.

b. Local Knowledge and Traditional Technology

The findings of similarity and pattern repetition (geometric transformations) in the mosque's carvings and fences indicate the application of traditional technology based on experience passed down through generations. The repeated carving patterns of the same size and shape indicate the application of the concepts of translation, reflection, and rotation, which were used to achieve aesthetics and efficiency. One informant stated that "the carvings were repeated with the same size to ensure they were neat and did not deviate from the initial pattern" (I2). This statement confirms the use of mathematical principles as a traditional quality control tool in the construction process.

Furthermore, the use of odd numbers for the steps of the pulpit demonstrates the connection between the concept of number and religious values. Odd numbers are seen as having specific symbolic meaning in religious practice, so the choice of this number is not merely a technical consideration, but also a cultural-religious one.

c. Similarities and Differences Between Mosques

In general, the three mosques demonstrate a dominance of flat and spatial geometry concepts, but there are differences in the level of complexity and variety of forms. The Sultan Suriansyah Mosque displays a richer variety of concepts, such as geometric transformations and Pythagorean concepts, indicating a higher level of architectural detail. Meanwhile, the Al-Karomah Grand Mosque and the Al-Mukarramah Sacred Mosque emphasize basic geometric shapes such as squares, triangles, and circles. These differences may be influenced by the historical background of their construction, the mosque's social function, and the availability of technology and craftsmen at the time.

d. Implications of Ethnomathematics

Ethnomathematically, these findings demonstrate that mathematics exists as a living cultural practice, not simply a system of abstract symbols. The Banjar people use mathematical concepts to organize prayer spaces, maintain beauty, and instill religious values. Therefore, historic mosques in South Kalimantan can be viewed as mathematical cultural artifacts, with great potential as contextual learning resources in mathematics instruction.

In other case, the findings of the ethnomathematics aspects in the Al-Karomah Mosque are as follows in Table 2:

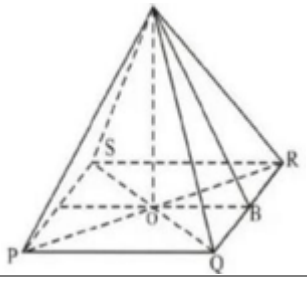
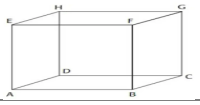
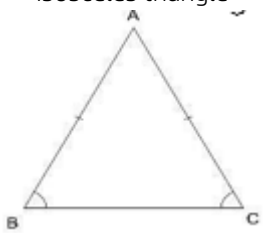
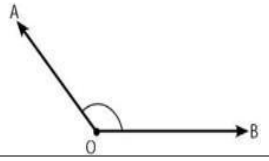
Table 2. Examples Findings of the Ethnomathematics Aspect of Al-Karomah Mosque

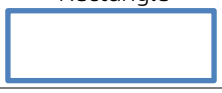
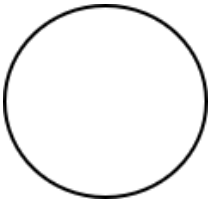
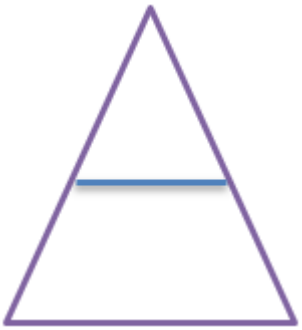
Object	Ethnomathematics	Mathematics Concept
Mosque window ornaments		Square  (Class 7, Semester II)

Object	Ethnomathematics	Mathematics Concept
Window glass ornaments of the Mosque		Rhombus and rectangle (Grade 7)

The findings of ethnomathematics aspects found in the Masjid Keramat or Banua Halat Mosque, Tapin are as follows in Table 3:

Table 3. Example Findings of the Ethnomathematics Aspect of Masjid Keramat/ Banua Halat

Object	Ethnomathematics	Mathematics Concept
Roof of The Mosque		Square pyramid 
		Cuboid 
		Isosceles triangle 
		Obtuse angle 

Object	Ethnomathematics	Mathematics Concept
		Rectangle 
Mosque Drum		Circle 
		Similarity of two triangle 
Fence		Symetrical

Based on the research, there found mathematical concepts in the buildings of three historic mosques in South Kalimantan. Two main concepts are the following:

1. Geometry Concepts

   In general, there are two geometric concepts, flat shapes (R^2) and spatial shapes (R^3).

   a. Flat Shape Concept (R^2)

      A flat shape is a two-dimensional shape that only has length and width, and is limited by a straight line. A flat shape is an abstract concept, while concrete is a property of a geometric flat shape. Types of flat shapes are square, rectangle, triangle, trapezoid, parallelogram, rhombus, kite, and circle (Karim, 2014).

      Some of the findings in the three mosques are:

1) Square

On the walls of the Sultan Suriansyah Mosque and the Window Ornaments of the Al-Karomah Mosque, there found a shape resembling a square flat shape (see Figure 1).

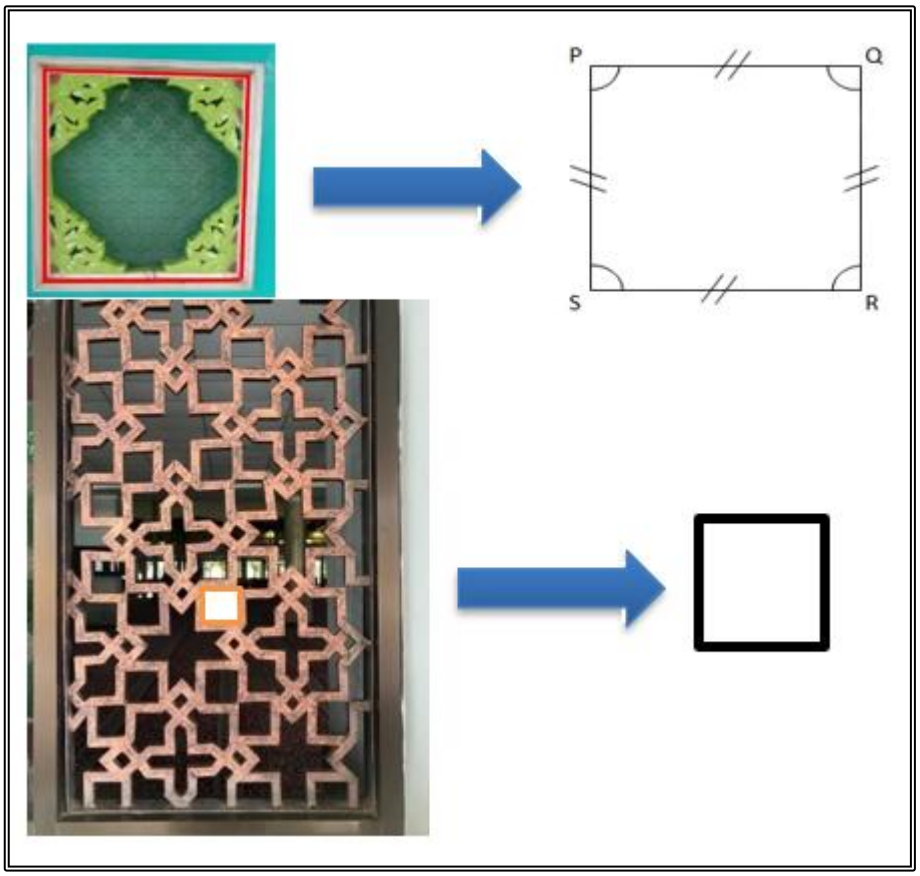


Figure 1. A square

A square is a flat shape, a quadrilateral whose four sides are the same length, and each of its four corners is a right angle. The properties of a square are, first, it has 4 angles of equal size of 90 º . Also, it has four sides of equal length AB=BC=CD=DA. And, it has 2 diagonals of equal length and is perpendicular to each other (Karim et al., 2014).

2) Rectangle

On the window ornaments of the Al-Karomah Mosque and the walls of the Sultan Suriansyah Mosque, there are shapes that resemble rectangular data structures (see Figure 2).

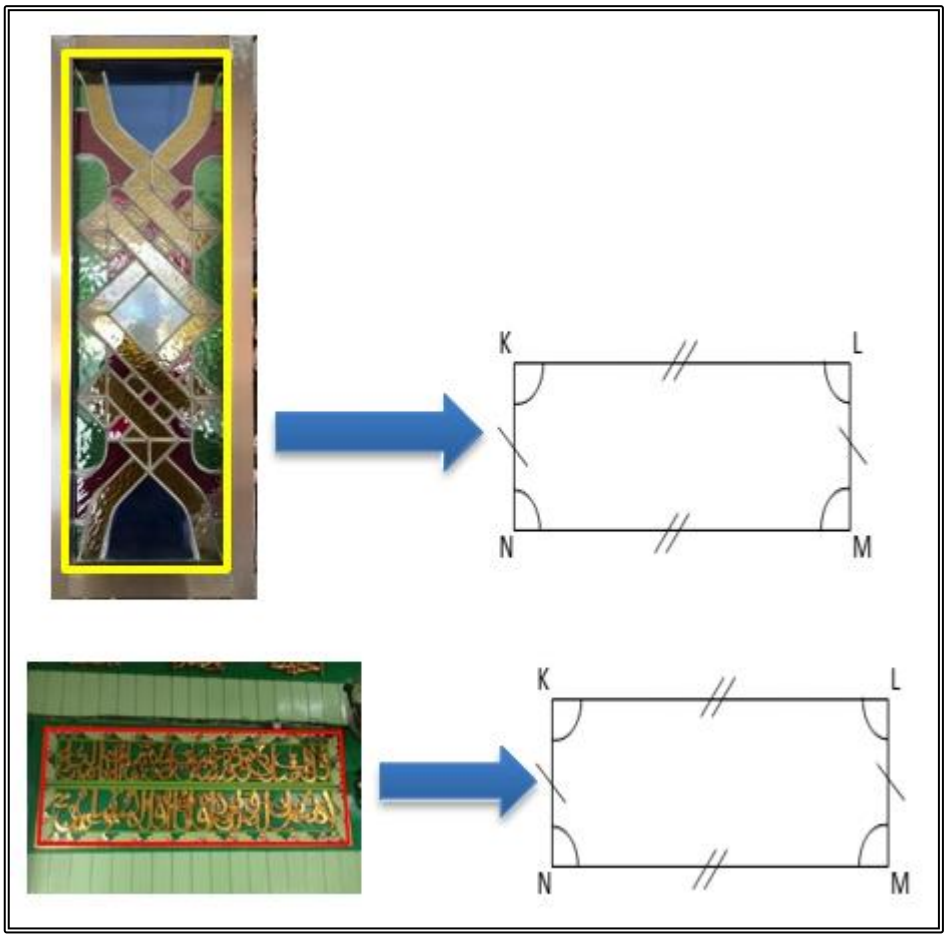


Figure 2. A rectangle

A rectangle is a four-sided data structure with 2 pairs of opposite sides of equal length and all four corners are right angles. The properties of a rectangle are, first, has 4 sides, consisting of 2 pairs of parallel sides of equal length AD=CB and AB=DC. Second, it has 4 angles of equal size of 90 º . And, it has 2 diagonals of equal length (Karim et al., 2014).

3) Rhombus

A rhombus shapes is found on the wall of the Al-Karomah Mosque (see Figure 3).

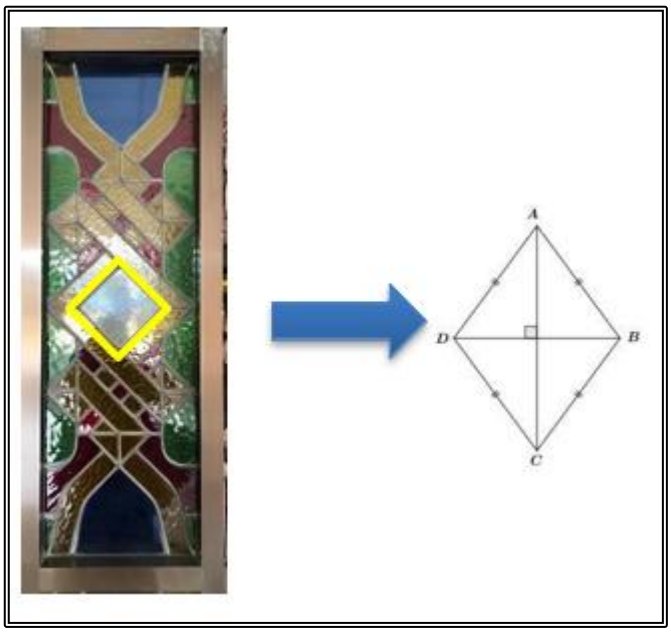


Figure 3. A rhombus

A rhombus is a quadrilateral formed by four sides of equal length and has two pairs of non-right angles, each of which is equal to the angle opposite it (Karim, 2014).

4) Parallelogram

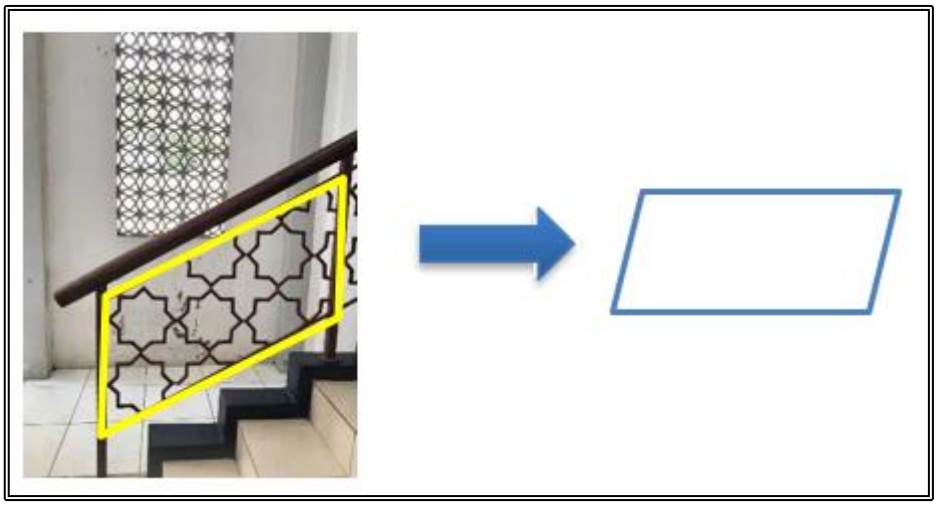


Figure 4. A parallelogram

A parallelogram is a quadrilateral with two pairs of opposite sides that are parallel and has two pairs of angles equal to the angle opposite it (see Figure 4) (Karim et al., 2014).

5) Trapezium

A type of trapezium found on the floor of the Sultan Suriansyah Mosque is an isosceles trapezium (see Figure 5).

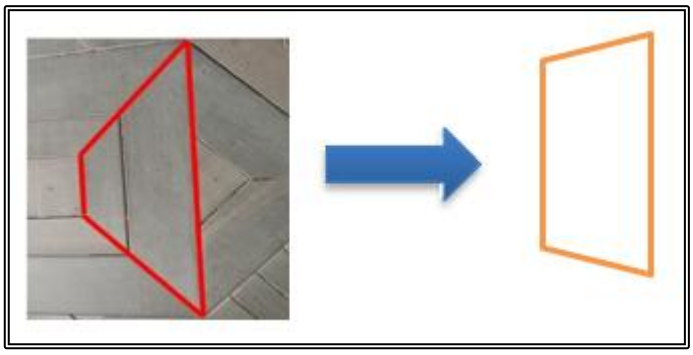


Figure 5. A trapezium

A trapezium is a quadrilateral with one pair of parallel sides. Isosceles trapezium has two sides of equal length DA=BC and two parallel sides of different lengths DC ≠ BA, and two adjacent angles with the same size (Karim, 2014).

6) Circle

The drum of the mosque has a shape of circle (see Figure 6).

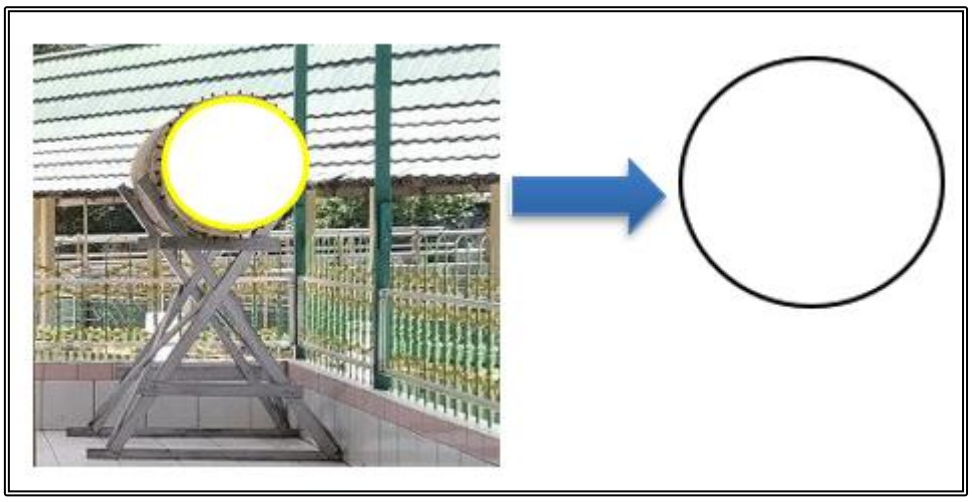


Figure 6. A circle

A circle is a simple regular and closed curve, which has a center point and an angle of 360^0 (Karim et al., 2014).

7) Triangle

It was found an isosceles triangle (see Figure 7).

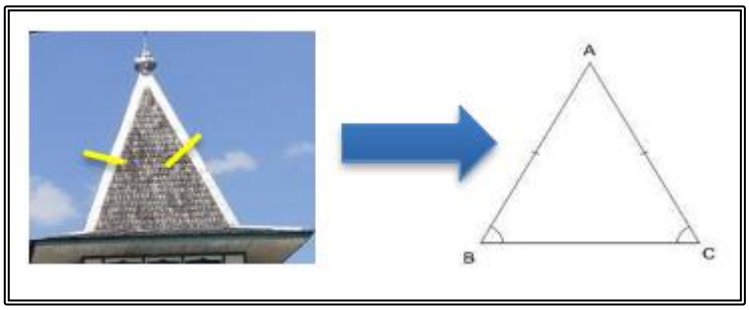


Figure 7. A triangle

A triangle is a flat shape that is limited by 3 intersecting and non-collinear line segments and has 3 corner points. An isosceles triangle has the second of the three sides with the same length AB=AC and the same size of two angles (Karim et al., 2014).

b. Spatial Figures (R^3)

A spatial figure is a three-dimensional geometric shape with boundaries in the form of flat planes and/or curved planes, and has certain properties, such having edges, side, and corner points (Subarinah, 2006; Sumarto et al., 2008). There are two types of spatial figures; flat-sided spatial figures and curved-sided spatial figures. Flat-sided spatial figures consist of blocks, cubes, prisms, and pyramids. While, curved-sided spatial figures are like cylinders, cones, and spheres. The findings of shapes that resemble flat-sided spatial figures in the three mosques are as follows.

1) Cuboid

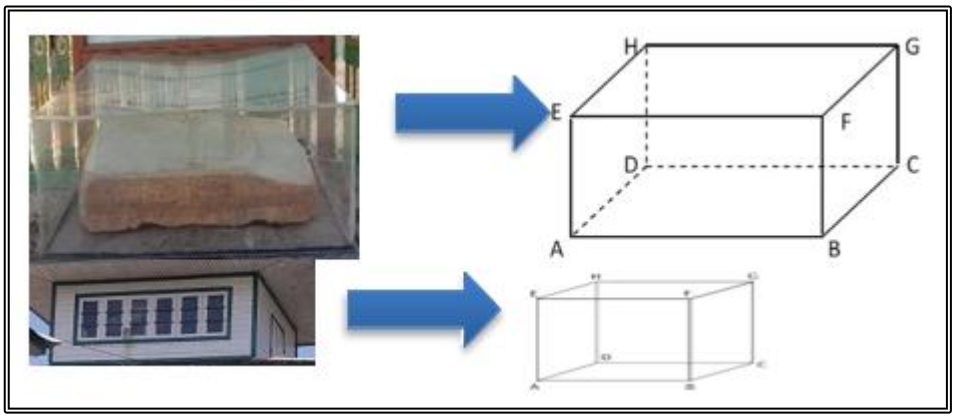


Figure 8. A Cuboid

Cuboid is a spatial figure that is bounded by three pairs of congruent rectangles and each pair is parallel (see Figure 8) (Suwaji, 2008).

2) Cube

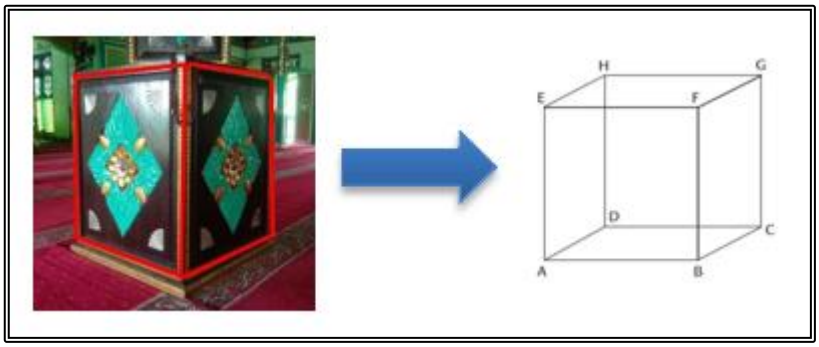


Figure 9. A Cube

A cube is a special case of a cuboid. In other words, a cube is a cuboid whose sides are all squares (see Figure 9) (Suwaji, 2008).

3) Pyramid

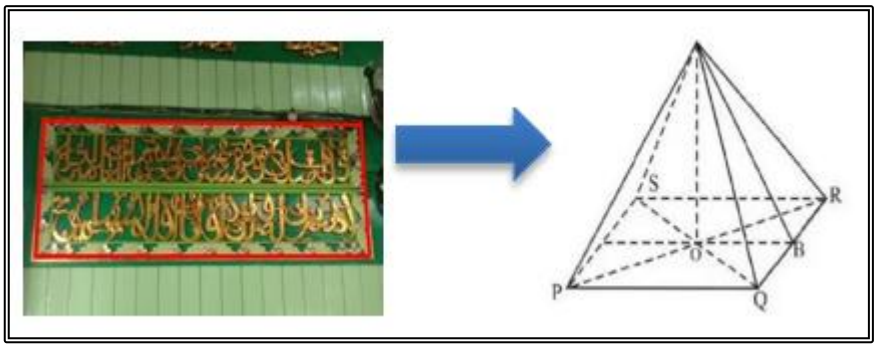


Figure 10. A Pyramid

A pyramid is a geometric figure whose base is a polygon (triangle, quadrilateral, pentagon, or other polygon), and the vertical side plane is in the form of a triangle that intersects at one point (the vertex) (see Figure 10) (Nuharini & Wahyuni, 2008).

2. Concepts of Similarity and Congruence

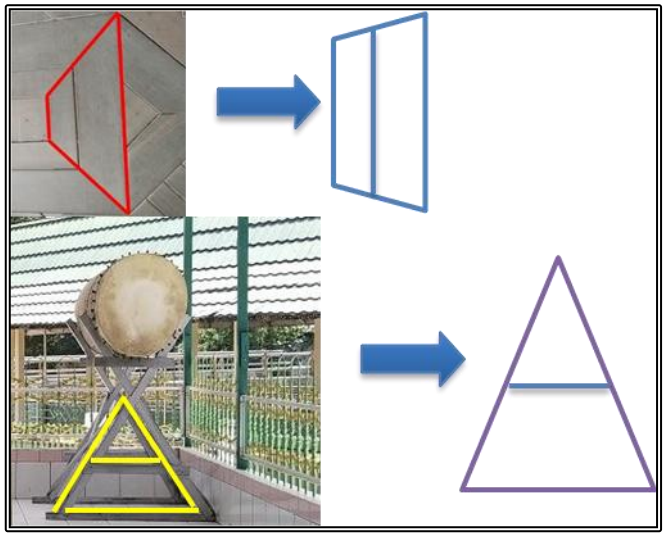


Figure 11. Congruent figures

Two plane figures are congruent if they have a same length of corresponding and same size of corresponding angles (see Figure 11) (Karim 2014).

e. The Philosophical, Cultural, and Religious Meaning of Geometric Shapes

The choice of geometric shapes in the architecture of historic mosques in South Kalimantan is not only based on structural considerations, but also contains philosophical, cultural, and religious meanings for the Banjar people. The rectangular pyramid shape of the mosque roof, as found at the Sultan Suriansyah Mosque and the Keramat Al-Mukarramah Mosque, is interpreted as a symbol of the vertical relationship between humanity and God, where the upward tapering represents submission and spiritual orientation. Mathematically, this shape

demonstrates the use of the concepts of symmetry, isosceles triangles, and angles, arranged in a balanced manner to maintain the stability of the building.

The dominance of square and rectangular shapes on the walls, windows, and floors reflects the values of order, balance, and harmony, which align with the Banjarese principles of life and the layout of worship spaces in Islam. The similarity of size and angles in these building elements demonstrates the application of the concept of congruence, which not only has mathematical significance but also represents equality and order in religious practice.

f. The Relationship of Mathematical Concepts with Local Knowledge and Traditional Technology

The mathematical concepts found in historic mosque buildings are closely related to the local wisdom and traditional technology of the Banjar people. The repeating carved and ornamental patterns on the mosque walls and fences demonstrate the application of geometric transformation concepts, such as translation, reflection, and rotation, used to achieve both visual beauty and efficiency. The repeating patterns with uniform dimensions indicate an intuitive understanding of similarity and measurement, acquired through the craftsmen's experience passed down through generations.

Furthermore, the use of odd numbers for the steps of the pulpit reflects the connection between the concept of number and religious beliefs. Odd numbers have symbolic value in Islamic tradition and are considered more sacred, so their choice is not only functional but also reflects the integration of mathematics and the beliefs of the community during the mosque's construction.

g. Similarities and Differences in Ethnomathematic Concepts Between Mosques

In general, the three mosques display striking similarities in the dominance of plane and spatial geometry concepts, particularly squares, triangles, pyramids, angles, and parallel lines. This indicates a relatively uniform traditional Banjar architectural pattern passed down through generations.

However, there are differences in the level of complexity and diversity of mathematical concepts. The Sultan Suriansyah Mosque displays a richer variety of concepts, such as geometric transformations and Pythagorean theorem, which demonstrate more complex architectural details. Meanwhile, the Al-Karomah Grand Mosque and the Al-Mukarramah Sacred Mosque emphasize basic geometric forms. These differences are thought to be influenced by the historical context of their construction, the mosque's social function, and the availability of technology and craftsmanship during each period.

4. CONCLUSION

Based on the research results, it can be concluded that mathematics in traditional Banjar Mosque architecture manifests as a cultural practice integrated with religious values, local knowledge, and traditional technology, not merely as an abstract concept. Geometric shapes such as squares, rectangles, isosceles triangles, rectangular pyramids, circles, angles, parallel lines, similarity, and congruence are consistently present in the building elements of historic mosques, particularly in the Sultan Suriansyah Mosque, the Al-Karomah Grand Mosque, and the Al-Mukarramah Sacred Mosque. The main findings of this study indicate that the application of these mathematical concepts is not coincidental, but rather stems from the Banjar people's intuitive understanding of the order, balance, and sacredness of worship spaces. Geometric concepts are used to maintain the stability and beauty of buildings, while congruence, similarity, and geometric transformations are utilized as traditional strategies to create visual harmony and efficiency. Thus, traditional Banjar mosques can be viewed as ethnomathematical artifacts that represent the integration of mathematics, culture, and religiosity.

These ethnomathematic findings have the potential to be integrated into mathematics learning in: Junior High School (grades VII – VIII): topics on plane figures (squares, rectangles, triangles, trapezoids), angles, and parallel lines; Junior High School (grade IX): topics on similarity, congruence, and geometric transformations; and Senior High School (grade X): topics on plane-sided solid figures (cubes, cuboids, pyramids) and contextual geometry reinforcement.

To accommodate ethnomathematics integration, recommended teaching material formats include: Ethnomathematics-based learning modules, linking mathematical concepts to traditional Banjar Mosque architecture; Contextual student worksheets (LKPD), based on exploring mosque images, floor plans, and ornaments; Documentary videos or interactive digital media, featuring visuals of mosques and explaining the relationship between the building's form and mathematical concepts.

Finally, further research is recommended to: Develop Research and Development (R&D) studies in the form of developing and testing the effectiveness of modules or student worksheets based on Banjar mosque ethnomathematics on students' understanding of mathematical concepts and literacy; Conduct ethnomathematics explorations in other aspects of mosques, such as calligraphy, spatial planning, or traditional construction systems, to enrich the repertoire of culturally based mathematics learning resources; Further examine the comparison of Banjar mosque ethnomathematics with traditional mosques in other regions to identify local and universal patterns in cultural mathematics practices.

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BIBLIOGRAPHY

Aini, G. M., Hastuti, I. D., & Mariyati, Y. (2023). Ethnomathematics: Exploration of Geometry from Karang Bayan Ancient Mosque in Elementary School Mathematics Learning. *Mosharafa: Jurnal Pendidikan Matematika*, *12*(3), 517-530. https://doi.org/10.31980/mosharafa.v12i3.824

Aufa, M. (2010). *Masjid-masjid tua di Kalimantan Selatan*. Banjarmasin: Dinas Pariwisata Kalimantan Selatan.

Afriansyah, E. A., Nurjamilah, E., Sumartini, T. S., Hamdani, N. A., & Maulani, G. A. F. (2024, November). Students Mathematical Understanding of Social Arithmetic in Terms of Student Self-Efficacy. In *4th International Conference on Education and Technology (ICETECH 2023)* (pp. 691-708). Atlantis Press.

Cahyono, A. N., & Budiarto, M. T. (2020). Ethnomathematics in mathematics learning: A literature review. *International Journal of Instruction,* *13*(3), 643 – 658. https://doi.org/10.29333/iji.2020.13343a

Fajriah, N., & Suryaningsih, Y. (2021). Eksplorasi etnomatematika pada arsitektur masjid di Kalimantan Selatan. *Jurnal Pendidikan Matematika*, *15*(2), 123 – 134.

Fitriza, R., Hurriyah, H., & Hadaina, D. (2024). Ethno-Mathematics in Minangkabau Indigenous Society. *Mosharafa: Jurnal Pendidikan Matematika*, *13*(3), 661-674. https://doi.org/10.31980/mosharafa.v13i3.2154

Ja' faruddin, & Naufal, M. A. (2023). Ethnomathematics: Two-Dimensional Figure Geometry Concept in the Balla Lompoa Traditional House in South Sulawesi. *Mosharafa: Jurnal Pendidikan Matematika*, *12*(3), 667-674. https://doi.org/10.31980/mosharafa.v12i3.834

Karim, A. (2014). *Pembelajaran matematika berbasis kontekstual*. Jakarta: RajaGrafindo Persada.

Karim, A., Suharyono, & Nugroho, S. (2014). *Geometri dan pengukuran*. Jakarta: Kementerian Pendidikan dan Kebudayaan.

Karimah, U., Isnarto, I., & Munahefi, D. N. (2025). Problem Solving Ability in Problem Based Learning Based on Ethnomathematics Assisted by Teachmint. *Plusminus: Jurnal Pendidikan Matematika*, *5*(1), 173-182. https://doi.org/10.31980/plusminus.v5i1.2541

Lukman H., Aunul M., & Putri A. T. (2024). Exploring Ethnomathematics in the Menara Kudus as a Learning Resource for Geometry. *Mosharafa: Jurnal Pendidikan Matematika*, *13*(2), 315 – 322. https://doi.org/10.31980/mosharafa.v13i2.1604

Miles, M. B., & Huberman, A. M. (1984). *Qualitative data analysis: A sourcebook of new methods*. Beverly Hills, CA: Sage Publications.

Musliana, R., Hulpiana, T., Putri, D., Awinda, S., Rahmania, L. A., & Nurmawanti, I. (2024). Etnomatematika Historical Building "Taman Mayura" dan Implementasinya dalam Pengembangan Kemampuan Numerasi Siswa Sekolah Dasar. Plusminus. *Jurnal Pendidikan Matematika*, *4*(2), 199-214. https://doi.org/10.31980/plusminus.v4i2.1467

Nuharini, D., & Wahyuni, T. (2008). *Matematika SMP dan MTs kelas IX*. Jakarta: Pusat Perbukuan Depdiknas.

Nurhasanah, W. F., & Puspitasari, N. (2022). Studi Etnomatematika Rumah Adat Kampung Pulo Desa Cangkuang Kabupaten Garut. *Plusminus: Jurnal Pendidikan Matematika*, *2*(1), 27-38. https://doi.org/10.31980/plusminus.v2i1.1083

Octaria, D., Zulkardi, Z., Putri, R. I. I., & Hiltrimartin, C. (2025). Ethnomathematical Insights from the Geometric Architecture of the Sultan Mahmud Badaruddin II Museum. *Mosharafa: Jurnal Pendidikan Matematika*, *14*(1), 1 – 22. https://doi.org/10.31980/mosharafa.v14i1.3008

Pramasdyasari, A. S., Aini, S. N., & Setyawati, R. D. (2024). Enhancing Students' Mathematical Critical Thinking Skills through Ethnomathematics Digital Book STEM-PjBL. *Mosharafa: Jurnal Pendidikan Matematika*, *13*(1), 97-112. https://doi.org/10.31980/mosharafa.v13i1.1979

Roehati, E. (2011). Transformasi budaya lokal dalam pembelajaran matematika. *Jurnal Pendidikan Matematika*, *5*(1), 1 – 12.

Salsabiela, T. F., & Nursanti, Y. B. (2024). Ethnomathematics of Traditional Houses on Two-Dimensional Figure Decomposition Material. *Mosharafa: Jurnal Pendidikan Matematika*, *13*(4), 1047-1054. https://doi.org/10.31980/mosharafa.v13i4.1066

Sirate, F. S. (2012). Implementasi etnomatematika dalam pembelajaran matematika pada jenjang pendidikan sekolah dasar. *Lentera Pendidikan*, *15*(1), 41 – 54.

Subarinah, S. (2006). *Inovasi pembelajaran matematika sekolah dasar*. Jakarta: Depdiknas.

Sugiyono. (2015). *Metode penelitian pendidikan: Pendekatan kuantitatif, kualitatif, dan R&D*. Bandung: Alfabeta.

Sulthoni, A. S., & Handayani, U. F. (2025). Eksplorasi etnomatematika pada masjid nurul anwar untuk pembelajaran bangun datar dan ruang di mts. *Jurnal Inovasi Pembelajaran Matematika: PowerMathEdu*, *4*(1), 59-74. https://doi.org/10.31980/pme.v4i1.2655

Sunardi, S., Widodo, S. A., & Rofiki, I. (2019). Students' anxiety and mathematical learning outcomes. *Journal of Mathematics Education*, *10*(2), 167 – 178.

Suwaji. (2008). *Bangun ruang sisi datar*. Jakarta: Pusat Perbukuan Depdiknas.

Sumarto, Y., Wahyuni, S., & Hartono. (2008). *Matematika SMP kelas VIII*. Jakarta: Pusat Perbukuan Depdiknas.

Riadi, A., Turmudi, T., & Juandi, D. (2024). Trends of Ethnomathematics Research in Indonesia: A Bibliometric Analysis from the Scopus Database. *Mosharafa: Jurnal Pendidikan Matematika*, *13*(2), 401-414. https://doi.org/10.31980/mosharafa.v13i2.1499

Roesdiana, L., Turmudi, T., Juandi, D., Suhendra, S., & Dahlan, J. A. (2025). Meta-Synthesis: Ethnomathematics in Educational and Cultural Contexts Over the Last Decade. *Mosharafa: Jurnal Pendidikan Matematika*, *14*(2), 413-432. https://doi.org/10.31980/mosharafa.v14i2.2257

Wahyuni, A., Tias, A. A. W., & Sani, B. (2013). Peran etnomatematika dalam membangun karakter bangsa. *Prosiding Seminar Nasional Matematika dan Pendidikan Matematika*, 113 – 118.

Yudianto, E., Siswono, T. Y. E., & Hartono, S. (2021). Ethnomathematics as a contextual approach in mathematics learning. *Journal of Physics: Conference Series, 1747*(1), 012023. https://doi.org/10.1088/1742-6596/1747/1/012023