

# ETHNO-MATHEMATICS EXPLORATION ON THE CARVINGS OF RUMAH GADANG IN SOUTH SOLOK REGENCY OF WEST SUMATERA

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**Abstract:** This study aimed to analyze ethno-mathematic exploration for basic information in the development of ethno-mathematics. The method of this research was by doing interview through questionnaire; and the data processed by taxonomic analysis. Taxonomic analysis done to create a category of cultural symbols that exist in the culture studied. The object of research was the shape and the name of carvings in *Rumah Gadang*. From the data analysis, the result obtained that most of *Rumah Gadang* in South Solok Regency has carved of 44.44%. There were 34 of carvings in *Rumah Gadang* and mostly symmetric to 76.47%.

**Keyword:** Ethno-mathematics, Rumah Gadang, Carving, South Solok

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## I. INTRODUCTION

In social life, students do not realize that they have been applying mathematics in their social life. They tend to consider that mathematics only found in computing, measuring, shopping, or cultural art in the form of carvings - both in carvings of rumah gadang or carving in woven, clothing, and jewelry. Rumah Gadang is widely spread in West Sumatra, especially in the southern Solok area called the land of 1000 rumah gadang. There are various forms of carving in Rumah Gadang with the form of circular and square carvings.

Carving as an element of beauty in Rumah Gadang has its own meaning and function. Inside of each carving, there was the elements of traditional teachings and philosophy of Minangkabau. Motif of carvings in Minangkabau mostly taken from the flora and some of them were named after the food that usually served during traditional ceremonies, such as *saik galamai* (rhombus).

Usman (1980) suggested that Rumah Gadang is a place to display carving patterns that represent traditional advices. These advices are further clarified by traditional literature in the form of *petatah petitih*. *Petatah petitih*, although expressed in allegory, but Minangkabau society can understand and applied them all in their everyday life. Carving is not allowed to place in random places. Before making a carving, the craver must consider the carved motifs in accordance with place for the carving will be placed.

Andika (2014) declared that carvings are widely used as a decoration of Rumah Gadang. It usually carved in a shape of circular lines or square, with motifs such as vines, the roots of leafy, flowers and fruits. This root pattern is usually in the form of a circle; the roots are aligned, coincide, braided, and connected. Other motifs are found in Rumah Gadang is a triangular geometry, four, and a parallelogram.

In mathematics, carving closely related to the geometry of the material field. Mathematics as a basic science needs to examine the basics of arithmetic that can be applied to the community to enrich the development of mathematics. Hiebert and Carpenter (1992) in Tandililing (2013) stated that mathematics taught in schools and mathematics that children found in everyday life are very different. Therefore, mathematics learning is very necessary to provide a bridge between math and daily life based on culture (Ethno-mathematics).

Situmorang (1993), culture, in literally sense, is not limited as the fruit of human thought, feeling, power initiative, the tradition; but it could have a broader understanding of how to apply these things in people's lives and bring benefits for life and for others. Culture is a symbolic representation of the movement of space and time in the universe in which several events take place. According to Piliang (2009), a culture encompasses the social system of its society, the moral system, the techno material system, the art system, the language system and the mental system that builds the society.

Culture is something that is inevitable in everyday life, because culture is a complete and comprehensive unity prevailing in a community. Tylor in Ratna (2005) defines culture as the whole of human activity, including knowledge, belief, art, morals, law, customs, and other habits. While Koentjaraningrat (1985) according to the science of anthropology, culture is the whole system of ideas, actions, and the work of human beings in the framework of the life of society that made human self by learning. This concludes that mathematics is a cultural product that is the result of abstraction of the human mind, as well as problem solving tools. As expressed by Sembiring in Prabowo (2010) that mathematics is the construction of human culture.

Thus, as a result, the cultural history of mathematics can have different forms and develop in accordance with the development of the wearer community. Ethno-mathematics uses widespread mathematical concepts related to various mathematical activities, including grouping activities, arithmetic, measuring, designing buildings or tools, playing, locating, and so on.

Process of mathematics done today tend to be too theoretical, lacking in context. Lesson learned is less varied, thus affecting students' interest to learn the

mathematics found by children in everyday life is very different from what they find in school. Therefore, mathematics learning is very necessary to provide a charge / bridge between math and the everyday world based on local culture with school mathematics. In schools that predominantly consist of ethnic groups of people, often did not teach mathematics using Indonesian language as well as in some areas where the instruction also used the local language.

In essence, mathematics is a symbolic technology that grows on cultural skills or activities that are cultural. Thus, a person's math is influenced by his cultural setting, because they do so based on what they see and feel. Bishop (1991), culture will affect the behavior of individuals and have a big role in the development of individual understanding, including learning mathematics. Mathematics education has actually blended with the life of the community itself.

## II. RESEARCH METHODS

This research is an exploratory study. This research is an ethnographic approach that is an empirical and theoretical approach aimed to get a description and in-depth analysis of culture based on field research is intensive. This approach focuses efforts to discover how people organize their culture in their minds and then use that culture in life, the culture exists in the human mind. The research method was by doing interview through valid questionnaire

The subject of this study is the rumah gadang on how to shape and carving the name of the rumah gadang located in the southern area of Solok (West Sumatra). Research subjects were taken about 20-25 rumah gadang which located in south Solok area. Research instruments in the form of questionnaires given to traditional leaders namely *ninik mamak* (uncles), *cadiak pandai* (geniuses), *alim ulama* (preachers), *bundo kanduang* (mothers) who understand about the ins and outs of carvings in rumah gadang.

In this study, researchers collected data by conducting interviews (questionnaire), observation, and documentation on the shapes and the name of carvings in rumah gadang. The data analyzed in this study based on observation, interviews, questionnaires, and documentation contained an element of mathematics in the cultures Minangkabau. Taxonomy analysis focuses on a particular domain that is very useful to describe the phenomenon or problem that the target of research. Taxonomic analysis done to create categories of cultural symbols that exist in the culture studied.

### III.RESULTS AND DISCUSSION

Minangkabau society has long been developing a cultural art form of carvings, clothing, and jewelry. Rumah Gadang is a traditional house of Minangkabau that cannot be separated from the carvings contained in rumah gadang. Carving is a characteristic or philosophy of life of minang people in everyday life. Over time, the motifs of rumah gadang rarely seen because of the expenses of raw materials for making carving in rumah gadang is in high prices or expensive.

Carving in rumah gadang usually circular or square-shaped outline, with motifs such as vines, the roots of leafy, flowering and fruiting. Engraving the house carved by location because based on the different locations of philosophy and its meaning. Based on the location of the carvings of the existing rumah gadang in South Solok Regency can be identified as follows:

**Table I: Identification of Gadang Home / Motif**

No	Sub-district	Rumah Gadang	Motif / Carving	Motif Location
1	Nagari	RG 1	Unavailable	-
2	Sitapui Kec. Sangir Batang hari	RG 2	Available	Below gonjong, outside walls, windows inside and outside
3		RG 3	Unavailable	-
4		RG 4	Available	Under the gonjong, the upper room wall
5		RG 5	Unavailable	-
6		Nagari Abai	RG 6	Unavailable
7	Kec. Sangir Batang Hari	RG 7	Unavailable	-
8		RG 8	Unavailable	-
9	Nagari Ranah Pantai	RG 9	Unavailable	-
10		RG 10	Unavailable	-
11	Cermin Kec. Sangir Batang hari	RG 11	Unavailable	-
12		RG 12	Available	Under Gonjong
13		RG 13	Available	Below the gonjong and the outer front wall
14	Nagari Lubuak Gadang Kec.Sangir	RG 14	Unavailable	-
15		RG 15	Available	The outer wall, under the gonjong, the outer and inner window
16		RG 16	Available	The outer wall, under the gonjong, the outer window
17		RG 17	Unavailable	-
18	Nagari Luak Kapau	RG 18	Available	The outer wall, under the gonjong, the outer window
19	Kec.Pauh	RG 19	Available	The outside wall

20	duo	RG 20	Available	The lower wall, lisplang, above the door of the room
21	Nagari Koto	RG 21	Available	The outer and inner wall, lisplang
22	Baru Kec.Sungai	RG 22	Available	The outer wall, under the gonjong, the outer and inner window
23	Pagu	RG 23	Unavailable	-
24		RG 24	Available	The outer wall, under the gonjong, the outer and inner window
25	Nagari Pasir	RG 25	Available	The outside wall
26	Talang	RG 26	Available	The outside wall
27	Kec.Sungai Pagu	RG 27	Available	The outside wall

Based on the above table, there was one sub-district in Batang Hari, Nagari Abai that has no carving due to their rumah gadang has been replaced to wall, there are 44.44%. of rumah gadang in South Solok regency that has no carvings.

Based on the identification of the location of the carving can be identified form of motif carving in rumah gadang, table 2 below is a form of motif carving of rumah gadang that can be seen in the table below:

**Table 2: Shape Motif Carving In House Gadang**

No	Sub-district	RG	Motif Name	
1	Nagari Sitapui	RG 2	Itik Pulang Patang	
2	Kec.Sangir Batang hari		Tirai	
3			Limpapeh	
4			Aka Cino Sagang	
5			Lapiah Duo	
6			Sitampuak Manggih	
7			Buah Palo	
8			Sajamba Makan	
9			RG 4	Sajamba Makan
10				Ombak-ombak
11	Nagari Ranah Pantai	RG 12	Wajik/ Saik Galamai	
12	Cermin Kec. Sangir	RG 13	Lapiah Duo	
13	Batang hari		Aka Barayun	
14			Saik Galamai	

15			Sitampuak Manggih
16	Nagari Lubuak Gadang Kec. Sangir	RG 15	Sitampuak manggih
17			Saik Galamai
18			Aka Cino Sagagang
19			Sajamba Makan
20			Tirai
21			Lapiah Ampek
22			Kaluak Paku Marunduak
23			RG 16
24		Aka Cino Sagagang	
25		Itiak Pulang Patang	
26		Saik Galamai	
27		Kaluak Paku Marunduak	
28		Sikambang Manih	
29		Rajo Tigo Seloh	
30	Aka Barayun		
31	Aka Tangah Duo Gagang		
32	Nagari Luak Kapau Kec. Pauh duo	RG 18	Tirai
33			Saik Galamai
34			Sitampuak Manggih
35			Sajamba Makan
36			Aka Cino Sagagang
37			Daun Bodi
38			Saluak Laka Jo Saik Kalamai
39			Kuciang Tidua Jo Saik Kalamai
40			Aka Cino Duo Gagang
41			Saik Galamai Jo Sajamba Makan
42			RG 19
43		Pucuak Rabuang	
44		Saik Galamai	
45		Daun Bodi	
46		Aka Cino Babungo	







47			Buah Jaguang
48		RG 20	Sajamba Makan
49			Saik Galamai
50			Aka Barayun
51			Aka Cino Sagagang
52	Nagari Koto Baru	RG 21	Aka Cino Sagagang
53	Kec. Sungai Pagu		Tirai Bungo Lado
54			Saik Galamai
55			Mahkota
56			Sikumbang Manih
57			Kapalo Tombak
58			Itiak Pulang Patang
59			Kaluak Paku Marunduak
60			Sitampuak Manggih
61			Sajamba Makan
62			Tirai
63		RG 22	Itiak Pulang Patang
64			Sitampuak Manggih
65			Saik Galamai
66			Kaluak Paku Marunduak
67			Lapiah Ampek
68			Aka Cino Sagagang
69			Sikambang Manih
70			Kapalo Tombak
71		RG 24	Itik Pulang Patang
72			Sitampuak Manggih
73			Aka Cino Sagagang
74			Sajamba Makan
75			Lapiah Duo
76			Kaluak Paku Marunduak
77			Lapiah Ampek
78			Aka Barayun








79			Pitih-pitih
80			Rajo Tigo Selo
81	Nagari Pasir Talang Kec. Sungai Pagu	RG 25	Pitih-pitih
82			Tirai
83			Saluak Laka
84			Lapiah Ampek
85			Limpapeh
86			Aka Cino Sagagang
87			Sajamba akan
88			Aka Barayun
89			Itiak Pulang Patang
90			Kaluak Paku Marunduak
91			Aka Tangah duo Gagang Jo Bungo Panca atahari
92			Saik Galamai Carano Kanso
93			Buah Palo
94		RG 26	Pucuak Rabuang
95			Daun Sakek
96			Itiak Pulang Patang
97			Tirai
98		RG 27	Buah Palo
99			Saik Galamai Jo Sitampuak Manggih
100			Pitih-pitih
101		Daun Bodi	








Based on the above table obtained 34 motifs, one of the most important in the carving of rumah gadang in Minangkabau is the name of the carvings. Name of carving can be seen from carving relation with people life. Each carving name symbolizes a symptom of life in Minangkabau society. The following can be seen in the table below about the motives, carvings and links with mathematical sciences.










**Table 3: Motives and Picture Engraving and Its Relation With Mathematics**

No	Motifs	Picture	Linkage With Mathematical Sciences
1	Itik Pulang Patang (7 pieces)		a plot
2	Sitampuak Manggih (8 Pieces)		Symmetrical, bounded by square plane
3	Aka Cino Sagagang (9 Pieces)		Oddly twisted, curved lines
4	Sajamba Makan (8 Pieces)		Symmetrical, bounded by square plane
5	Lapiah Duo (3 Pieces)		Oddly coupled, curved lines, bounded by a rectangular, symmetrical plane
6	Kaluak Paku Marunduak (6 Pieces)		Even symmetrical flower petals, curved lines

7	Lapiah Ampek (4 Pieces)		The symmetrical winding, the curved line, is bounded by a rectangular plane
8	Aka Barayun (5 Pieces)		Curved line
9	Pitih-pitih (3 Pieces)		Circular, Symmetrical
10	Rajo Tigo Selo (2 Pieces)		A circle of interconnected, symmetrical
11	Tirai (6 Pieces)		Shaped Circle Contains Odd, Symmetrical Petals
12	Limpapeh (2 Pieces)		Symmetrical, curved lines
13	Buah Palo (3 pieces)		Half circle to oval, Symmetrical

14	Ombak – ombak (1 Piece)		Semicircles are recurrent
15	Saik Galamai (9 Pieces)		Rhombus-shaped, symmetrical
16	Sikambang Manih (3 Pieces)		Symmetrical, curved lines, bounded by a rectangular plane
17	Aka Tangah Duo Gangang (1 Piece)		Oddly coupled, curved lines, bounded by rectangles
18	Daun Bodi (3 Pieces)		Symmetrical
19	Saluak Laka Jo Saik Kalamai (1 Pieces)		Symmetrical, curved lines, bounded by a rectangular plane
20	Kuciang Tidua Jo Saik Kalamai		Symmetrical, curved lines, rhombus and bounded by a rectangular plane

	(1 Pieces)		
21	Aka Cino Duo Ganggang (1 Piece)		Curved lines, oddly wavy
22	Saik Galamai Jo Sajamba Makan (1 Pieces)		Symmetrical, curved lines, rhombus and bounded by a rectangular plane
23	Buah Palo Jo Sitampuak Manggih (1 Piece)		Symmetrical and semicircle
24	Pucuak Rabuang (2 Pieces)		Symmetrical, triangle
25	Aka Cino Babungo (1 Piece)		Symmetrical, curved lines, bounded by a rectangular plane
26	Buah Jaguang (1 Piece)		Symmetrical, curved lines
27	Tirai Bungo Lado (1 Piece)		Semicircular, symmetrical



28	Crown (1 Piece)		Curved line
29	Kapalo Tombak (2 Pieces)		Semetris
30	Saluak Laka (1 Fruit)		Symmetrical, curved lines, bounded by a rectangular plane
31	Aka Tengah duo Ganggang Jo Bungo Panca Matohari (1 Piece)		Symmetrical, circular, curved lines
32	Saik Galamai Carano Kanso (1 Piece)		Symmetrical, rhombus
33	Daun Sakek (1 Piece)		Symmetrical

34	Saik Galamai Jo Sitampuak Manggih (1 Piece)		Symmetrical, rhombus
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Based on the above table can be seen motif carving rumah gadang most of them are symmetry of 76.47%.

#### IV. CONCLUSION

Based on the analysis above, it can be concluded that the carvings / motifs of rumah gadang are as follows:

- a) There is one sub-district of South Solok in Nagari Abai, sub-district of Batang Hari, that their rumah gadang has no carvings because the walls of rumah gadang has been replaced into concrete wall. There are 44.44% of rumah gadang in South Solok without carvings.
- b) There are 34 motifs of carvings.
- c) 76.47% of motif carvings in rumah gadang South Solok are symmetric.

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