

ETHNOMATHEMATICS EXPLORATION IN THE CULTURE SYSTEM OF MALAY CULTURE IN NAGA MAHAP VILLAGE

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Abstract

Ethnomathematics is the study of mathematics' distinctive characteristics or colors as they exist and develop in society. Ethnomathematics is the study of mathematics as it appears or is utilized in cultural community groups such as urban and rural communities, children of a specific age, labor groups and indigenous peoples. For the vast majority of Indonesians, cultivation is a way of life, particularly the residents of Nanga Mahap Village. Mathematical words are employed in farming activities, ranging from units to fundamental mathematical concepts. Cultivation systems have been practiced in grasslands and forests around the world. Cultivation is a shifting cultivation system from one plot of land to another, usually cleared by cutting down and burning part of the forest to make fields. The goal of this study was to investigate the mathematical principles inherent in the Malay culture's farming system in Nanga Mahap Village. This is a qualitative study with an ethnographic approach. This is a qualitative research that makes use of an ethnographic approach.. The study took place in Nanga Mahap Village, Sekadau Regency's Nanga Mahap District. The subjects of this research are informants, namely field farmers with Malay culture in Nanga Mahap Village. Data were gathered from a variety of sources including observation, interviewing, and documentation procedures. The results indicated that the farming system incorporated a mathematical element through the requirements for seeds, yields, and tools, namely the concept of comparison, the concept of counting mathematical words, tessellation (tiling), geometry, and congruence.

Keywords: Cultivation System , Ethnomathematics, Exploration , Malay Culture

INTRODUCTION

Nanga Mahap consists of two (two) syllables: "Nanga" and "Mahap". Nanga, which means "Estuary" or "Kuala," and Mahap, which comes from the name of the river that flows east of Nanga Mahap Village and forms a barrier between the areas of Dusun Soket and Dusun Tanjung and Dusun Engkayak, and that of the Dayak Mahap (the Dayak tribe). native to the Mahap River), pronounced 'maap,' which means "sorry." Nanga Mahap village is inhabited by members of the Dayak Mahap tribe who have converted to Islam. Islam was introduced to the area during the Dutch colonial period in the 1930s by relatives of King Kewedanan Sekadau and Bugis nomads.

In Nanga Mahap Village there are differences in nicknames between Dayak culture and Malay culture, people with Dayak culture are called land people or upper land people, while people with Malay culture are called water people or underground people. According to the agrarian condition in Nanga Mahap Village, the economic structure of the population is dominated by the agricultural and/or livestock sector. Individual behavior will be influenced by Malay culture, which will play an important role in the development of individual knowledge, including mathematics (Hardiarti, 2017). Ethnomathematics is a part that can serve as a bridge between

existing instruction in mathematics and culture (Wahyuni, et al, 2013). Sudirman, Rosyadi, and Lestari (2017) show how mathematical principles can be linked to real-world scenarios.

D'Ambrosio (1985:44-48) defines ethnomathematics as the application of mathematics used by a group in a culture that is classified as a whole society, ethnicity, professional class, laborers, and children of certain age groups, and others. (Aini et al., 2018; Rohmaini et al., 2020). Ethnomathematics is a point that brings together mathematics, mathematical modeling, and culture which has a function in the process of understanding and connecting mathematical ideas in various activities found in society to be studied academically (Gerdes, 1996:912-913). Ethnomathematics can also be defined as a research design related to the history and philosophy of mathematics, with clear implications for teaching (D'Ambrosio, 2006:17).

Dove (in Arkanudin, 2010:59), estimates that in Indonesia nearly four million families or 20 million people are involved in the cultivation system with a total land area of around 85 million hectares. In the interior of West Kalimantan, most of the Dayaks and Malays practice shifting cultivation as the only "rational" answer to efforts to maintain life on infertile land (Alqadrie, 1995:6).

In the farming system in Nanga Village, especially in Malay culture, there are 6 processes . The first and second processes carried out in early June to mid-July are *Clearing* and *cutting* , the *third* from the end of July to the end of August is the root of the land which aims to make the soil more fertile with burnt land, carried out in mutual cooperation. Fourth, in September what the community does is *n ugal* (planting rice), fifth when the rice is 2-3 months old, the new thing is called *n guru uma* (*cleaning the grass* /pulling grass). Sixth, at the beginning of February to the end of March *n gotam* / *n getam* (rice harvest) using a tool called a *singer made* of canned sardines and the size of about 10 cm is shaped into a round so that it can be inserted into the thumb or finger . thumbs up. There is a first process before harvesting rice, which is a *new rice crop* (breaking one stalk in the first morning) after breaking the rice on the first day it stops immediately , and will continue harvesting rice on the 3rd day after the procession of *new rice grains* .

After the rice harvest, an activity called *n yemaru* (eating new rice) is carried out called *s lamatan* or *r uahan n yemaru*. The place for storing rice after it is harvested is called *jurong* . The land used by the community is their own land. Field size measured using a lot of rice called *k ulak* (10 cans of milk / 10 *canting*), rice has several types including, Raja rice, Javanese rice and Perosuk rice . For the cultivation of Pulut Rice (Padi Ketan) in Malay culture has *Mali'k* (abstinence) the first is that rice other than glutinous rice will *result in crop* failure (harvest failure), the second is that people who plant glutinous rice will eat *cheers* _ (sick). Based on the above explanation regarding the relationship between mathematics and Malay culture, this study aims to explore ethnomathematics in the farming system in Nanga Mahap Village.

METHODS

Spradley argues that ethnography is a methodological and empirical technique that tries to provide a detailed description and analysis of culture through extensive fieldwork (Rakhmawati (2016: 225). The ethnographic approach is a type of approach in this research. Ethnography is a method by combining researchers in associations or events. community, in which observers generally participate as part of field studies (Moleong, 2017).The research was conducted in Nanga Mahap Village, Nanga Mahap District, Sekadau Regency, on February 7, 2022. The

subjects of this research are informants, namely field farmers who adhere to Malay culture. in Nanga Mahap Village. Data were collected by observation, interview, documentation, and literature review methods. Observations were used to document farmer activities during the rice growing season. Documentation is a way to improve research effectiveness. With documentation, research findings may be more appropriately stored in and served. Literature review was conducted to confirm mathematical ideas related to rice planting and harvesting activities.

RESULTS AND DISCUSSION

Documentation, the research findings are discussed. This topic includes a summary of the mathematical components of the Nanga Mahap Village trading system. This stage combines ethnomathematical features, namely:

1. Calculation of seed requirements

The amount of plantation land that will be planted by farmers can determine the need for the type of rice. From the research, the results obtained for seed purposes are with an area of 2500 m^2 , a lot of 10 kg of seeds which is equivalent to 4 *kulaks*, a spacing of $20 \text{ cm} \times 20 \text{ cm}$, a reference for seeds per 2500 m^2 . For an area of 5000 m^2 , *kulak* seeds. From these data, it can be written as follows:

Table 1. Results of interviews and reviews of Seed Quantity Needs

No	Responden	Luas Lahan	Banyak bibit (kg)	Waktu Pembibitan	Jarak Tanam (cm)	Acuan bibit per 2500 m^2
1	A1	2500	10	20	20×20	10
2	A2	25000	100	21	20×20	10
3	A3	3000	15	23	20×20	15
4	A4	5000	20	20	20×20	10
Rata-rata Kebutuhan Bibit						11,25

According to the findings of interviews with respondents, it is necessary to first determine the area of rice fields to calculate the number of rice seeds needed. The four respondents calculated the minimum rice seed requirements for an area of $2,500 \text{ m}^2$ by referring to the minimum rice seed requirements for an area of $2,500 \text{ m}^2$. This is acquired through inherited farming experience. The average number of seeds needed by the respondents for each area of $2,500 \text{ m}^2$ is 11.25 kg. According to agricultural theory, $10,000 \text{ m}^2$ of land is required to grow rice seedlings weighing up to 30-40 kg. If the number of rice seeds needed in an area of $10,000 \text{ m}^2$ is 40 kg, then the number of rice seeds in an area of 2500 m^2 is 10 kg. According to the answer, the average number of seeds required for an area of 2500 m^2 is 1 kg less than the number of seeds determined using mathematical calculations.

The concept of numbers is a simple mathematical idea where the concept is in the form of counting, numbering, and sorting as the beginning of learning (Anggraeni and Mas'udah, 2020: 3). The creation of the concept of numeracy in relation to such a description of society is actually inconsistent with the proper designation. However, as a result of an established tradition, it has become widespread in the Nanga Mahap Village community (Supriatna et al., 2021).

2. Cultivation system procedures in Nanga Mahap . Village

The procedure for the farming system in Nanga Mahap Village generally follows the following stages of activity:

- a. Land determination
- b. *Nebas* and felling (land clearing)
- c. Burn the land
- d. *Nugal* (rice cultivation)
- e. *Nguru uma* (cleaning grass/pulling grass)
- f. *Ngotam* or *ngetam* (rice harvest)
- g. *New rice buds* (break the first rice stalk)
- h. *Nyemaru* (eating new rice)

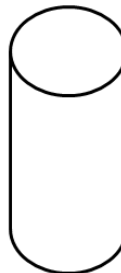
Matinahoru's research (2006) shows that trade shifts have a greater impact on forest ecological damage than forest exploitation by entrepreneurs. Shifting cultivation and forest fires have a positive correlation, because the farming season is generally in the dry season. Various media reports and research show that every dry season fires occur everywhere in Indonesia's forests, this is because they are triggered by cultivation activities by cultivators (Matinahoru, 2018) .

The Malay culture in Nanga Mahap village generally takes 15-20 years to return to the initial location during cultivation. Through interviews, it can be revealed that the location used for farming can be used for 1-3 years.

3. Tools used in the farming system

a. Singer Usage

At the beginning of February to the end of March the process *n gotam / n getam* (rice harvest) is carried out, usually the farmers always use a tool called a *singer* made of sardine cans cut and the size for a length of about 10 cm is shaped into a round so that it can be inserted into the thumb or finger the thumb , for the diameter is 2 cm or adjusted to the size of the farmer's thumb .



b. Use of Capan

Capan is made of rattan and the webbing is rectangular, the woven *capan* which crosses each other contains the concept of tiling/teselation. According to Apiati, et al. (2019: 113) A tessellation is a unique pattern consisting of geometric constructions arranged without separators or spacing to completely cover a flat plane. In the *stamp* there is a mathematical element in the form of a geometric element where the *stamp* has a rectangular shape and a trapezoidal shape at the top.

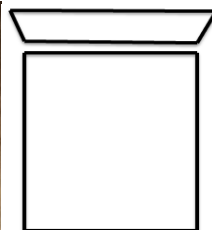


Figure 2. Capan

c. Use of Jurong

Jurong is a building that resembles a house, but is small. The top of the *jurong* is made using sago tree leaves and the walls and floors are made of wood or boards. *Jurong* also has mathematical elements, namely isosceles triangles and trapezoids.

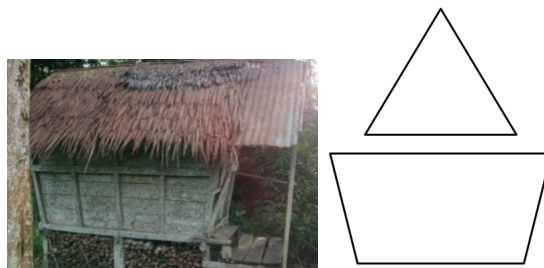


Figure 3. Jurong

Based on the description of the image above, the following are the mathematical elements in the tools used in the farming system in Nanga Mahap Village. Learning to build space seeks to equip students with the ability to recognize and apply the principles of building space for solving everyday problems. According to Muhsetyo et al. (2009: 5.10), building space is defined as part of the room determined from the set of points that exist on the complete base of the building. Such surfaces on a spacecraft are referred to as sides. According to Karim et al. (2008: 2.12), spatial structure is a shape that is determined by the flat and curved sides. Build a room with flat sides using cubes, blocks, prisms, and pyramids. While the space on the curved side is made entirely of tubes, spheres, and cones. In this study, construct flat spaces and structures using tubes, trapezoids, triangles, and rectangular or square shapes.

CONCLUSION

The results of this study indicate that ethnomathematics in the cultivation system of Malay Culture in Nanga Mahap Village there is a mathematical concept in calculating the need for seeds according to land area, the use of this farming tool is in the term of counting concepts, comparisons, building flat sides, building sides of space, tesseleri (tiling).), geometry and also congruence. In the results of observations and interviews regarding the need for the number of seeds in Nanga Mahap Village, the thing that needs to be known in calculating the total need for rice seeds is the area of rice fields first, from the interviews, the four respondents used an area of 2,500 m² which was used for seed needs rice as a benchmark in calculating the minimum requirement for rice seeds. This is obtained from the knowledge passed down from the past during farming. As for each land area of 2,500 m² the average respondent needs is 11.25 kg of seeds. The tools used in the farming system, there are three objects that I can examine and have a mathematical element in it. The first is a *singer* which functions as a tool for cutting rice stalks when harvesting rice, which is made from used cans with a round shape resembling a tube shape, for the size of the *singer* can be adjusted to the size of the farmer's thumb or thumb. The second tool is a *capan* made of rattan and woven across each other and contains the concept of tiling or tessellation. *Capan* is also square or rectangular and at the top is a trapezoid. For this third tool is a building called a *jurong* , which functions as a rice storage area. *Jurong* is triangular in shape at the top or the roof is made of sago leaves, while the bottom is a trapezoid made of boards or wood.

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