

EXPLORING GEOMETRIC CONCEPTS THROUGH AN ETHNOMATHEMATICS APPROACH IN MAKASSAR'S KULAPISIK IN GOWA REGENCY

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ABSTRACT

This study aims to explore the concept of geometry that focuses on shape and size through an ethnomathematics approach to *kulapisik*, a traditional food of the Makassar tribe in Gowa Regency, and to identify the cultural values embedded within it. The research employs an ethnographic method with data collection techniques including observation, interviews, and literature study. The subject of the study is Mrs. Najmawati, a traditional cake maker with over 20 years of experience. The findings reveal that the process of making kue lapis involves values such as patience and togetherness, as the layering process requires gradual pouring of the batter, symbolizing hopes for abundant blessings. Geometrically, the cake embodies concepts of 2D shapes such as squares, rectangles, and parallelograms, as well as 3D shapes like cubes and rectangular prisms. The cake is typically cut into square or rectangular shapes, with each layer measuring approximately 0.4–0.5 cm thick. The cultural values reflected include togetherness in traditional wedding ceremonies, respect for cultural heritage, and patience throughout its preparation process. This study recommends integrating ethnomathematics into geometry education in schools. This approach can preserve cultural traditions while enhancing students' contextual understanding of mathematics

Keywords: ethnomathematics; geometry; kulapisik; makassar culture

ABSTRAK

Penelitian ini bertujuan mengeksplorasi konsep geometri yang berfokus pada bentuk dan ukurannya melalui pendekatan etnomatematika pada *kulapisik*, makanan tradisional khas suku Makassar di Kabupaten Gowa, serta mengidentifikasi nilai-nilai budaya yang terkandung di dalamnya. Metode yang digunakan adalah penelitian etnografi dengan teknik pengumpulan data melalui observasi, wawancara, dan studi literatur. Subjek penelitian adalah Ibu Najmawati, pembuat kue tradisional dengan pengalaman lebih dari 20 tahun. Hasil penelitian menunjukkan bahwa proses pembuatan kue lapis melibatkan nilai kesabaran dan kebersamaan karena lapisan adonan dituangkan bertahap, mencerminkan simbol harapan rezeki berlapis-lapis. Secara geometris, kue ini memuat konsep bangun datar seperti persegi, persegi panjang, dan jajar genjang serta konsep bangun ruang seperti kubus dan balok. Bentuk potongan kue umumnya berbentuk persegi atau persegi panjang, dengan ketebalan setiap lapisan berkisar 0,4–0,5 cm. Nilai budaya yang terkandung meliputi kebersamaan dalam tradisi pernikahan, penghargaan terhadap budaya, serta kesabaran dalam proses pembuatannya. Penelitian ini merekomendasikan integrasi etnomatematika dalam pembelajaran geometri di sekolah sebagai upaya melestarikan budaya sekaligus meningkatkan pemahaman siswa terhadap konsep matematika secara kontekstual

Kata kunci: budaya makassar; etnomatematika; geometri; kulapisik



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Introduction

One element of a number of disciplines that has significant educational value is mathematics. Besides teaching logical, critical, and creative thinking, mathematics is a science that can help solve problems in everyday life (Witha et al., 2021). Mathematics has long been taught in schools as a discipline that teaches students widely recognized facts, ideas, and content. Mathematics is a subject that is seen as free from values and culture, resulting in the assumption that mathematics does not need to take into account the increasing diversity of students because mathematics is a topic that is considered free from values and culture (Wahyuni, 2019). In order to be used as an authentic educational resource and be present among students, mathematical ideas can be found in a culture (Dhofir et al., 2019). Much mathematical information is stored informally in cultural activities throughout society. It can be discovered in ways such as observing, playing, asking questions, and so on (Aini et al., 2022; Bude et al., 2025; Christiansen, 2022; Fauzi & Si, 2022). Culture and mathematics are two topics that have a significant influence on people's daily lives. Various mathematical principles have been applied to cultural customs without people realizing it (Zayyadi, 2023). Thus, the relationship between mathematics and culture not only enriches students' conceptual understanding, but also makes mathematics learning more contextual, meaningful, and relevant to their real lives.

Rosa & Orey in M. Rosa and M.E. Gavarrete explain that the aim of ethnomathematics is to build relationships between mathematics students and the processes found in academic conceptual frameworks and local activities (Kurniawan & Hidayati, 2019). Ethnomathematics is defined as a program that studies and integrates mathematical concepts, practices, and methods produced by members of various cultural or sociocultural groups. Ethnomathematics is created by members of a particular cultural group to study the concepts, procedures, and strategies in creating knowledge systems (Ni'matussa'adah & Malasari, 2024; Risdiyanti & Prahmana, 2020; Susanti & Budiarto, 2020). One approach to ethnomathematics is traditional food. Therefore, exploring traditional food culture by linking it to mathematical concepts is considered an innovation or renewal in mathematics learning.

Ethnomathematics exploration of the Makassarese, particularly traditional foods, is still minimal, even though the Makassarese are widely spread, with many residing in Gowa Regency. The Bugis, who live side by side with the Makassarese, are often confused, even though the two tribes are distinct (Nahriana & Tawani, 2022). To prove the existence of the Makassar people and the role of mathematics in Makassar culture, it is deemed necessary to conduct in-depth research on ethnomathematics among the Makassar people. Because they are considered to possess noble qualities worthy of high regard, customs and traditions are still highly valued in Makassar society (Andriani et al., 2024; Busrah & Pathuddin, 2021). One of the customs that is still found in Makassar society is the dowry (*Erang-erang*). This dowry includes traditional Makassar food, one of which is *kulapisik* (Ibrahim et al., 2024; Rahman, 2025). According to Fakhrunnisa (2016), to preserve this tradition, the younger generation, especially girls, are taught how to make cakes (Pathuddin et al., 2021). One of the areas of mathematics frequently studied in ethnomathematics is geometry. Points, lines, planes, and solid shapes are all studied

in the field of geometric mathematics. In this case, researchers will also look for and research mathematical components, especially geometry. Elements of Lampung's local culture can motivate students to love and preserve local culture (Sugiharti et al., 2025). The importance of using ethnomathematics methods to connect mathematics education with regional culture so that students can understand mathematical ideas in a way that can be applied in everyday life. *kulapisik* are a rich and engaging learning tool because they incorporate geometric components in their design and arrangement as well as other mathematical ideas such as measurement, comparison, fractions, and number operations (Idha Isnaningrum & Muhammad Abdul Wahab, 2023).

Many previous studies on ethnomathematics have been conducted, including ethnomathematics on traditional Bugis food, namely barongko (Pathuddin et al., 2021); traditional food kerak telur (Della et al., 2024); ethnomathematics in making Alame and Lemang as typical Padang Lawas food (Siregar, 2024); ethnomathematics on traditional Malay food Daik Lingga (Muk Minah & Izzati, 2021); There are also those who research buildings such as Cultural Heritage in Yogyakarta (Abdullah et al., 2023); ethnomathematics at the Great Mosque of Demak (Radiusman et al., 2021); ethnomathematics in Solo batik (Faiziyah et al., 2021); and batik of Bali island (Irawan et al., 2019). However, no one has discussed the *Kulapisik* as a traditional food of the Makassar tribe using an ethnomathematics approach, even though this *Kulapisik* has unique characteristics compared to other foods, namely its regular and colorful layered structure, and the process of making it requires precision in measuring and dividing the dough, so it is very representative for teaching geometry and mathematics concepts contextually (Mahendra & Hasanah, 2023). Therefore, currently, the importance of this research is increasing because mathematics learning in schools still tends to be abstract and does not relate the material to local culture, so that ethnomathematics exploration in *kulapisik* can be an innovative solution to increase students' interest and understanding of mathematics while preserving regional culture (Tri et al., 2024). The aim of this research is to explore the concept of geometry which focuses on shape and size through an ethnomathematics approach to *kulapisik*.

Research Methods

This research is an exploratory research with an ethnographic approach that aims to describe and analyze the traditional food of *kulapisik* as a form of cultural heritage of the Makassar tribe in Gowa Regency, which can be used as a medium for understanding mathematical concepts, especially geometry. The data collection techniques used in this study consisted of three parts: library data collection obtained from literature studies and field data collection obtained from observations and interviews. The results of the observations and interviews were in the form of ethnographic notes (field notes), obtained during the observation and interview activities with informants. The instruments in this study included interview guidelines and observation instruments.

The research subjects consisted of community leaders and cultural practitioners who understand the process of making and the symbolic meaning of *kulapisik*, selected selectively by Mrs. Najmawati. The research location was Gowa Regency. The research instruments included a semi-structured interview guide and

an observation sheet, compiled based on the study's focus on geometric shapes and sizes in cultural objects. Data collection techniques were conducted in three ways: literature review to obtain a theoretical framework, observation to directly observe the process of making, shape, and size of layered cakes, and in-depth interviews to explore the cultural meaning of the research subjects. Data validation was carried out using triangulation techniques, namely comparing and verifying the findings of the three data collection techniques to obtain valid data.

Data analysis in this study follows procedures in qualitative ethnography, starting from the process of transcribing field data, then interpreting cultural meanings to identify important meanings. Next, categorization is carried out based on similarities in meaning or certain patterns, followed by the process of identifying the main themes that are relevant to the focus of the study, such as the concept of shape, pattern, and geometric form that appear in cultural objects. This analysis process takes place iteratively, where researchers continuously compare field findings with literature and personal reflections to gain a deeper understanding. This approach allows the data obtained to not only be described descriptively, but also interpreted culturally.

Results and Discussion

Philosophical Aspects and Cultural Values of Kulapisik

In this study, the researcher conducted an interview with Mrs. Najmawati, 67 years old, a traditional cake maker, one of which is *kulapisik*, who has more than 20 years of experience. Mrs. Najmawati said that *kulapisik* is usually only used at weddings and this *kulapisik* is passed down from generation to generation. According to the source, there are several values contained in the process of making this *kulapisik*, 1) togetherness and harmony. *Kulapisik* is usually served at weddings as a gift symbolizing the hope that the married couple can live together in harmony, as well as prayers and hopes for abundant sustenance, which is the meaning of *kulapisik* itself. 2) Respect tradition and culture. *Kulapisik* is a traditional dish that has existed for a long time and has been passed down from generation to generation. By learning how to make and serve *kulapisik*, we are also respecting and preserving local cultural traditions. 3) Patience. Because the manufacturing process takes a long time, we can take the value of patience which is needed in the process of making *kulapisik*.

Mrs. Najmawati said that in the process of making the dough, it is not immediately poured into the mold, but through a very long process. Little by little the dough is poured into the mold, then the first dough is waited until it is cooked, then the second dough is also like that and so on until the mold is full. The shape of the *kulapisik* usually uses a rectangular size. In serving it is also usually served with other traditional cakes. From the past until now the implementation of the tradition and making of *kulapisik* has not changed much, only according to her now the color of this *kulapisik* is not only white, but now people also use green taken from pandan, Using white color show in Figure 1.



Figure 1. Using white color

Based on Figure 1, the kulapisik is cut to your desired shape. It is usually square or rectangular. Figure 1 also shows the typical color of kulapisik made in Gowa Regency, which is all white show in Figure 2.



Figure 2. Using pandan mixture

Based on picture 2, the shape of the cake is still intact and has not been cut into small pieces. In picture 2, not only white is used, but there is a mixture of green produced by pandan.

During observations of the *kulapisik* making process, great attention was paid to order, starting from the selection of ingredients used. The rice is milled to produce rice flour, the coconut pulp is separated to produce coconut milk, the thin coconut milk is mixed with the rice flour, the thick coconut milk is boiled, then mixed with the rice flour, and the tapioca flour is added to create a chewy texture. After that, it is strained again and steamed until cooked through. It is then served in its usual rectangular shape.

The source said that the meaning of kulapisik is a symbol of prayer and hope for layered fortune in line with research (Nurfadilah & Yunus, 2022) who says kulapisik is a prayer and hope that his fortune will be layered, the same as the shape of kulapisik itself which is layered. Regarding what traditions or rituals the kulapisik is used for, the source said that the kulapisik is usually only used at wedding ceremonies. This is in line with research (Rahman, 2025) More specifically, it refers to the dowry (*erang-erang*) at weddings. More precisely, it refers to the small dowry (*appanaik lekok cakdi*) served alongside other traditional cakes, one of which is *umba-umba*.

The Concept of Geometry in Kulapisik

Laypeople generally refer to the cut shape of *kulapisik* as a plane geometry rather than a solid geometry. Although at first glance, a single layer of *kulapisik* appears to be a plane shape, it is approximately 0.4–0.5 cm thick. So, it depends on our perspective. If we want to talk about the concept of flat geometry, we don't consider the thinness of the thickness. It has also been said for generations that the shape takes its perspective from the concept of flat geometry.

Based on the results of observations carried out during the research, mathematical concepts were obtained, especially geometric concepts, which are found in the *kulapisik* typical of the Makassar tribe in Gowa Regency shows in Figure 3.

- **Concept of Plane Geometry**

- **Square**

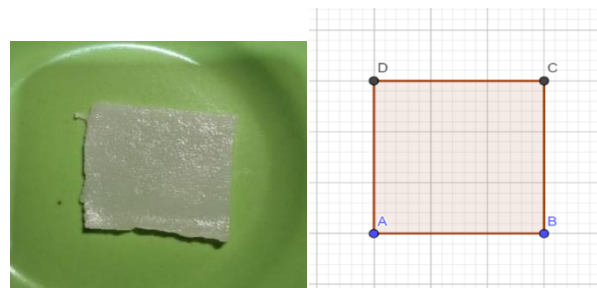


Figure 3. Slice in the Shape of a Square

Based on Figure 3, the observation of the one-layer *kulapisik* slice shows that it can form a square, with all sides equal in length, namely 4 cm. Therefore, the formulas to determine the area and perimeter of the square are as follows:

$$\text{Area} = s \times s = s^2$$

$$\text{Perimeter} = 4 \times s$$

In addition, this square shape has line symmetry and rotational symmetry, making it a concrete example of the application of plane geometry concepts as well as a learning medium that connects cultural objects with mathematics shows in Figure 4..

- **Rectangle**

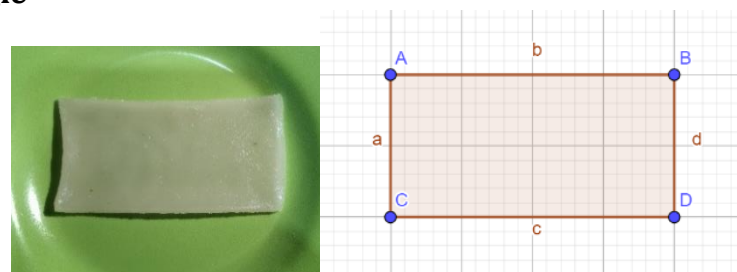


Figure 4. Slice in the Shape of a Rectangle

Based on Figure 4, the observation of the one-layer *kulapisik* slice shows that it can form a rectangle, with a length of 10 cm and a width of 4 cm. Therefore, the formulas to determine the area and perimeter of the rectangle are as follows:

Area = $length \times width$
 Perimeter = $2 \times (length + width)$

This rectangular shape demonstrates geometric regularity with two pairs of equal sides and four right angles. In addition, the shape possesses line symmetry and rotational symmetry, making it a concrete example for understanding the concept of plane figures shows in Figure 5.

– **Parallelogram**

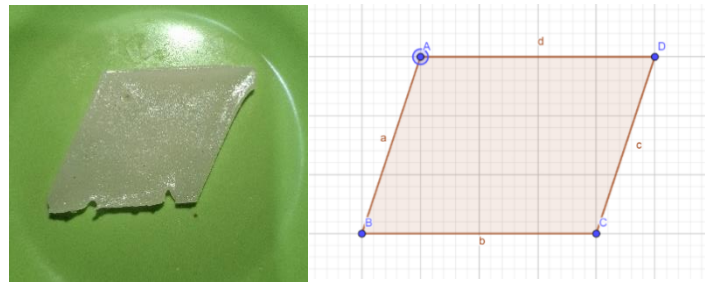


Figure 5. Slice in the Shape of a Parallelogram

Based on Figure 5, the observation of the one-layer *kulapisik* slice shows that it can form a parallelogram with a base of 10 cm, a height of 8 cm, and a slanted side of 6 cm. Therefore, the formulas to determine the area and perimeter of the parallelogram are as follows:

Area = $base \times height$
 Perimeter = $2 \times (base + side)$

This parallelogram shape shows two pairs of parallel and equal sides, making it a concrete example to explain the properties of plane figures shows in Figure 6.

• **Concept of Solid Geometry**

– **Cube**

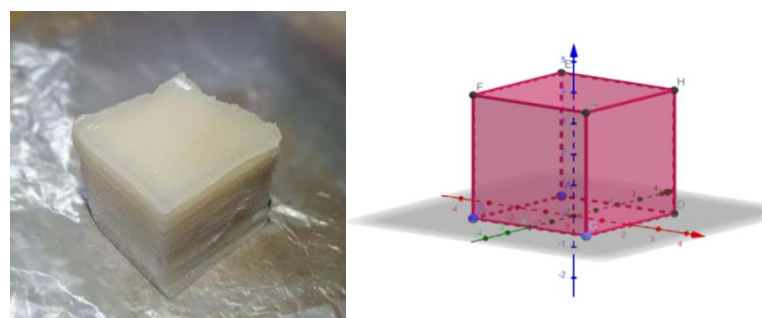


Figure 6. Slice in the Shape of a Cube

Based on Figure 6, the observation of the *kulapisik* slice shows that it can form a cube with a side length of 4 cm. Therefore, the formulas to determine the surface area and volume of the cube are as follows:

Volume = s^3
 Surface area = $6 \times s^2$

A cube has six congruent square faces, twelve edges of equal length, and eight

vertices. This shape represents spatial regularity in geometry that can be directly observed in cultural objects shows in Figure 7.

– **Cuboids**

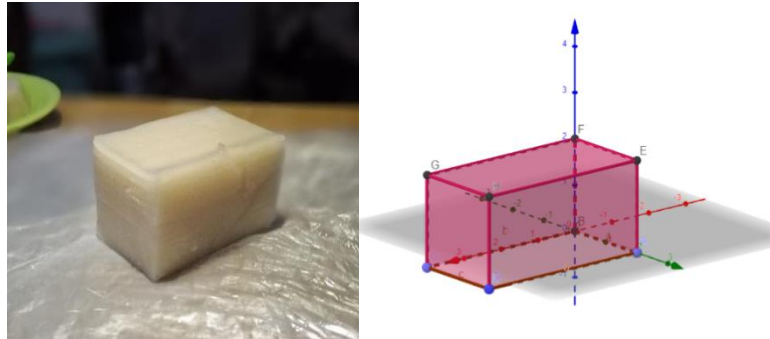


Figure 7. Slice in the Shape of a cuboids

Based on Figure 7, the observation of the *kulapisik* slice shows that it can form a rectangular prism with a length of 10 cm, a width of 4 cm, and a height of 6 cm. Therefore, the formulas to determine the surface area and volume of the rectangular prism are as follows:

Volume = $length \times width \times height$

Surface area = $2 \times (l \times w + l \times h + w \times h)$

A rectangular prism has six rectangular faces, twelve edges, and eight vertices. This shape reflects the concept of three-dimensional figures that can be found in everyday life.

Overall, this study explores ethnomathematics in layer cake (*kulapisik*), a traditional food typical of Makassar in Gowa Regency, with a focus on geometric concepts and cultural values, where the author argues that layer cake is not just food, but also a representation of mathematical concepts and cultural traditions inherent in the Makassar ethnic community. The main finding of this research is that *kulapisik* contains geometric concepts, both in the form of flat shapes (squares, rectangles, parallelograms) and spatial shapes (cubes, cuboids), as well as cultural values such as patience, togetherness, and preservation of tradition. Factors influencing the findings of this study include the use of ethnographic methods, the focus on geometric shapes and sizes, the emphasis on cultural values, and the characteristics of the *kulapisik* itself. The strengths of this study include a deeper understanding of the relationship between culture and mathematics and the potential of *kulapisik* as a teaching tool. However, this study also has limitations, such as the lack of numerical data to support a more in-depth analysis.

This research is in line with previous research that explores ethnomathematics in traditional food and emphasizes the importance of an ethnomathematics approach in learning, such as research (Choeriyah et al., 2020) about Cilacap's traditional food, namely tempe mendoan which discovered concepts such as squares, rectangles, triangles, parallelograms, trapezoids and hexagons. Research (Sumayani et al., 2020) also found geometric shapes in traditional Sasak food, and research (Pathuddin et al., 2021) about barongko cake also found geometric concepts in traditional Bugis food, with the difference lying in the specific

focus on Makassar layer cake and its uniqueness. The results of this study reveal the importance of integrating ethnomathematics in education, its contribution to cultural preservation, and the potential for further research.

Conclusion and Suggestion

This study explores the concept of geometry through an ethnomathematical approach to *kulapisik*, a traditional food of the Makassar people in Gowa Regency, and identifies the cultural values contained within it. The method used is ethnographic research with data collection techniques through observation, interviews, and literature review. The research subject is Mrs. Najmawati, a traditional cake maker with over 20 years of experience.

The results of the study indicate that the process of making *kulapisik* involves the values of patience and togetherness because the layers of dough are poured in stages, reflecting the symbol of hope for sustenance in layers. Geometrically, this cake contains the concept of flat shapes such as squares, rectangles, and parallelograms as well as the concept of solid shapes such as cubes and cuboids. The shape of the cake slices is generally square or rectangular, with the thickness of each layer ranging from 0.4–0.5 cm. The cultural values contained include togetherness in wedding traditions, respect for culture, and patience in the process of making it. This study recommends the integration of ethnomathematics in geometry learning in schools as an effort to preserve culture while improving students' understanding of mathematical concepts contextually.

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