

## EXPLORATION OF ETHNOMATHEMATICS IN THE ANRI (NATIONAL ARCHIVES OF THE REPUBLIC INDONESIA) BUILDING WEST JAKARTA

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Received July 29, 2024; Revised November 15, 2024; Accepted November 25, 2024

### Abstract:

Mathematics and culture have a strong relationship in life. In Indonesia, culture is different from local wisdom, and the culture of certain community groups or tribes that support mathematical activities is called ethnomathematics. One example is cultural heritage buildings, such as the ANRI (National Archives of the Republic of Indonesia) building which was founded in 1750 in DKI Jakarta Province, precisely on Jalan Gajah Mada, West Jakarta. The purpose of the research that we use, which is exploratory with this ethnographic method, is to find and categorize the mathematical concepts contained in the ANRI building which is one of the sources of learning mathematics and efforts to develop ethnomathematics as a basis for mathematics learning. This study focuses on understanding the informal mathematical knowledge acquired by local people from their environment and culture, especially those related to cultural heritage sites, which are referred to as ethnomathematics. The study findings show that the National Archives Building is a significant cultural heritage site with historical and architectural significance. The architectural features of the building, such as the rectangular and trapezoidal shapes of the main structure and roof, reflect various geometric concepts. Overall, this research emphasizes the importance of preserving cultural heritage and documents in the National Archives to retain the historical knowledge contained within. Ethnomathematics provides a valuable framework to explore and appreciate mathematical concepts embedded in cultural artifacts, promoting a deeper understanding of mathematics through real-world activities and cultural practices.

**Keywords:** National Archives, ANRI Building, Historical Artifact

## EKSPLORASI ETNOMATEMATIKA PADA GEDUNG ANRI (ARSIP NASIONAL REPUBLIK INDONESIA) JAKARTA BARAT

### Abstrak:

Ilmu matematika dan kebudayaan memiliki hubungan yang kuat dalam kehidupan. Di Indonesia, budaya berbeda dengan kearifan lokalnya, dan kebudayaan kelompok masyarakat atau suku tertentu yang mendukung aktivitas matematika disebut etnomatematika. Salah satu contohnya adalah bangunan cagar budaya, seperti

gedung ANRI (Arsip Nasional Republik Indonesia) yang didirikan pada tahun 1750 di Provinsi DKI Jakarta, tepatnya di Jalan Gajah Mada Jakarta Barat. Tujuan dari penelitian yang kami gunakan yaitu bersifat eksploratif dengan metode etnografi ini untuk menemukan dan mengkategorikan konsep matematika yang terdapat pada bangunan gedung ANRI yang menjadi salah satu sumber belajar matematika dan upaya pengembangan etnomatematika sebagai dasar pembelajaran matematika. Kajian ini berfokus pada pemahaman pengetahuan matematika informal yang diperoleh masyarakat setempat dari lingkungan dan budayanya, khususnya yang berkaitan dengan situs warisan budaya, yang disebut sebagai etnomatematika. Temuan studi menunjukkan bahwa gedung Arsip Nasional adalah situs warisan budaya yang signifikan dengan signifikansi sejarah dan arsitektur. Ciri arsitektur bangunan, seperti bentuk persegi panjang dan trapesium dari struktur utama dan atap, mencerminkan berbagai konsep geometris. Secara keseluruhan, penelitian ini menekankan pentingnya melestarikan warisan budaya dan dokumen di Arsip Nasional untuk mempertahankan pengetahuan sejarah yang terkandung di dalamnya. Etnomatematika memberikan kerangka kerja yang berharga untuk mengeksplorasi dan menghargai konsep matematika yang tertanam dalam artefak budaya, mempromosikan pemahaman matematika yang lebih dalam melalui aktivitas dunia nyata dan praktik budaya.

**Kata Kunci:** Arsip Nasional, Gedung ANRI, Artefak Sejarah

*How to Cite:* Adrian, M., Buhari, F., & Fadhillah, M. (2024). Exploration of Ethnomathematics in the ANRI (National Archives of the Republic Indonesia) Building West Jakarta. *MaPan : Jurnal Matematika dan Pembelajaran*, 12(2), 294-306. <https://doi.org/10.24252/mapan.2024v12n2a6>.

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## INTRODUCTION

**M**athematics education, when culturally nuanced, plays an important role in promoting cross-cultural socialization. Mathematics is a unique social institution (Juano & Jediut, 2019). Ethnomathematics is about integrating mathematics as a cultural form into all aspects of people's lives, no matter where they live. According to Richardo (2020), ethnomathematics is a science that combines mathematics and culture, helping students learn through hands-on activities that allow them to build and understand abstract mathematical concepts.

Meanwhile, according to Mahuda (2020), ethnomathematics involves the application of mathematical concepts to diverse cultural groups, while ethnography refers to the study of ethnic organizations, work groups, children, and familiar classes (Ambrosio, 2012). Ethnomathematics includes not only ethnography but also the cultural anthropology of mathematics and

its teaching, especially in Indonesia, a country rich in culture. National Archives of the Republic Indonesia (ANRI) is responsible for the maintenance and protection of 13,232 conventional archives and 8,080 new media archives in Indonesia (Wigati & Rachman, 2019). According to Anon (2009), Landsarchief was established by the Dutch East Indies Government on January 28, 1892. Landsarchivaris was established to keep archives for the Dutch East Indies government and to assist in government administration. National archaeologists such as van der Chijs, de Haan, and Molsbergen contributed to Indonesian history. The government opposed the Indonesian national movement and accused the Landsarchief of obstructing freedom. The Indonesian National Archives was established after independence in 1945.

National Archives of the Republic Indonesia (ANRI) was established in 1971 under the leadership of Dr. Sumartini, the first woman to lead the organization. Its name was changed to Arsip Negara RIS in 1950 and its director was appointed as a professor. In addition, ANRI is also in the process of improving its quality, by organizing courses to increase the knowledge and commitment of its employees to the community. Awareness of ANRI and archives is promoted through the media. The aim is to increase understanding of archival preservation.

## **METHODS**

This qualitative research used an ethnomathematics approach to study the structure, function, and history of the ANRI building in West Jakarta. Data was collected through interviews, documents, and observations by lay pastors. The research systematically collected, processed, and analyzed data to gain a comprehensive understanding. The focus of this research is an understanding of the structure, function, and history of the ANRI building in West Jakarta, especially on Jalan Gajah Mada. One of the tour guides at the ANRI (National Archives of the Republic Indonesia) building in West Jakarta. This research used interviews, document analysis, and observation to collect qualitative data. Data were analyzed over time and irrelevant information was reduced, resulting in a structured analysis. This research explores the informal mathematical knowledge of local communities, with a focus on ethnomathematics and cultural heritage, particularly mathematics found in cultural heritage buildings.

## RESULTS AND DISCUSSION



**Figure 1.** ANRI Building

According to Azmi (2014), National Archives of the Republic Indonesia (ANRI) is the custodian of Indonesia's diverse archive collections from the colonial period to independence. The National Archives Building in West Jakarta, located in front of and behind the historic Dutch East Indies building, is a cultural heritage site with exhibits on two floors. The ground floor displays large gongs, cabinets, and weapons, while the second floor is the general's residence. The building also has a large courtyard for outdoor events. In the background, a new four-story building serves as the Ir. Presidential Archives. The National Archives building is classified as a static archive under the Digital Archives Act of 2009. Static archives are essential in the service sector, support work within the unit and for purposes outside the institution, and can be used in certain situations (Pudyastuty, 2018).

Well-managed information and data management can support an organization's business units in carrying out their primary missions and providing efficient services to those in need. Rapid growth in organizations leads to the creation of many archives. This leads to the uncontrolled hoarding of these archives. Uncontrolled records are often ignored by managers. As the number of storage locations increases, processing operations become more complex due to factors such as staff shortages and inadequate compensation.

According to Surtikanti (2020), the National Archives of the Republic Indonesia manages archival materials overseen by provincial, regional, and university archives and is a non-ministerial administrative institution.

The Indonesian government makes various efforts to protect cultural heritage from destruction, including natural, biological, and physical disasters, as well as acts of terrorism, espionage, sabotage, war, and vandalism. Fire is one of the major disasters that has caused many casualties. Archival institutions are responsible for maintaining and preserving these historical documents by applicable regulations. This is proven by a previous study from Dandi and Sudiarta (2022), which revealed that local governments must preserve cultural heritage by UU No. 11 Tahun 2010. However, there is a lack of clarity regarding the authority between the central and local governments, which can result in the shifting of responsibilities in the protection of cultural heritage sites.

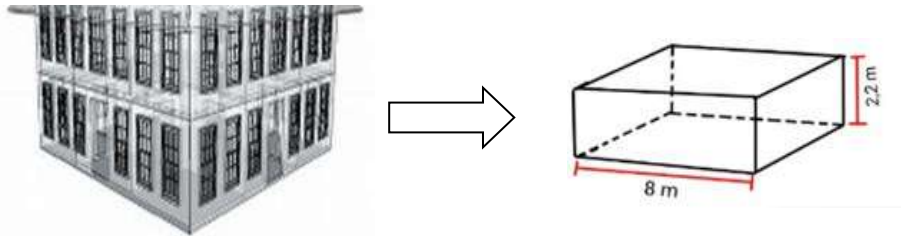
The National Archives of the Republic of Indonesia should prioritize the preservation of static archives, including the development of disaster plans, staff training, and firefighter awareness to ensure the safety and preservation of national cultural heritage. The researchers found various geometric shapes in the National Archives building. One of them is the shape of the building itself. According to Faturrahman and Soro (2021), geometry is the study of points, lines, angles, planes, spaces, and two types of shapes: planes and geometric shapes.



**Figure 2.** Sketch of the ANRI Building

The rectangular National Archives building with a trapezoidal roof is currently 57 meters high and 164 meters long, although its width has decreased over time. Based on this research cited from the magazine

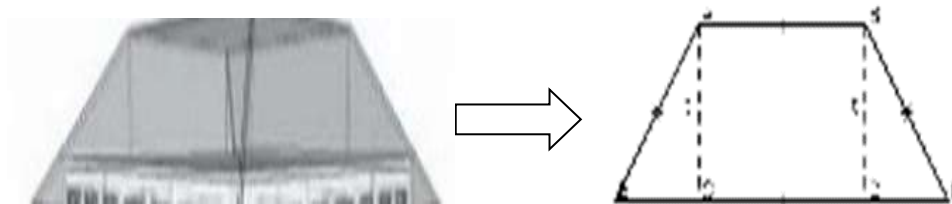
(Mardiyah & Budiarto, 2019). Square, rectangle, quadrilateral, parallelogram, trapezoid, kite, and rhombus, have 2 pairs of equal length sides and all equal sides with right angles.



**Figure 3.** ANRI Building Shape

According to Fajri (2023), a beam is a flat rectangle with three pairs of sides and 8 corners. The main hall column, 57m high and 164m long, has a cubic area of  $2 \times p \times l \times t$ . Quoted from (Fajarwati, Faidah, Joelian, Hakiki, & Purwoko, 2021) journal Certain characteristics of the geometric shapes of the blocks were:

- a) 12 ribs.
- b) 6 congruent sides with 3 pairs of parallel sides.
- c) 8 vertices.
- d) 12 side or diagonal faces.
- e) 4 intersecting space diagonals of equal length.
- f) Each quadrilateral has 6 congruent diagonals.



**Figure 4.** The shape of the roof of the ANRI Building

The ethnomathematical roof of the ANRI building shows the different spaces of the building, forming a trapezoid with six and twelve sides, corresponding to an isosceles trapezoid. The properties of an isosceles trapezium are:

- a) Two sides are parallel.
- b) The corresponding sides have equal angles.
- c) The sum of the sides of the angle is  $180^\circ$ .

Despite its shape, the National Archives building is home to many historical artifacts, including flat geometric shapes and landscapes.

### 1. The Circle Shape of the Waming Gong

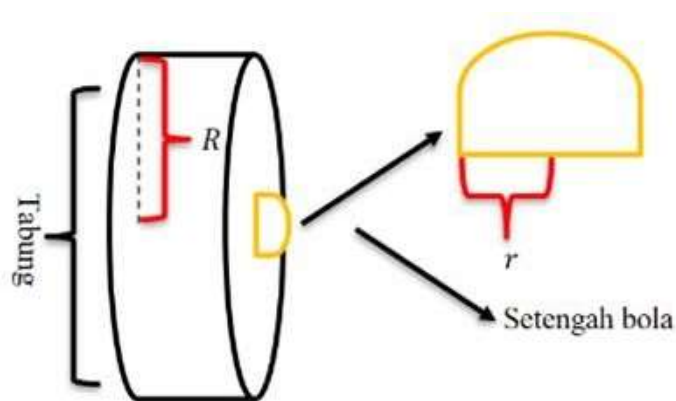


**Figure 5.** Gong Waming

Gong Waning is a traditional musical style from East Nusa Tenggara, featuring gong, wane, and sa'ur instruments that were once used in ceremonies, but are now a performing art.

The geometric concept of the roundabout is revealed in the analysis of the shape of the Waming Gong by Sitanggang (2021). A roundabout is a curved line connecting two ends. All points are equidistant from the center, as shown in the image:

- There are no one-sided angles.
- Axis of symmetry and infinite rotation.
- Point O is the center.
- Equidistant points A, B, and C are called radius (r).

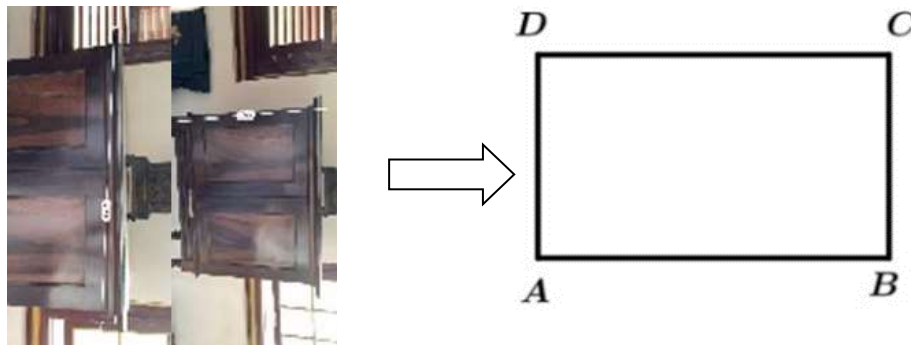


**Figure 6.** Side View Gong Shape

The Warming Gong, a commemorative musical instrument, is designed with a combination of tubular and hemispherical shapes that enhance intonation and provide unique frequencies. The large diameter of the gong, 49 cm, affects its sound. The hemispherical shape of the gong shows the geometric concept. According to Hendriawan and Faridah (2022), half a ball is half of a whole ball cut into two parts of the same size. In a journal, the ball itself is a three-dimensional shape that has a curved surface, formed by a set of circles with the same radius, and has one common center point with an infinite number of circles. In the journal (Diniyati, Ekadiarsi, Bila, Herdianti, Amelia, & Wahidin 2022). Half ball has properties:

- a) 1 internal center point.
- b) 1 rounded side.
- c) There are no vertices.
- d) Infinite radius.

## 2. Rectangular Shape on the Table



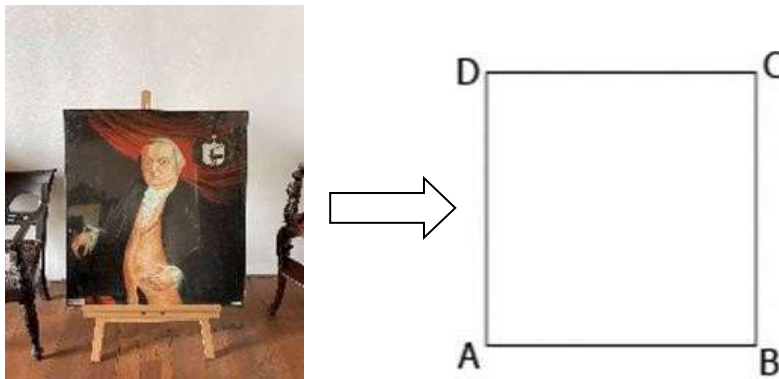
**Figure 7.** Rectangular Shape on the Table

Figure 7 shows a rectangular table with rectangular features. It is 1.26 m long and 77 cm wide and is used to display historical artifacts. Juano and Jediut (2019) A rectangle is a parallelogram with four equal perpendicular sides. According to Ikawati and Wardana (2022), rectangle ABCD has 2 parallel sides and 4 right angles, with sides AB, BC, CD, and AD of equal length. The angle  $DAB = AB = BCD = CAD = 90^\circ$ . According to Hidayat, Asmar, and Yerizon (2021) the properties of rectangles:

- a)  $AB = CD$ ;  $CA = BD$ .
- b) Angles A, B, C, D =  $90^\circ$ .
- c) 2 rotational symmetry, 2 folding symmetry.



### 3. Square Shape in Painting

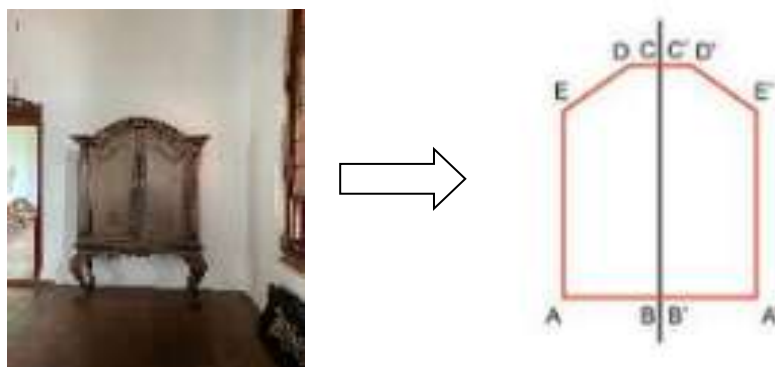


**Figure 8.** Square Painting

Painting is an aesthetic art form that depicts flora, fauna, humans, nature, and the environment. Figure 8 shows a rectangular table with a height of 70 cm and a width of 50 cm, with an area of 3500 cm. According to Nurjannah, Nurhalizah, Irmawati, and Ismunandar (2020), the characteristics of a rectangle are:

- a)  $90^\circ$  angles and parallel sides
- b) Both parallel sides have the same length.
- c) Two diagonals bisect each other.

### 4. Reflections on Cabinets



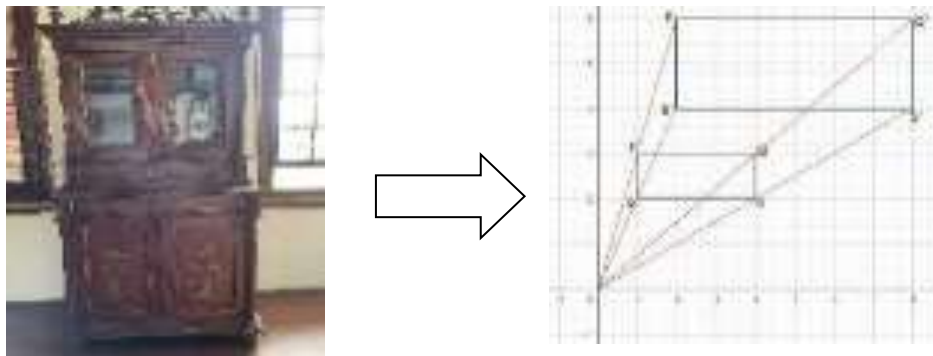
**Figure 9.** Cabinet Reflections

Mirroring or reflection according to Nisa (2019) is a transformation geometry that utilizes the mirroring property. The definition of mirroring/reflection according to Natun, Mamoh, and Amsikan (2021) is the

nature of the mirror image of the moved position, determining changes in the plane. In addition, there are also properties of reflection according to Auliya and Nabhar (2019) as follows:

- a) Displays the same shape and size as the original.
- b) The mirror distance is the same as the mirror distance.
- c) Mirror image contrary to the original form.

## 5. Dilatation in Cabinets



**Figure 10.** Cabinet Dilatation

Definition of dilatation According to Manik, Sayu, and Munaldus (2022), dilatation is the enlargement or shrinkage of a flat object without changing its shape. In addition, there are also functions of dilatation quoted by (Matswa, Khizbaini, Latifah, & Alista, 2021) namely:

- a) If  $k > 1$ , the image is strengthened and reduced to the center of enlargement.  
If  $0 < k < 1$ , then the shadow is reduced and in the direction of the center of expansion.
- b) if  $-1 < k < 0$ , then the shadow is reduced and does not correspond to the center of expansion.
- c) if  $k < -1$ , then the shadow is enlarged, not part of the shadow and the expansion center.

## CONCLUSION

Research on the exploration of ethnomathematics at the National Archives of the Republic Indonesia (ANRI) Building in West Jakarta concluded that this building is a cultural heritage that has a long historical value since the Dutch East Indies era, with a structure that covers two locations on Jalan Gajah Mada and Jalan Ampera Raya. The building has two floors, where the ground

floor is used to store archives, while the upper floor used to be the Governor General's residence. The building and the historical objects inside have geometric shapes that reflect the application of ethnomathematics, such as rectangles, trapezoids, and circles on various elements, including gongs and tables. The research also highlighted the importance of protecting static archives to preserve historical value and the importance of maintenance efforts and the development of a disaster management plan to ensure the safety of archives in this building.

### ACKNOWLEDGMENT

Based on the results of the research that has been tried, it can be concluded that the ANRI Building Archive has been produced to prove that the Indonesian historical archives were placed as a museum of Indonesian history from the colonial era to independence.

We would like to express our deepest gratitude to our supervisor Dr. Joko Soebagyo M. Pd for his input in designing the research and analyzing the ANRI archive information.

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