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Identification of Geometric Concepts Contained in The Pa'binti' Weaving Crafts of The Toraja Society

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Abstrak
Indonesia adalah negara yang kaya akan budaya yang berasal dari berbagai suku bangsa. Budaya dapat diterapkan disekolah melalui pembelajaran berbasis budaya. Toraja adalah salah satu suku di indonesia yang memiliki beragam kebudayaan. Kerajinan anyaman merupakan salah satu kebudayaan yang ditekuni oleh masyarakat Toraja sejak dahulu sampai sekarang. Tenun pa'binti' merupakan suatu kerajinan anyaman masyarakat Toraja khususnya daerah Sa'dan yang dibuat dari benang. Pada tenun pa'binti' terdapat konsep-konsep matematika di dalamnya berupa bangun datar. Tujuan penelitian ini untuk mengetahui konsep geometri yang terdapat pada kerajinan anyaman tenun pa'binti' masyarakat Toraja. Penelitian ini menggunakan metode deskriptif kualitatif untuk mempelajari dan memahami lebih dalam tentang etnomatika pada kerajinan anyaman tenun masyarakat Toraja. Lokasi penelitian yaitu berada di daerah Toraja Utara yakni dilembang Sa'dan Ulusalu kecamatan Sa'dan. Hasil dari penelitian ini yaitu terdapat konsep geometri pada kerajinan anyaman tenun pa'binti' masyarakat Toraja dimana konsep geometri yang terdapat pada anyaman tenun pa'binti' antara lain ; bangun datar segitiga, bangun datar belah ketupat, bangun datar persegi, dan bangun datar jajargenjang.
Kata Kunci: Etnomatika, Konsep Matematika, Motif Kain Tenun Toraja

Abstract
Indonesia is a country rich in culture from various ethnic groups. Culture can be applied in schools through culture-based learning. Toraja is one of the tribes in Indonesia that has a variety of cultures. Woven craft is one of the cultures occupied by the Toraja people since ancient times until now. Weaving pa'binti' is a woven craft of the Toraja people, especially the Sa'dan area, which is made from yarn. In pa'binti weaving, there are mathematical concepts in it in the form of flat shapes. The purpose of this study was to determine the geometric concepts contained in the pa'binti woven woven craft of the Toraja people. This study uses a qualitative descriptive method to study and understand more deeply about ethnomatics in the woven weaving craft of the Toraja people. The research location is in the North Toraja area, namely in Lembang Sa'dan Ulusalu, Sa'dan sub-district. The results of this study are that there is a geometric concept in the pa'binti woven woven craft of the Toraja people where the geometric concepts contained in the pa'binti woven woven craft include; flat triangle, rhombus, square, and parallelogram.
***Keywords**: Ethnomatics, Mathematical Concepts, Woven Fabric Motifs of Toraja*

Introduction

Indonesia is a country rich in culture that comes from various ethnic groups. Each region of Indonesia has a different culture that is passed down from generations from ancestors (Rizky and Wibisono, 2015). The culture of growth and development in the community must be maintained and preserved so that the culture owned by Indonesia is not extinct. In addition, cultural values are important to be instilled in each individual so that each individual is able to understand, interpret and realize the importance of cultural values in carrying out life activities. The cultivation of cultural values can be applied through family, education and the community environment (Fajriya, 2018: 114).

Culture can be applied in schools through culture-based learning. According to Sardjiyo and Pannen (putri, 2017: 21) said that culture-based learning is a learning model that prioritizes the activities of students with a variety of cultures owned. Culture-based learning is very beneficial for students. Worship activities also invite student participation so they don't get bored (Hakpantria, 2022).

This is because students really need interesting learning so that mathematics that is considered difficult by students can be better understood and become contextually meaningful learning that is closely related to cultural groups (Muttaqin, 2018) (Marmi, 2020: 1). As for mathematics learning that can be done through a cultural approach called ethnomatics.

According to Hiabert and Capenter 1992, it reminds all parties that the teaching of mathematics in schools and mathematics that children find in everyday life is very different. Therefore, learning mathematics is very necessary to provide content or position mathematics between mathematics in the everyday world based on local culture and mathematics in schools. The idea of ethnomatics will be able to enrich existing mathematical knowledge. Therefore, if the development of ethnomathematics has been widely studied, it is not impossible for mathematics to be taught unpretentious history by taking the local culture.

Toraja is a tribe in Indonesia that has a variety of cultures. As an aggressive society, Toraja is still very attached to traditional perebadan which is passed down from generation to generation from the ancestors of the Toraja people. Woven handicrafts are one of the cultures that the Toraja people have been engaged in since ancient times to meet their basic daily needs. Weaving is a form of handicraft that continues to be produced by a small part of the community in Toraja. Weaving is made from the characteristic using a yarn base. Precisely in the area of sa'dan lembang sa'dan ulusalu is a place for making a pa'tannun craft, an example of a woven craft created by the Toraja people is pa'binti weaving'. Pa'binti' weaving is a woven craft of the Toraja people, especially Sa'dan, which is made from yarn, and if you pay attention to the woven craft of pa'binti' weaving, it contains a lot of geometric concepts.

From the above, it can be concluded that since long ago the Toraja people have known mathematics specifically geometry and have even operated with the process of making woven weaving, especially pa'binti'. However, it is not certain that it is known by the Toraja people that there are geometric elements in the woven pa'binti' motifs they made. In the woven motif weaving pa'binti' the Toraja people, especially the Sa'dan area. We will find the concepts of flat sepetri geometry.

Based on the description above, that mathematics as a branch of science has an important role in everyday life. This is evident from the activities carried out by the Toraja people such as in the process of making woven woven pa'binti'. It is on that basis that tampa realized that mathematics always has an important role in every activity that we do on a daily basis.

Related to the research, namely the Identification of Geometric Concepts Found in the Pa'binti' Weaving Webbing Crafts of the Toraja Community, the researcher is interested in describing and exploring the Geometry concepts contained in woven pa'binti' weaving.

The author raised this title in order to understand what types of geometric concepts are contained in the pa'binti' weaving craft motifs of the Toraja people. This needs to be known because the motifs on the weaving crafts of the Toraja people are one of the uniqueness that exists in Toraja that needs to be preserved. This is because the youths in Toraja have begun to worry about this so that researchers want to conduct research in order to provide an understanding of the motifs on woven fabrics, especially the pa'binti' weaving of the Toraja people and be able to preserve them and be applied in the learning process in schools.

In this pa'binti' cloth, the mathematical science applied is counting. Counting the number of threads that will be woven to form the motifs to be made by the weaver and the motifs are made has mathematical concepts and also the equipment for making them in it. The mathematical concepts contained in it are lines, horizontal lines, two parallel lines two intersecting lines, square, rhombic, triangle and jajargenjang. The mathematical concept contained in the pa'binti' woven cloth motif above can be used for learning mathematics through local culture. Thus, learning mathematics will be more meaningful and no longer difficult when giving a view to students who have difficulty understanding the material during the learning process, because with this students will be able to understand quickly during the mathematics learning process, because this is familiar to students and is well known in their own cultural environment (Panggarra and Trivena, 2021).

The word mathematics comes from the word latim mathematics which was originally taken from the Greek word mathematike which means to learn. Perekataan has the origin of the word mathema which means knowledge and knowledge or knowledge, sciensi. The word mathematicality is also related to another word that is almost the same, namely mathein or mathenein which means to learn or think. So from the origin of the word it can be concluded that Mathematics is a science obtained through reasoning thinking.

According to Nasutison in Arifin (2017:1) posits that the term mathematics comes from the Greek, mathein and mathenem which means to learn. The word mathematics is thought to be closely related to the Sanskrit word, medha or widya which means intelligence, discovery or intelligence. Meanwhile, James in Arifin (2017:1) stated that the term mathematics is the science of logic, regarding forms, arrangements, magnitudes, and concepts related to one another. Mathematics is divided into three major parts, namely algebra, analysis and geometry. But there is an opinion that says that mathematics is divided into four parts namely arithmetic, algebraic, geometric and analysis with arithmetic includes number theory and statistics. Mustafa in TriWijayanti (2011:1) mentions that mathematics is the science of quantity, shape, arrangement and size, the main thing is the method and process of finding with the right concept with a consistent symbol, the nature and number of relationships between quantity and measure, either in the abstract of pure mathematics or in the interrelation of benefits in applied mathematics. From this definition, it is concluded that mathematics is a science of methods and processes for finding concepts (shapes, arrangements and sizes) and fixed symbols related to the benefits of applied mathematics.

From the definition above, the author concludes that mathematics is a science that studies the structure, size, arrangement, magnitude, concepts and relationships in it. The term mathematics was first used in 1960 by Brazilian mathematicians. D'Ambrosio (in Rudhito 2020:25) says that ethnomatics is referred to as mathematics practiced in a culture. The culture in question is the habits of human behavior in the environment such as human behavior in society, tribe, nation, other groups of workers. According to Shirley (in Wahyuni, et al:115) argues that ethnomatics is a mathematical science that grows and develops in accordance with the culture of society. From this opinion it is concluded that in ethnomatics it is to study about how mathematics is generated and transferred according to a wide variety of cultures.

Meanwhile, according to Margisit (2018: 23) ethnomatics is a science used to understand how mathematics is adapted from a culture and serves to describe the relationship between culture and mathematics. The opinion concluded that ethnomatics is a science adapted to fulfill the relationship between culture and mathematics. Toraja-Culture have a set of life principles or guidelines that they constantly reflect upon and use in their daily activities (Hakpantria, Patintingan & Saputra, 2022).

In the big Indonesian dictionary (2008:610), weaving is the result of crafts in the form of materials (fabrics) made from yarn (cotton, silk, and so on) by inserting weeks transversely on the warp. In another sense, it is stated that weaving is to arrange horizontal and longitudinal threads in a density and wear various shades.

Geometry is one of the branches of mathematics that studies objects, surface area, points, lines, and angles along with the relationships created, properties and all measures that apply in space. Geometry itself comes from the Greek geo which means earth or soil and metrio which weighs size.

The definition of geometry according to Novelia Sondan (2018: 1) is that Geometry is one of the mathematical sciences applied in the world of architecture, it is also one of the branches of science related to shape, composition and proportion. Alders (Saimah. 2020) also states that geometry is one of the branches of mathematics that studies points, lines, planes and objects of space and their properties, measures and their relationships between one another.

From some of the definitions of geometry above, the author can conclude that geometry is one of the branches of mathematics that discusses points, lines, planes, measures and flat buildings, building spaces and their relationships between one another. Toraja traditional fabric crafts or called cloth if you look at the Toraja weaving motifs have mathematical concepts, especially geometry concepts. With the concept of geometry found in Toraja woven fabrics, it is realized that the mathematical value of suda is embedded in the toraja woven fabric craftsman community. Some of these motifs can be used as learning media in schools to introduce mathematical concepts, especially in geeometric building so that it makes it easier to understand geometry concepts. The Toraja woven fabric motif contains a flat build, namely a square, belaketupat, parallelogram, triangle, and even an angular concept.

Metode

In this study, what was used was descriptive qualitative research with an ethnographic approach. According to Sparedley in Zainal (2018:2) ethnographic methods are used to describe, explain and analyze the cultural elements of a society or ethnic group.

The presence of the researcher in this case is very important and main, as Moleong said that in qualitative research the presence of the researcher himself or the help of others is the main data collection tool. So that the presence of researchers as instruments and data collection in research.

The location of this study is located in one area in North Toraja, namely in Lembang Sa'dan Ulusalu, Sa'dan district. The data sources used in this study are primary data and secondary data.

1. Primary data is objective fact data obtained from direct research, namely from respondents. The primary data in this study were taken directly from the study site. The results of the observations included in the primer in this writing are

geometric concepts in the woven woven motifs of the Pa'binti' people of Toraja.

2. Secondary data shall mean data in the form of data that is indirectly processed or obtained through books, journals, research, pasts and related materials/institutions.

Data collection techniques are the most important scarce in research, because the main purpose of this study is to obtain data. Data collection can be done in a variety of sources and a variety of ways. Therefore, the data collection technique in this study consists of 4 parts, namely:

1. Observation

   Review of the location to be studied and observe the thing to be studied. The observation of researchers will observe the activities directly of making woven pa'binti' woven handicrafts as the object of research.

2. Interviews

   In this study, the largest data collection was sourced from interviews. What researchers will do in this technique is to ask a few questions to the resource person about woven weaving pa'binti'. Pa'binti' woven woven craftsmen are the speakers who will be interviewed by researchers.

3. Literature Study

   This literature study is intended to reveal various theories that are relevant to the problem to be studied. This technique is carried out by reading, studying and reviewing the literature on woven motifs on pa'binti' woven fabric. The review of literature for the benefit of this researcher is in the form of engineering literature and non-technical literature. Technical literature such as: reports on research studies and written works in the form of theoretical or philosophical papers. While non-technical literature such as: biographies, documents, manuscripts, notes, catalogs, and other materials that can be used as support for interviews. The results of this literature study can be used as input and basis in explaining and detailing the problems to be studied.

4. Documentation

   In addition to the three techniques above, the technique that will also be carried out by researchers is to carry out documentation. Researchers will take pictures of the motifs on the kai weaving pa'binti' of the toraja community.

Results and Discussion

In this chapter, the researcher will describe and explain the data and research results on the problems that have been formulated in chapter1. In this chapter will be discussed about the results of research that has been carried out by researchers. Broadly speaking, the results of this study include a description of the stages of the researcher. Broadly speaking, the results of this study include the observation stage and the interview stage. Before conducting research, the researcher first conducts planning in carrying out the research. Therefore, researchers prepare the means that will be used in conducting research, for example, paper, polpen, HP, and objects that support in conducting interviews and observations. In addition, researchers also plan the time required to conduct research and provide notice to informants before conducting interviews.

The time to make observations and interviews is on Sunday, July 10, 2022 from 08:00-10:30. The location where the researcher conducted the study was in Rante-Rante, Lembang Sa'dan and Ulusalu, Sa'dan district, North Toraja district.

1. Observation stage

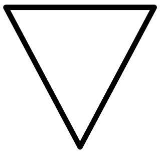
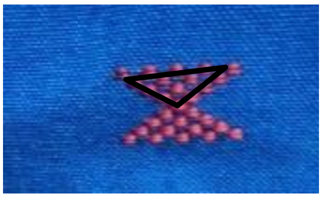
At this stage researchers made observations on woven woven pa'binti'. At this stage the researcher begins to observe the woven pattern of pa'binti' weaving and begins to analyze the type of geometric concept that exists in the woven pa'binti' weaving, at this stage the researcher analyzes and measures the pattern of motifs in pa'binti' weaving using measuring instruments, namely; meters and arc of the circle.

2. Interview stage

At this stage, the researcher conducts an interview with an informant where the informant chosen by the researcher is a woven woven craftsman of pa'binti' by relying on the interview guidelines that have been made before. There are several questions asked to the informant which include questions asked to the informant which include general questions and questions about the concept of geometry. With this stage of the interview, the researcher obtains the desired data from the informant.

Table 1. Plane Figure on Pa'binti' weaving motifs (Triangle plane figure)

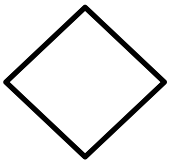
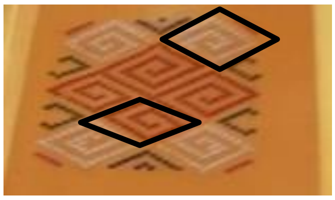
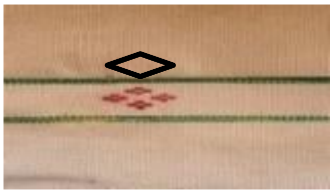
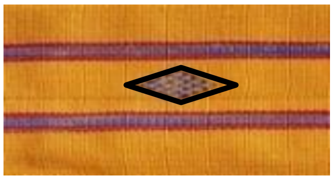
Plane Figure	Pa'binti' weaving motif

Triangle plane figure 	
	Pa’sekong sangpali
	
	Pa’singki’ bungkang
	
	Pa’dadu.

In the picture above is a woven pattern of pa'binti' where in the wicker pattern there is a concept of geometry. The concept of formed geometry is a triangle, which we can see in the picture on the side. Based on the results of observations and interviews of the pa'sekong sangpali', pa'singki' bungkang and pa'dice motifs, the motif forms a triangular flat build because it meets the requirements of a triangle, which has 3 corners, and the number of the three angles is 180º, the length of the two sides is longer than the other side, so that the flat build formed from the motif above is triangular in shape where we can see it as shown in the table besides.

Based on the results of observations and interviews from informants who explained that the number of threads used could be calculated and the weaver did not use a special measuring instrument but used a stretched thread. This number of threads forms a triangle because in the first weaving stage the number of threads that are mummified from within the rendened thread consists of one thread then the second stage two threads are raised, the third stage is three threads raised, the fourth stage is four threads raised and the fifth stage is five threads raised. So that the threads arising from the first to the fifth stage form three angular points. Therefore, it can be concluded that the motifs of pa'sekong sangpali', paruki pa'sikki'bungkang and pa'dadu are included in the triangular flat build.

Table 2. Plane Figure on Pa'binti' weaving motifs (Rhombus plane figure)

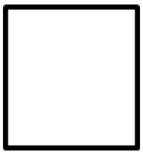
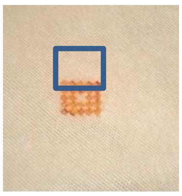
Plane Figure	**Pa'binti' weaving motif**
Rhombus plane figure 	
	Pa’singki Bungkang
	
	Passekong Kandaure
	
	Pa’bunga
	
	Pa’kalosi

In the picture above is a woven woven pattern of pa'binti' where in the wicker pattern there is a geometric concept, which we can see like a flat build formed from the motif in the picture above. Based on the results of observations and interviews of the pa'singki' bungkang, passekong kandaure, pa'bunga and pa'kalosi motifs form a flat wake, namely building a flat belaketupat because the motif has the condition of building a flat bela ketupat, namely; has 4 sides equal in length, the sum of the two opposite corners is equal to 180º, and the sum of the four corners if juxtaposed is 360º. So build a flat formed from the motif above, namely the rhombic where we can see in the picture in the table besides.

Based on the results of observations and interviews from informants who explained that the number of threads used can be calculated and the weaver does not use a special measuring instrument but uses a stretched thread, for the motif of pa'sekong kandaure, paruki' pa'singki' bungkang, pa'kalosi. This number of threads forms a rhombic because in the first weaving stage the number of threads raised from within the rendented thread consists of one thread then the second stage two threads raised, the third stage three threads raised, the fourth stage four threads raised, the fifth stage five threads raised, then the sixth stage the number of threads raised four, stage seven number of threads raised three, stage eight number of threads raised two stages to nine number of threads raised one. So that the thread arising from the first stage to the ninth stage forms four angular points and four equally long sides. So it can be concluded that the motifs of paruki pa'sikki'bungkang, passekong kandaure, and pa'kalosi are included in the flat build of belaketupat.

For the pa'bunga motif in the first stage the number of threads raised from within the thread that suda is draped by one thread, the second stage the number of threads raised two threads of the third stage the number of threads that appear one thread, so that the threads arising from the first stage to the third stage are four angular points and four equal sides of length. So it can be concluded that the pa'bintang motif includes a flat build.

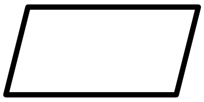
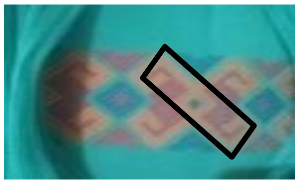
Table 3. Plane Figure on Pa'binti' weaving motifs (Square plane figure plane figure)

Plane Figure	Pa'binti' weaving motif
Square plane figure 	
	Pa'bintang

In the picture above is a woven woven pattern of pa'binti' where in the woven pattern there is a geometric concept where we can see the flat build formed in the picture on the side. Based on the results of observations and interviews of the flat wake pa'star motif formed, namely the square flat build, because the motif has a square flat wake condition, namely; has 4 equally long sides, the four corners are elbows, the opposite sides are the same length and parallel, and the sum of the 4 corners is 360º, so that the flat build formed from the motif above is a square, where we can see as in the picture in the table besides.

Based on the results of research and interviews from informants who explain the number of threads used, it can be calculated and the weaver does not use a special measuring instrument but uses a squeezed thread. This number of threads forms a persigi because in the first weaving stage the number of threads raised from within the rendented thread consists of five threads, the second stage the number of threads raised is five, the third stage the number of threads that are raised is four but have a distance deliberately emptied by the weaver, the fourth and fifth stages the number of threads raised five. So that starting from the first stage to the fifth stage, it forms four equally large corners and four equally long sides. So the explanation of the pa' star motif can be inferred to form a square flat build.

Table 4. Plane Figure on Pa'binti' weaving motifs (Parallelogram plane figure)

Plane Figure	Pa'binti' weaving motif
Parallelogram plane figure 	
	Pa’singki’ bungkang
	
	Pa’sekong sangpali’

In the picture above is a woven woven pattern of pa'binti' where in the wicker pattern there is a concept of geometry. Based on the results of observations and interviews of the pa'singki' bungkang and pa'sekong kandaure motifs of flat waking which are formed, namely building flat parallelograms because these motifs have jajargenjang requirements, namely: the facing and parallel sides are equal in length, the opposite corners are equal in length, the number of opposite angles is equally large, the sum of the four corners if juxtaposed is 360º, so build a flat formed from the motif above, namely the parallel where we can see in the figure in the table besides.

Based on the results of the research and the results of interviews from informants who explained that the number of threads used could be calculated and the weaver did not use a special measuring instrument but instead used a benag that was rejected, for the pa'singki' motif, this number of threads forms a row because in the first weaving stage to the fifteenth stage the number of threads raised from within the rendented thread consists of eight. So that from the first stage to the fifteenth weaving stage forms four angular points where the sum of the two angle points that are equal in size, and has four sides, where the two parallel sides have the same length.

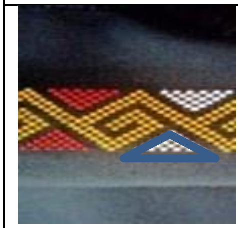
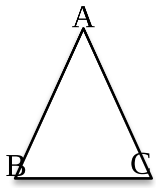
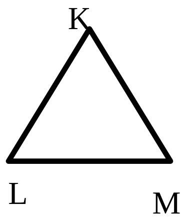
In the sangpali pa'sekong motif, this number of threads forms a parallelogram because in the first weaving stage to the nineteenth stage the threads that appear from within the thread that suda direnden consists of two threads. So that from the first stage to the weaving stage the nineteen forms four angular points where the sum of the two angular points that are equal in size, and has four sides, where the two parallel sides have the same size length. So the explanation above is summed up that the motifs of pa'sekong sangpali', paruki and pa'sikki'bungkang are included in the flat build of the jajargenjang.

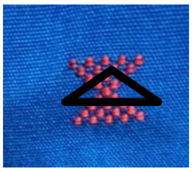
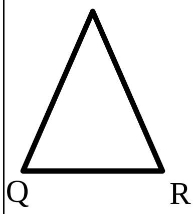
Based on the results of the research discussed in the previous chapter, it can be concluded that there is an ethnomatics in the pa'binti' woven fabric motif of the Toraja people, especially in Sa'dan ulusalu. The ethnomatics in question is the concept of geometry. The concept of geometry contained in the pa'binti' woven fabric motif is flat building. The flat builds found in woven woven pa'binti' are triangular, square, rhombic, and jajargenjang. It can be concluded that since long ago the Toraja people have known mathematics, especially geometry, and even applied it in everyday life. We can see this in the process of making pa'binti' weaving craft motifs.

Triangle plane figure

The motifs contained in the woven fabric of the Pa'binti' of the Toraja people, especially Sa'dan ulusalu, namely the concept of triangular flat wake geometry are found in the motif of pa'sekong sangpali', paruki' pa'singki' bungkang and pa, the triangular flat wake dice will be explained through the following table.

Table 5. Geometric Concept of Triangle Plane Figure on Pa'binti' Woven Fabric Motif of Toraja People

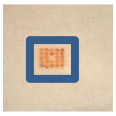
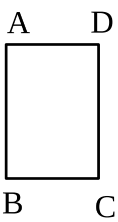
Drawing of pa'tannun cloth motif	Triangle image	Description
 *pa'sekong sangpali'*		Based on the results of measurements made by researchers, it was obtained: 1. The sides have the following lengths: Side AB=1,5cm Side AC=1,5cm Side BC=1cm 2. The two angles facing the same are: $\angle B$ and $\angle C$=70° and ∠ A=40°
 *Paruki' pa'singki' bungkang*		Based on the results of measurements made by researchers, it was obtained: 1. The sides have the following lengths: Side KL=1cm Side KM=1cm Side LM=0,5cm 2. The two angles facing are equally large, namely: ∠L and $\angle M$=65° and ∠ K=50°

		Based on the results of measurements made by researchers, it was obtained: 1. The sides have the following lengths: Side PQ=1cm Side PR=1cm Side QR=1,5cm 2. The two angles facing are equally large, namely: $\angle Q$ and $\angle R$=45° and ∠ P=90°

Square plane figure

The motifs contained in the pa'binti' woven fabric of the Toraja people, especially sa'dan ulusalu, namely the concept of square flat build geometry found in the pa'bintang bangun datar square motif, will be explained in the following table above.

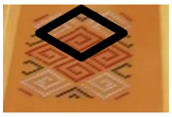
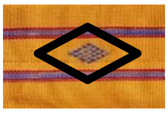
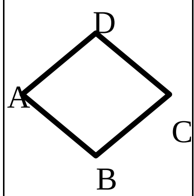
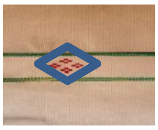
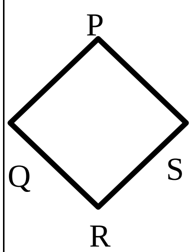
Table 6. The Concept of Square Plane Figure Geometry on The Pa'binti' Woven Fabric Motif of The Toraja People.

Drawing of pa'tannun cloth motif	Square image	Description
 *Pa'bintang*		Based on the measurements made by the researcher, it is obtained: 1. Have four sides that are equal in length, namely: Side AB=BC=CD=DF= 1,2cm 2. Have 4 equally large angles, namely: ∠A,∠B,∠C dan∠D

Rhombus plane figure

The motifs found in the pa'binti' woven fabric of the Toraja people, especially sa'dan ulusalu, namely the concept of square flat building geometry, are found in the pa'kalosi, paruki' pa'singki' bungkang pa'bunga, passekong kandaure motifs. The flat wake of the calicumb will be explained in the following table.

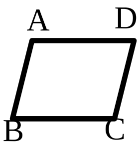
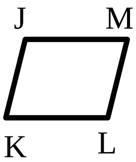
Table 7. The Concept of Geometric Rhombus Plane Figure on The 'binti' Woven Cloth Motif of The Toraja People

Drawing of pa'tannun cloth motif	Rhombus image	Description
 *Passekong kandaure*  *Pa'kalosi*  *Paruki'pa'singki'bungkang*		Based on the results of measurements made by researchers, it is carried out: 1. Have 4 pieces of equal length sides namely: SideAB=BC=CD=AC=1,2cm 2. has two pairs of equally large facing angles namely: ∠ABC with ADC and ∠BAD with ∠BCD
 Pa'bunga		Based on the results of measurements made by researchers, it is carried out: 1.Has 4 pieces of equal length side namely: Side PQ=QR=RS=SP=0,5cm 2.has two pairs of equally large facing angles namely: $\angle QRS$ with QPS and $\angle PQR$ with $\angle PSR$

Parallelogram plane figure

The motif found in the pa'binti' woven fabric of the Toraja people, especially sa'dan ulusalu, namely the concept of square flat building geometry, is found in the pa'sekong sangpali', paruki' pa'singki' bungkang motif. Build a flat jajargenjang will be explained through the following table.

Table 8. The Concept of Geometric Parallelogram Plane Figure on The 'binti' Woven Cloth Motif of The Toraja People

Drawing of pa'tannun cloth motif	**Square image**	**Description**
 *Pa'sekong Sangpali*  Paruki' pa'singki'b ungkang	 	Based on the measurements made by the researcher, it was obtained: 1. The parallel sides are equal in length, namely : Side AB=CD=0,5cm Side AD=BC=4cm 2. Has 4 right angle points, namely : ∠B∠D=60º ∠A∠C=120º 1. Parallel sides equal in length: Side JK=ML=1cm Side JM=KL=4cm 2.It has 4 right angles, namely: ∠K∠M=90º ∠J∠L=90º

Based on the results of the research from the figure in the column above about measuring the sides and angles on the flat body, according to the results of research from informants, the number of threads used when weaving can be determined, and the number of threads used alone amounts to 4 threads for each motif above and the benag has a length of 30 cm. And the weaver if making a weaver motif does not use a special measuring instrument but the weaver uses a thread that is suda direnden which is occupiedmakes the motif. If you make the motif, the distance inside the motif is divided by the thread that is occupied, making the motif, and the more threads the motif is the bigger, but if the fewer threads the motif chooses, the smaller it is.

Based on the results of the research above, it can be concluded that the motifs in the woven pattern of pa'binti' weaving meet the criteria of triangular flat builds, square and parallelograms.

Conclusion

The mathematical concept was obtained from measuring activities and interviews. In the activity, measuring the angle and length of the flat side of the building, while in the interview, the flat build is in the pa'binti' motif and specifically for the motif used, it contains the concept of geometry, namely flat building. The flat builds that are formed include: build a triangular flat, build a flat califist, build a flat square, and build a flat parallel. The triangular flat build is obtained from the motifs of pa'sekong sangpali', pa'singki'bungkang, pa'dadu. Flat build belaketupat flat build is obtained from pa'singki'bungkang, passekong kandaure, pa'bunga, pa'kalosi. A square flat build is obtained from the pa'bunga motif. The flat build of the jajargenjang is obtained from the motifs of pa'sekong sangpali' and pa'singki' bungkang.

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Curriculum Vitae

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