



**ETHNOMATHEMATICS SASAK: GEOMETRY CONCEPTS IN COMMUNITY LIFE BANYUMULEK WEST LOMBOK**

**Lalu Alwan Junaidi**

Mathematics Education Departement Surabaya State University, Surabaya, Indonesia  
\*Email: yoohoo.rtk@gmail.com

**ABSTRACT**

The present study aims to explore and describe ethnomathematics in Banyumulek in terms of geometry concepts in its pottery and how a potter teaches pottery making to others and successor. This study is a qualitative research with ethnography. Data were collected for a month by observing, studying literature, documenting, and interviewing three native potters. Based on the data collected, 31 kind of pottery and 23 different motive in this village. The results of the analysis showed that among these pottery, 25 pottery were indicated to have geometric shape. The concepts included in these pottery were circle, triangle, square, rectangle, ellipse, polygon, tube, sphere, cone, pyramid, hemisphere, truncated cone, and truncated pyramid. Meanwhile, among these motive, 17 were identified as geometric motif. The concepts included in these motive were line, triangle, square, rhombus, rectangle, trapezoid, circle, semicircle, symmetry, rotation, and translation. Besides, potter has concepts about how to make a circle and determine the center, how to make square and equilateral triangle.

Key Word: Ethnomathematics, Geometry, Banyumulek

**INTRODUCTION**

A specific society might have been using the concept of math in everyday life, but not formally. As seen in indigenous culture technology Zulu society, South Africa, they use to produce the bead bracelets, cloth, a necklace, picture frames, a belt, marker book, and a headband with a variety of motives and (Chahine and Kinuthia, 2013). So also with the Hausa people, the northern Nigeria who have applied mathematics in the game that can train the brain (Yusuf, 2010). The game taught by the community to the children contain algebra, set theory, coordinates geometry, the arithmetic, and geometry. In the tradition of embroidering the African people and America has also apply the geometry of fractals indirectly (Bales, 2009). Can be seen also geometric patterns in Islamic culture as calligraphy, engraving building, architecture and other buildings that use the principle of symmetry (Abas, 2001)

Some researchers have also explore ethnomathematics in various regions of indonesia. As performed by Sabillirrosyad (2013) who examined about geometry motive woven of *Sasak*, Tandililing (2012) explored the geometry of traditional house and in carving *tongkonan*, and Rachmawati (2012) explored ethnomatematics in Sidoarjo that have implemented the concept of mathematics in building a temple and an inscription, selling in markets, and traditional games. Besides, Kuquk (2013) in his research, explored geometry that exist in motive of carpet produced by Anatolian, Turkey. He found decorative values such as

hope, situation, sadness, and belief of Anatolian from line, curve, triangle, rectangle, and circle.

*Sasak* is major and native ethnic live in Lombok Island. In *Sasak*, there are some unique arts and crafts. The famous one of art is *Peresean*. *Peresean* is a competition that challenge 2 mmen who have brave to fight physically. Featured with a shield and little stick made from twisted banana's bark. Those both men fight until one of them run out of energy and get defeated. While the unique crafts in this ethnic group are *Ketak* and pottery. People make *ketak* for household object that is used in daily life. *Ketak* is made from a kind of plant that grows on water. This craft is more made by people in Loyok, Sikur, East Lombok. While pottery is centered in some region in Lombok, they are Penakak, Penujak, and Bnyumulek. But the famoust is Banyumulek.

Banyumulek is one of tourism object in Lombok, located in Kediri, West Lombok. It's about 14 km from central city, Mataram. The village is exited tourism destination mainly for tourist that have interesting in culture. About 80% of inhabitant of Banyumulek are pottery craftsman. Therefore, more people here are expert in making potteries with export quality. In the past, making pottery is purposed as daily life need such as *gentong* for retaining water, *kendi* as bottle, etc. however, time by time and the development of tourism in Lombok, value sifted and more directed to decoration that means potteries are produced and used for decoration. For instance decorating park or hotel room. The more exciting is in the village, can be seen

process of making pottery from beginning until burning process.

Though the handicrafts workers that is in this village do not understand geometry formally through the level of education, but indirectly they have understand in a different way and can even applied it to produce merchandise that has high selling values. Based on the explanation, it is need to study the ethnomathematics existed in Banyumulek, especially about geometry concept which is exist in the life of local community

**METHODS**

This research is qualitative with ethnograph method. Ethnography is used to describe, explain, and analyze element culture of a society or nations. Data were collected by steps that is explained in the diagram below.

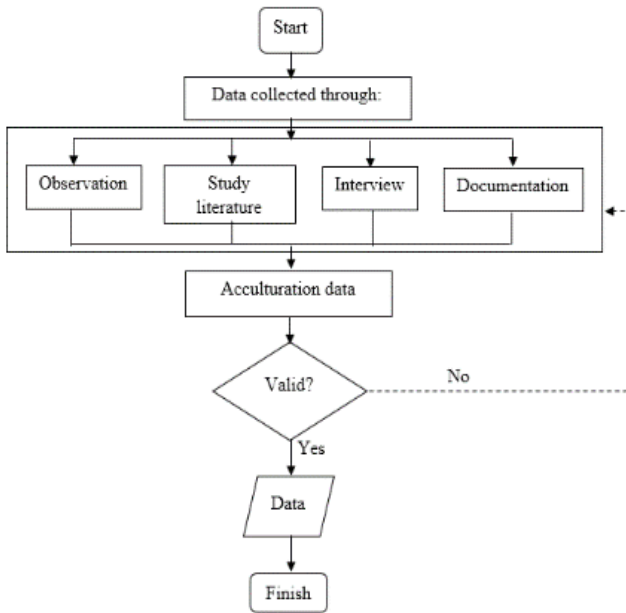


Diagram 1. Steps for collecting data

While the data were analysed by steps shown on the diagram below:

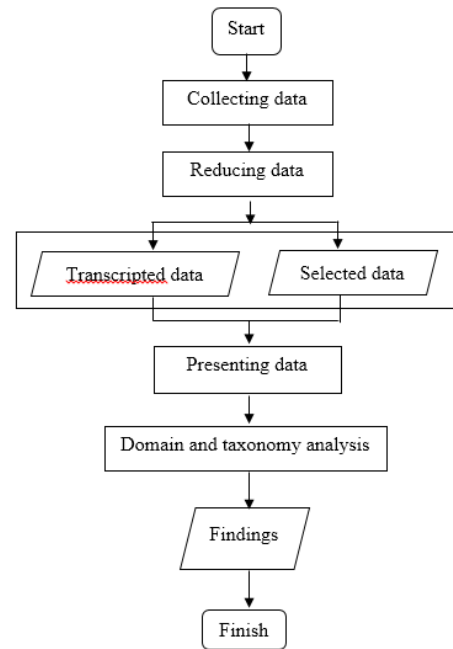


Diagram 2. Steps for analysing data

**RESULT AND EXPLANATION**

Based on the analysis of the domain and taxonomy, obtained from 31 kinds of pottery that existed in Banyumulek village, Kediri sub-district, West Lombok, 25 kinds of them included in geometrical shape that is: (1) Mangkuk Bunder; (2) Ponjol Dupe; (3) Mangkuk Kobok; (4) Ponjol Kotak; (5) Piring Cakram; (6) Bekem Sirep; (7) Bekem Tereng; (8) Ceret Maling; (9) Bekem Alu; (10) Bekem Pentung; (11) Piring Segiempat Panjang; (12) Piring Bunder; (13) Piring Kotak; (14) Nampan Bunder Rate; (15) Nampan Oval; (16) Nampan Seraton Segienam; (17) Tempat Lilin Yin Yang; (18) Tempat Lilin Segitiga; (19) Tempat Lampu Pyramid; (20) Tempat Lilin Kobok Nyiur; (21) Tempat Lampu Peluru; (22) Tempat Lampu Komboq; (23) Pot Pyramid Terbalik; (24) Vas Botol; dan (25) Vas Gasing. Potteries had a main shape of square, rectangular, equilateral triangles, ellips, a circle, a polygon, a tube, beams, a cube, pyramid, cone, the ball, semisphere, cut cone, and cut pyramid.

But, there are 6 categories of pottery that included in non-geometric shape, namely: (1) Ponjol Dongson; (2) Ponjol Gedeng; (3) Nampan Jantung; (4) Tempat Lilin Dongson; (5) Tempat Lilin Penyu; dan (6) Tempat Lilin Bulan Sabit. That Potteries had a major in the form of animal, a genus of plants, as natural element part of the body, and a tool. In other words that variety of ornamental in the form of pottery as a certain symbols. So, it is not contain the geometrical shape.

The results of research supported by the findings Rachmawati (2012) who explored ethnomathematics of Sidoarjo mentioned that the mathematical conception as a result the activity of designing an instrument as well as makes patterns that are found on earthenware traditional and equipment, some of them are basic form irik, kalo, and ebor if that is shaped half of a sphere with ledges patterned circl , layah (cobek) with a circular shape, gentong with ellips shaped, capil with cone-shaped, ilir and kelasa shaped like a rectangle, as well as of relics culture having other forms of geometry. In addition, Hopper (2000) also mentions that pottery is solid geometry or to the geometry of three dimensions. This means that the pottery have the values of geometry.

In addition, obtained also that of the 21 kinds of motives of pottery which already exist at the Banyumulek village, West Lombok, 17 kind of motives included in geometric motives, namely: (1) Pangan Jejer; (2) Cungklik; (3) Garis; (4) Spiral; (5) Mate Lengkeng; (6) Pucuk Rebong; (7) Penggale Bilaq; (8) Kipas; (9) Sultur; (10) Catur; (11) Matahari; (12) Yin Yang; (13) Kubah Mesjid; (14) Jelo Tiwok; (15) Pangan Kembar; (16) Longe; dan (17) Teker. The motives have a main element of line, a triangle, square, rhombus, rectangular, of a trapezoid, a circle, and a half circle on a body of earthenware who forms a connection with a beautiful shape .While the motives included non-geometric as many as 6 motives namely: (1) Ladik Jejer; (2) Belincek; (3) Jangger Manuk; (4) Penyus; (5) Kembang Sepatu; dan (6) Jerapah The motives have a main element of flower, animals, a tools, and etc. In other words, variety of ornamental in the motives of certain symbols. Then, they are not containing a main element of line, a triangle, square, rhombus, rectangular, a trapezoid, a circle, and a half circle.

This research on the motive was supported by the findings Sabilirrosyad (2014) who examines motives on a fabric woven of Sasak Sukarara, Central Lombok. His research in the form of 40 motives that have the concept of geometry namely points a line, triangle, square, rectangle, rhombus, a pentagon, a hexagon, octagon, reflection; translation, of rotation, and dilatation. Result of this research was also supported by the findings of Embong (2010) has namely in weaving there are in the form of a mathematical conception of the application of the concept of transformation, measurements, estimation; accuracy and equality. The concept of transformation, reflection, in the form of translation, of rotation, and dilatation often used in makes patterns motives. Besides, historical study conducted by Ascher (1991) on Incas pottery also shows that motif on

that pottery have the geometry concept as translation, reflection and rotation.

There was a unique finding in this research. It is a Ceret Maling. Ceret Maling is a kind of pitcher to retain water. But the design is not like usual bottle. This pitcher has an opening at the bottom as ducts enter water. However when it stands, the water can not falling out. Actually, the design is like Klein Bottle, but there was a little different in the inner part of this pitcher as shown below.

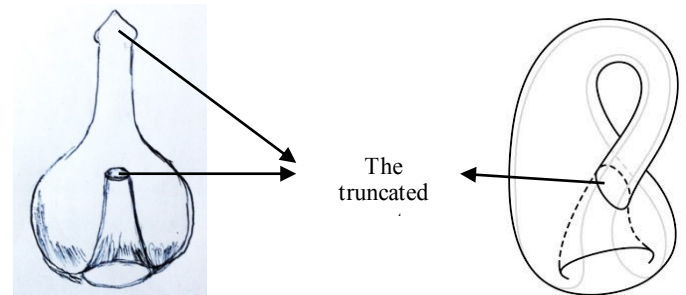


Figure 1. comparison between Ceret Maling and Klein Bottle

Pottery on a Banyumulek village has its own concept of some geometry shape such as a circle, a square, and equilateral triangle. They made the shapes by using simple tools such as thread, sticks, and boxes, and apply ways that nobody on learning mathematics. For instance a craftsman determining the center of a circle by using the traditional way that is explained below.

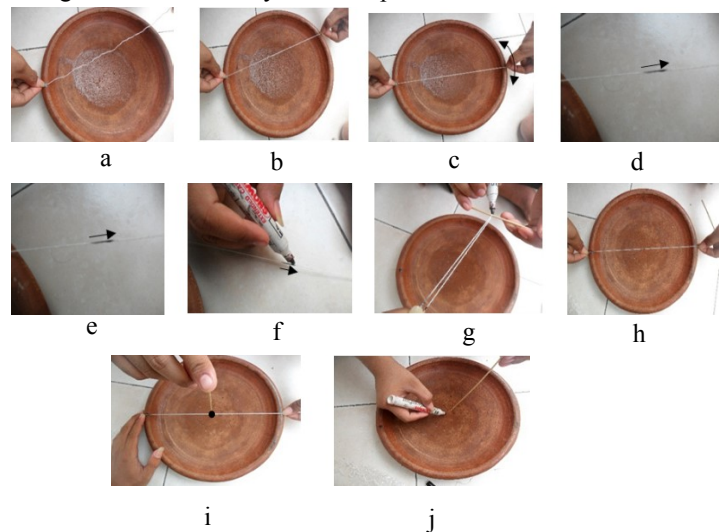


Figure 2. Some steps to determine of circle's center

## CONCLUSION

The concept of geometry that were on the pottery are: a circle, a triangle, square, rectangular, ellipse, polygon, a tube, a ball, cone, pyramid, half of a sphere, cut cone, and cut pyramid. While the concept of

geometry that was found in pottery motives namely: a line, a triangle, square, a rhombus, rectangular, of a trapezoid, a circle, and half of its, and the use of the principle of symmetry, rotation, translation, and reflection. Besides, pottery craftsman have their own concept about some geometry shape such as circle, square, and equilateral triangle.

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