



GEOMETRIC EXPLORATION IN TORAJA CARVING

¹Beatric V. Remme', ²Yusem Ba'ru
^{1,2}*Universitas Kristen Indonesia Toraja*
beatric@ukitoraja.ac.id

Abstract

Toraja carving is rich in mathematical concepts, especially geometric concepts, this is because in Toraja carving there are many geometric concepts such as squares, rectangles, triangles, and so on. This fact shows that the concepts of mathematics, especially geometry have been used by our ancestors since ancient times. The concept of geometry combined with Toraja local wisdom is expected to be able to facilitate learning geometry both in class and in college. Besides, it can be a means of preserving Toraja culture, especially for the younger generation of Toraja. The purpose of this research is to examine what geometric concepts are contained in Toraja carvings, as well as the meaning contained in them. This research was conducted in 3 (three) stages. Data were obtained using observation and interviews with 5 informants, namely those who understand the ins and outs of Toraja culture, study of literature and field notes. From the research results, it is found that in Toraja carving, there are geometric concepts such as squares, rectangles, circle, triangle, rhombus, kite, and trapezoid. Each carving has its own meaning and matches the name of each carving. The symbolic meaning in Torajan carvings generally describes the life of the Toraja people in relation to God, others, and their surroundings.

Keywords: Geometric; Toraja Carving; Toraja Culture

Citation: Remme' V. B., Ba'ru, Y. 2020. Geometric Exploration in Toraja Carving. *Matematika dan Pembelajaran*, 8(2), 122-132. DOI: <http://dx.doi.org/10.33477/mp.v8i2.1594>

INTRODUCTION

Geometry is one of the materials in mathematics which is very important for students to master considering its benefits and uses in everyday life. When compared to other branches of mathematics, geometry should have a greater chance of being understood by students. This is because the ideas in geometry have been known since childhood and many around children, for example, the concept of points, lines, fields (Remme', V., Beatric, Ba'ru, Yusem, 2018). However, in reality, students' mastery of geometry is still very low, as seen in UKI Toraja mathematics education students.

Various methods and methods have been developed to improve the quality of learning mathematics. One way is to integrate local culture into the mathematics curriculum. When culture, mathematics and education are combined,



This work is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/).



this mixing is often called ethnomathematics. When associated with education, ethnomathematics is a study that examines the history and philosophy of mathematics, which has implications for teaching (D'Ambrosio, 2007:26). Matang (2002:36) said that integration of ethnomatematics into the formal math curriculum is one way to overcome the difficulties of students learning math. From the definition of these experts it can be said that there is a relationship between mathematics and culture that can be used for school math learning.

Culture is a representation of many mathematical concepts. Some research shows that there are various mathematical concepts in culture, especially the culture of the archipelago. Senita & Neno (2018) has researched The Crystallography of Flat Fields In Manggarai Community Weaving Fabrics, Pitriana Tandililing has researched the concept of geometry in Toraja culture, as well as Sabilirrosyad researching about the exploration of weaving geometry of sasak sukarara tribe and its implications for learning.

Toraja as one of the tourist destinations in Indonesia is famous for its various cultures. One of the famous cultures is the traditional Toraja house which is often called the Tongkonan. This building is rich in cultural elements and filled with unique and interesting carvings. A typical Torajan wood carving called Passura 'is a manifestation of Toraja culture because it has become daily life for Toraja people. Basically, Toraja carving motifs are geometric and abstract patterns, and each pattern has its own meaning and history, as stated by Tandililing (2012), Toraja carving is rich in mathematical concepts, especially geometric concepts, this is because many Toraja carvings are found. geometric concepts such as square, rectangle, triangle, and so on. This fact shows that in fact the concepts of mathematics, especially geometry have been used by our ancestors since ancient times.

The concept of geometry combined with Toraja local wisdom is expected to be able to facilitate learning geometry both at school and in college, besides that it can be a means of preserving Toraja culture, especially for the younger generation of Toraja. Because in fact culture has become the daily life of children who will



help in understanding the concept of mathematics, especially geometry. Bishop (1994) asserts, mathematics is a form of culture and has actually been integrated in all aspects of people's lives wherever they are.

Therefore, the researcher considers it necessary to study what geometric concepts are contained in Toraja carvings, as well as the meaning contained in them. The results of this study are expected to contribute to improving the quality of mathematics learning, especially in the branch of geometry, as well as being a means of preserving Toraja culture, especially for the younger generation of Toraja. The research purposes is to describe the geometric concepts contained in Toraja carving and to explain the meaning of Toraja carving.

METHOD

This type of research is qualitative research with ethnographic attachment. Data collection is obtained by observation, interviews, field notes, and literature studies. This research will be conducted in 3 (three) stages. The first stage is to identify and interview the research subject's initial subject about Toraja carving to people who understand the ins and outs of Toraja culture (traditional figures). The second stage is to collect data through observation and interviews. observations about the types of geometric shapes found in Toraja carvings as well as interviews about the meaning of symbols in the form of geometric shapes in Toraja carvings to people who understand Toraja culture (traditional figures) and also to related sources. In data collection, digital recording tools were used to support this research, as well as engraved photos as a documentation tool that supports the research results. To complement the data obtained, a literature study was carried out, namely looking for information through textbooks or the internet regarding Toraja carvings. The third stage is processing and analyzing the data set obtained from observations and interviews. The data analysis used was qualitative data analysis with data reduction steps, data presentation, drawing conclusions, and data verification.

The method of implementation in this research is as follows:



1. Identifying and Interviewing

Identifying and interviewing problems with the types of Toraja carvings.

2. Collecting Data

Interviews were conducted to seek information and explore the meaning of the existing geometric shapes in Toraja carvings. Interviews were conducted with sources or people who understand Toraja culture (traditional leaders) and also to related sources. In this study, the number of informants who will be used as sources of information is 5 people.

3. Manage and Analyze data

Analyzing data from observations and data interviews about geometric shapes and their meanings found in Toraja carvings.

RESULTS AND DISCUSSION

1. Toraja Carving

This research begins with identification and preliminary interviews related to the types of carvings in Toraja. For the initial stage, the researchers collected information from Pdt.Dr. Johana Tangirerung, and visited two different places to get information about the types of Toraja carvings, namely the ke'te 'kesu' tourist attraction and one of the tongkonan houses in Tallunglipu which are currently under construction. Based on information obtained from the informan, the types of carvings in Toraja originated from 4 types called Garonto 'Passura', which later developed into 16, now there are about 130 types. This is according to what is stated in the book "Theology Through Symbols" in his book Theology Through Symbols, saying that in the beginning the Toraja people only recognized four kinds of carvings called Garonto Passura ', meaning the basis of carving. Garonto 'Passura' consists of: (1) Pa 'Barre Allo, namely carvings that resemble the sun or the moon, the noble objects on earth come from the creator who gave life and life to his people. (2) Pa 'Tedong, a carving that resembles a buffalo head. This carving is placed on poles that stand upright as the backbone of the building. (3) Pa 'Manuk Londong, a carving that resembles a rooster. 4) Pa'Sussuk, which is a



carving that resembles straight lines placed on the upper wall that adorns the room (Tangirerung, 2017).

Based on information from one of the carvers at Ke'te 'Kesu', Mr. Yulius Limbong Allo, currently there are hundreds of types of Toraja carvings, and they continue to develop according to the engraver's creative ideas. From the results of interviews with other carvers in Tongkonan Tallunglipu, it was found that in the Tongkonan house that was being worked on there were Toraja carvings.

According to information from the informant, not all carvings must be present or need to be carved in the traditional tongkonan and barns. This can be found in every tongkonan carving with other tongkonans and also in barns. This is because the higher the social position of the house owner, the higher the carvings or carvings that are made specifically for that person and vice versa, if the owner of the house has a moderate or average social stratum, the carvings adjust to the strata of the house owner.

2. Geometric Exploration in Toraja Carving

Geometry is the oldest branch of science in Mathematics, which is the study of geometric, such as triangles, circles, ovals, squares, rectangles, parallelograms, rhombuses, spheres, cones, cylinders, pyramids, prisms, hemispheres, etc. The study of geometry exists in the plane as well as in space. This is in line with the opinion of Guven and Kosa that Geometry is a science that studies fields and spaces (Rahmat, Suhito, Sutarto, 2016). In this research, what will be studied is the geometry of the plane which includes the concept of triangles, circles, squares, rectangles, kites, lines, trapezium, rhombus.

a. Square Concept in Toraja Carving



Figure 1. The square concept in Paqsalaqbiq Ditoqmokki carving



Based on Figure 1, the concept of geometry contained in the Paqsalaqbiq Ditoqmokki carving is square, besides that it is also found in the Paqmanuk londong, paqkosiq, paqlalan manuk, baqbatang lau, paqdon lambiri, paqbungkang tasiq, paqkaraq denak, paqkangkung, paqdaun paria, paqdon lambiri, paqbua' tinaq, paqtakku pare, paqdon bolu sangbua, paqtedong tumuru, paqbarraq-barraq, paqdadu, paqsekong sala, paqsala'bi dibungai, paqpolloq songkong, paqerong, paqsala'bi' biasa, paqsekong dibungai' paqsekong anak, paqtanduk re'pe, paqbolu londong, paqkadang pao, paqkapu' baka.

b. Rectangle concept in Toraja carving



Figure 2. The rectangle concept in paqsekong sala carving

Based on Figure 2, the concept of geometry contained in **paqsekong sala** carving is rectangle, besides that, it is also found in the Paqsussuk, paqpollo' gayang, paqkollong buqku, paqmanik-manik, paqsekong, kandaure, paqsepa' torongkong, paqtalinga, paqbokoq komba, paqdoti siluang, paqpapa kandaure, paqsekong sala, pa'sempa, paqtakke lumu', paqdon bolu, paqbunga, paqbarana', pa'lolo tabang, paqsissik bale, paqsussuq.

c. Circle Concept in Toraja Carving

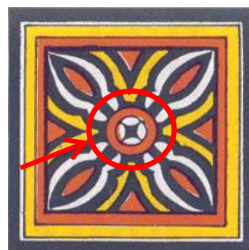


Figure 3. The circle concept in Paqdon Bolu Sangbua carving



Based on Figure 3, the concept of geometry contained in the Paqdon Bolu Sangbua carving is circle, besides that, it is also found in the Paqbare allo, ne' limbongan, paqtaki' pattung, paqkulu karua, paqdon bolu sangbua, paqbua tina'.

d. Triangle concept in Toraja carving

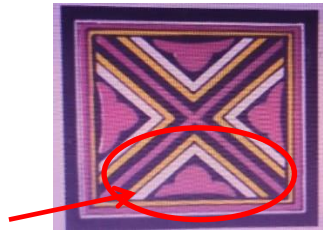


Figure 4. The triangle concept in paqsempa carving

Based on Figure 4, the concept of geometry contained in paqsempa carving is triangle, besides that, it is also found in the Paqsissik bale, paqdon lambiri, paqlamba lalan, paqkatik, paqtoloq paku, paqdon lambiri, paqbua tina', paqtakke pare, paqdon bolu sangbua, paqdon bolu, paqtedong tumuru, paqbarra'-battaq, , paqdadu, paqsempa, paqsekong sala, paqsala'biq dibungai, pa'papan kandaure, paqpolloq songkang, paqsulan sangbua, paqbulu londong, paqbombo uai, paqkollong ba'ka', paqsekong kamdaure, paqsekong anak, paqsekong dibungai, paqsala'bi' biasa, paqsala'bi' ditokmokki, paqtalinga, paqboko' komba kalua', paqerong, paqsiborongan, paqre'po sangbua.

e. Kite Concept in Toraja Carving



Figure 5. The kite concept in paqkangkung

Based on Figure 5, the concept of geometry contained in the paqkangkung carving is kite

f. Rhombus concept in Toraja carving



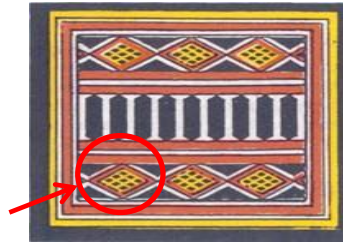


Figure 6. The rhombus concept in Paqlamban Lalan carving

Based on Figure 6, the concept of geometry contained in Paqlamban Lalan carving is rhombus. Besides that, it is also found in the paqlamban lalan, paqkosik, paqsekong sala, paqsala'bi dibungai, paqpapan kandaure, paqre'po sangbua, paqdoti siliang, paqsala'bi biasa, paqsla'bi ditokmokki, paqkollong bukku', paqsulan sangbua

g. Trapezoid Concept in Toraja Carving



Figure 7. The trapezoid concept in paqtalinga carving

Based on Figure 7, the concept of geometry contained in the paqtalinga carving is trapezoid.

From the data analysis process carried out, from the 60 carvings presented above, it can be classified in the geometric concept as follows (Sande, 1989):

Table 1. Geometric Concepts In Toraja Carving

Geometric Concepts	Carving
Square	Paqmanuk londong, paqkosiq, paqlalan manuk, baqbatang lau, paqdon lambiri, paqbungkang tasiq, paqkaraq denak, paqkangkung, paqdaun paria, paqdon lambiri, paqbua' tinaq, paqtakku pare, paqdon bolu sangbua, paqtedong tumuru, paqbarrak-barrak, paqdadu, paqsekong sala, paqsala'bi dibungai, paqpolloq songkong, paqerong, paqsala'bi' dito'mokki, paqsala'bi' biasa, paqsekong dibungai' paqsekong anak, paqtanduk re'pe, paqbolu londong,



	paqkadang pao, paqkapu' baka.
Rectangle	Paqsussuk, paqpollo' gayang, paqkollong buqku, paqmanik-manik, paqsekong, kandaure, paqsepa' torongkong, paqtalinga, paqbokoq komba, paqdoti siluang, paqpapa kandaure, paqsekong sala, pa'sempa, paqtakke lumu', paqdon bolu, paqbunga, paqbarana', pa'lolo tabang, paqsissik bale, paqsussuq.
Circle	Paqbare allo, ne' limbongan, paqtaki' pattung, paqkulu karua, paqdon bolu sangbua, paqbua tina'
Triangle	Paqsissik bale, paqdon lambiri, paqlamba lalan, paqkatik, paqtoloq paku, paqdon lambiri, paqbua tina', paqtakke pare, paqdon bolu sangbua, paqdon bolu, paqtedong tumuru, paqbarra'-battaq, , paqdadu, paqsempa, paqsekong sala, paqsala'biq dibungai, pa'papan kandaure, paqpolloq songkang, paqsulan sangbua, paqbulu londong, paqbombo uai, paqkollong ba'ka', paqsekong kamdaure, paqsekong anak, paqsekong dibungai, paqsala'bi' biasa, paqsala'bi' ditokmokki, paqtalinga, paqboko' komba kalua', paqerong, paqsiborongan, paqre'po sangbua.
Rhombus	Paqkangkung, paqlamban lalan, paqkosik, paqsekong sala, paqsala'bi dibungai, paqpapan kandaure, paqre'po sangbua, paqdoti siliang, paqsala'bi biasa, paqsla'bi ditokmokki, paqkollong bukku', paqsulan sangbua
Kite	paqkangkung
Trapezoid	paqtalinga

Regularity is a common feature of Toraja carvings in addition to Toraja wood carvings as well as abstract and geometric, nature is often used as the basis of Toraja ornaments, because nature is full of abstraction and regular geometry. Therefore it can generally be said that almost all Toraja carvings contain the concept of geometry. The concept of geometry found in Toraja carvings is square, rectangle, circle, triangle, rhombus, kite, trapezoid. Based on the table above, the most common geometric concepts found in Toraja carvings are squares and triangles.

In this study did not examine the shape and naming on toraja carvings. The meaning of Toraja carving relates to the life of the Toraja people, the way of living life properly and wisely. Sande (1988) in his book states that toraja carvings contain the meaning and values of life that are closely related to the philosophy of



life of the Toraja people. Toraja carvings are generally in the form of advice to live a good and true life, always work hard, respect each other always foster unity and kinship and ketaqwaan to the One True God. In general the symbolic meaning of Toraja carving generally describes the life of the Toraja people in relation to God, man, and the surrounding nature.

CONCLUSION

Toraja carvings have an orderly and abstract shape, and almost all Toraja carvings are founded the concept of geometry. The concept of geometry found in Toraja carvings is square, rectangle, circle, triangle, rhombus, kite, trapezoid. Based on the table above, the most common geometric concepts found in Toraja carvings are squares, triangles.

Each Toraja Carving has its own meaning and philosophy, the meaning of toraja carving is based on the name of the carving, and the naming on the carving is based on the shape of the carving. In general the symbolic meaning of Toraja carving generally describes the life of the Toraja people in relation to God, others, and the surrounding nature.

REFERENCES

- Bishop, A.J. (1988). *Mathematics Enculturation: A Cultural Perspective on Mathematics Education*. Dordrecht: Kluwer.
- Budiarto, T.,Mega. (2016). *Etno Matematika: Sebagai Batu Pijakan Untuk Pembelajaran Matematika*. Prosiding Seminar Nasional Pendidikan Matematika. ISBN 978-602-449-023-2
- D'Ambrosio, U. 2007. *Peace, Social Justice And Ethnomathematics*. The Montana Mathematics Enthusiast, Monograph 1, pp.25-34.
- Matang, Rex. (2002). *The Role Of Ethnomathematics In Msthenatics Education In Papua New Guinea: Implications For Mathematics Curriculum*. Directions: Journal of Educational Studies vol 24 (1) June 2002.
- Panduan Penelitian dan Pengabdian Kepada Masyarakat Edisi XII revisi 2019
- Remme', V., Beatric, Ba'ru, Yusem. (2018). *Analisis Kesalahan Mahasiswa dalam Menyelesaikan Soal Geometri Berdasarkan Newman's Error Analysis Ditinjau Dari*



- Gaya Kognitif Pada Mahasiswa Semester IV UKI Toraja*. Prosiding Seminar Nasional Kepariwisata Berbasis Riset dan Teknologi UKI Toraja.
- Sabilirrosyad. 2016. *Ethnomathematics Sasak: Eksplorasi Geometri Tenun Suku Sasak Sukarara Dan Implikasinya Untuk Pembelajaran*. JURNAL TATSQIF (Jurnal Pemikiran dan Penelitian Pendidikan) Volume 14 No. 1 – Juni 2016.
- Sande, S., J. (1989). Toraja In Carving's.
- Senita, P., & Neno, E.S. (2018). *Kristalografi Bidang Datar Dalam Kain Tenun Masyarakat Manggarai*. PROSIDING SENDIKA, 4(1).
- Sutarto,dkk. (2016). *Hyper-Paraboloida Dalam Ruang Euclid Berdimensi-n*. Unnes journal of mathematics. Universitas Negeri Semarang
- Side, S., Sukarna, H., & Jusriadi. *Analisis Matematika Pada Pembuatan Rumah Panggung Toraja*. Jurusan Matematika FMIPA Universitas Negeri Makassar.
- Tandililing, Edy. (2013). *Pengembangan Pembelajaran Matematika Sekolah Dengan Pendekatan Etnomatematika Berbasis Budaya Lokal Sebagai Upaya Untuk Meningkatkan Kualitas Pembelajaran Matematika Di Sekolah*. Prosiding Seminar Nasional Matematika dan Pendidikan Matematika Jurusan Pendidikan Matematika FMIPA UNY.
- Tandililing, Pitriana. (2012). *Etnomatematika Toraja (Eksplorasi Geometris Budaya Toraja)*. Universitas Negeri Surabaya. Tesis.
- Tangirerung, R., Johana. (2017). *Berteologi Melalui Simbol-simbol Upaya Mengungkap Makna Injil Dalam Ukiran Toraja*. Bandung: BPK Gunung Mulia. ISBN 6022314135, 9786022314134
- Ubayanti, S., Chandra, dkk. (2016). *Eksplorasi Etnomatematika Pada SERO (SET NET): Budaya Masyarakat Kokas Fakfak Papua Barat*. Jurnal Ilmiah Matematika dan Pembelajarannya, 1(1), 12-21.

