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# ETHNOMATHEMATICS IN CREATING JONG BOAT: TRADITIONAL GAME FROM TELUK BINTAN

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***Abstract***

The environment can be used as a learning resource in the mathematics learning process related to real life. One source of learning mathematics can be obtained from local culture. Ethnomathematics is a science that connects culture with mathematical concepts. This research examines the mathematical concepts in making Jong boats in Bintan Bay. Jong Boat is one of the traditional games played by the people of the Riau Islands province, which has a mathematical aspect in the manufacturing process. The ethnomathematics analyzed are several mathematical concepts related to mathematics that students learn at school. This research aims to explain several mathematical concepts as an activity, namely, in making a Jong Boat. This research is included in qualitative descriptive research with an ethnographic approach, and data was obtained through interviews, observation, and documentation. Data analysis techniques are guided by the Miles and Huberman model: data reduction, data presentation, and conclusion. The results of this research show that the traditional Jong boat game has ethnomathematics, which are related to several concepts in mathematics, including the concept of flat-sided shapes, geometry, angles, comparisons, numbers, measurements with non-standard units, and measurements using hypothetical assumptions. Several mathematical concepts can be used to demonstrate and understand the mathematical concepts contained in them through local culture.

**Keywords:** Ethnomatematics; Joang Boats; Culture; Mathematics; Traditional Games

**Abstrak**

Lingkungan bisa dijadikan sebagai suatu sumber belajar pada proses belajar matematika yang berhubungan dengan kehidupan nyata. Salah satu sumber belajar matematika bisa diperoleh dari budaya setempat. Etnomatematika merupakan ilmu yang menghubungkan budaya dengan konsep matematika. Penelitian ini menelaah konsep matematika pada proses pembuatan perahu Jong di Teluk Bintan. Perahu Jong merupakan salah satu permainan tradisional masyarakat provinsi Kepulauan Riau yang memiliki aspek matematika pada proses pembuatannya, etnomatematika yang dianalisis yaitu sejumlah konsep matematika yang berkaitan dengan matematika yang peserta didik pelajari di bangku sekolah. Tujuan dari penelitian ini yaitu untuk memaparkan sejumlah konsep matematika selaku suatu aktivitas, yaitu dalam proses pembuatan Perahu Jong. Penelitian ini termasuk ke dalam penelitian deskriptif kualitatif dengan pendekatan etnografi, data didapatkan melalui proses wawancara, observasi, dan dokumentasi. Teknik analisis data berpedoman pada model Miles dan Huberman yaitu reduksi data, penyajian data, dan proses menarik kesimpulan. Hasil penelitian ini yaitu memperlihatkan jika permainan tradisional perahu Jong mempunyai etnomatematika yang berhubungan dengan sejumlah konsep pada matematika antara lain konsep bangun ruang sisi datar, geometri, sudut, perbandingan, bilangan, pengukuran dengan satuan non-standar, dan pengukuran menggunakan hipotesis mengandaikan. Sejumlah konsep matematika tersebut bisa digunakan untuk memperlihatkan dan melakukan pemahaman terhadap konsep matematika yang ada di dalamnya melalui budaya lokal.

**Kata kunci:** Etnomatematika, Perahu Jong, Budaya, Matematika, Permainan Tradisional

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Nowadays, culture has been slowly forgotten, especially by the next generation of students (Agustin & Soebagyo, 2024). This is certainly a concern for all parties, considering the importance of culture as a

milestone of civilization that must always be preserved. Culture is the result of human creation and will. People form a culture, improve it, and pass it down to their children and grandchildren. This also includes a series of provisions, ideas, thoughts and values related to the life system, which includes religion, rules, economics, language, work, social groups and customs (Febrian & Astuti, 2022). Culture is diverse all over the world. This indicates that people's systems of behaving from that cultural point of view differ from one level to another. Therefore, this also indicates that the activities in the daily life of a community will also differ from one person to another. Thus, culture becomes a factor that characterizes a society and must not be lost slowly.

On the other hand, it is believed that every person, group of people, and society worldwide faces difficulties and challenges. This moment is when people try to face and solve problems with their thinking and strategies. Mathematics is believed to grow and develop by people from any culture when difficult situations or challenging conditions enter their lives. Undeniably, people who grow mathematics means people who grow knowledge. Because knowledge, as defined by Tyler, is part of society's culture, it can be concluded that mathematics becomes part of culture and society.

Mathematics is found in school and when humans carry out daily activities. In everyday life, many people are still unaware that they have used mathematical knowledge in their activities (Muzni & Rafianti, 2024). Without realizing it, we have become too close to mathematical knowledge, including giving patterns, measuring, calculating, and other activities (Mahuda & Isnaini, 2020).

Humans are social creatures whose lives require other people. When humans interact to meet their needs, many problems arise, so solutions are needed. As a communication tool, mathematics was used to solve human problems at that time. Society uses the concept of mathematics in the context of trade, business, carpentry, time management, and so on. This shows how crucial mathematics is in social life, even though it has developed occasionally. Studying the history of mathematics development from ancient times to the present has implications for mathematics learning in schools. The current education system has introduced mathematics from kindergarten to college. Kindergarten students are taught simple calculation concepts, such as recognizing number symbols and how to pronounce them. At the elementary school level, students are introduced to the concept of number operations, arithmetic, algebra, etc. The higher the level of education, the more complex the mathematical concepts taught. The intellectual journey of scientists in formulating their findings makes us aware that intellectual activities must be preserved throughout time as a cultural heritage in developing mathematics (Siregar & Dewi, 2022).

Mathematics is one of the subjects seen as independent based on values and culture. As a result, there is a perspective that mathematics education does not have to investigate more developed differences in the student population (Wahyuni, 2021). However, Mathematics is not considered culturally neutral because learning, calculating, remembering, and communicating mathematical

concepts vary significantly across cultures (Azmi, 2024). In reality, daily activities can explicitly or implicitly contain mathematical activities in every aspect of culture. As a result, daily activities can be a source of informal mathematical content that develops in the community. These activities include calculating, positioning, organizing, explaining, measuring, playing, and designing. Mathematical activities carried out by some people, such as the general public, are known as ethnomathematics. The grouping of these activities is called the ethnomathematics domain.

Mathematics is a group of symbols and numbers that require understanding and concentration in all of its thoughts (Sekarsari & Azka, 2024). Mathematics taught in schools is known as academic mathematics, while ethnomathematics is mathematics applied to cultural groups identified as ethnic communities, labour groups, children of a certain age group, professional classes, and others (Sunandar, 2016). The term ethnomathematics comes from the word ethnomathematics, introduced by D'Ambrosio, a Brazilian mathematician, in 1977 (Andriyani & Kuntarto, 2017). Formed from the words ethno, mathema, and tics. The prefix ethno refers to a recognizable cultural group, such as an ethnic group in a country and professional classes in society, including their language and daily habits. Then, mathema here means explaining, understanding, and managing real things, specifically by calculating, measuring, classifying, sequencing, and modelling a pattern that appears in an environment. The suffix tics means art in engineering. Ethnomathematics is mathematics practised among identified cultural groups such as national, tribal, labour groups, children of certain age groups and professional classes.

Some cultures contain aspects of mathematics known as ethnomathematics. The evolution and history of ethnomathematics in Indonesia are increasing rapidly because there has been much research related to it. The scope of ethnomathematics studies includes 1) the subjects of ethnomathematics studies, namely all cultural organizations; 2) the objects studied in ethnomathematics, namely activities in everyday life and objects made by people; and 3) the focus of ethnomathematics studies, namely providing easy patterns. in mathematical reasoning in cultural activities. (Wahyuni & Pertiwi, 2017). In addition, in the context of mathematics education, ethnomathematics can also be considered as a program that aims to learn how students can understand, articulate, process, and ultimately utilize various mathematical ideas, concepts, and several practices that can solve problems related to their daily activities (Fajriyah, 2018). According to Pratiwi & Heni, 2020, ethnomathematics can be interpreted as ethno, which means ethnic/culture, and mathematics, a cultural anthropology related to mathematical concepts. The purpose of ethnomathematics is to be able to introduce if there are several ways to do mathematical activities through the development of mathematical knowledge developed by the culture of the community in the environment (Nova & Putra, 2022). Ethnomathematics grows and develops from a culture that uses several mathematical concepts in a broad way, namely related to mathematical activities (Wildan et al., 2024).

Indonesia is a Unitary State of the Republic of Indonesia, enriched by the existence of 1,340 ethnic groups (Aflah & Andhany, 2022) and it has hundreds of regional languages, traditional houses,

and various uniqueness of each culture. Indonesia is an archipelago from Sabang to Marauke consisting of many provinces with abundant diversity, one of which is culture (Sarmila & Yuhana, 2023). Indonesia is popular as a country with cultural, ethnic and linguistic diversity. Indonesia also has a diversity of traditional games, which contain mathematical aspects, one of which is traditional games. Traditional games are inherited from ancestors and must be protected and developed because traditional games contain several local cultural wisdom values (Mulyani, 2016). All groups like traditional games, but as time passes, traditional games are rarely popular with the public.

The aspects of knowledge contained in several traditional games will provide opportunities for children to understand several knowledge concepts with real actions that they carry out. There is a relationship between traditional games and mathematics; several traditional games can be seen as a means that can assist children in learning several basic mathematical concepts such as various sounds, several codes or symbols, and several concepts related to numbers, simple calculation operations that they carry out during the game. Several previous studies have explained several mathematical elements contained in traditional games. One of them is a study by Harahap & Jaelani, 2022 which aims to reveal ethnomathematics in the hopscotch game, which contains the concept of flat shapes, numbers, mathematical logic, and opportunities. Research conducted by Susanti (2020) aims to reveal the ethnomathematics of the traditional Kempreng game, which contains the concepts of addition, multiplication, subtraction and division. Research conducted in the game Endog-endogan and Engklek (Supriadi & Arisetyawan, 2019) aims to reveal the ethnomathematics which contains the concept of fractions. Furthermore, there is research conducted by Irmayanti & Danial (2019) which aims to reveal the ethnomathematics in the games Ma'belle, Ma'ggurecceng and Ma'cciccu, namely flat shapes, number recognition, space shapes, and multiplication of integers. Moreover, Rohmatin (2020) research aims to reveal the ethnomathematics of the traditional game Congklak, which contains mathematical elements in whole numbers.

Indonesia has the largest archipelago in the world, consisting of more than 17,000 islands and a length of 1,904,569 km2, stretching between the Asian and Australian continents (Syarmadi & Izzati, 2020). The thousands of islands that Indonesia has made Indonesia known as a maritime country. The Riau Islands is one of Indonesia's provinces, with the most islands. Almost all areas in the Riau Islands province have borders with neighbouring countries. This is the Riau Islands, one of the regions in Indonesia with a population that works as fishermen. When nature is not in good condition, such as when there are strong winds and waves, certain residents who work as fishermen carry out positive activities by playing the Jong boat. The purpose of the Jong Boat game is to relieve fatigue and as a gathering place for residents who come from the Malay tribe.

The Jong Boat is a unique game that is a historical relic of Malay culture. It involves small, colourful boats that do not have a crew. The game is played during the northern season, when the sea water is at high tide and the wind is strong. Coastal residents take advantage of their free time to play

Jong boat. The game has unique rules and gameplay, which can be introduced to local, national, or international residents. Therefore, the Bintan district government provides support for maintaining sustainability and introducing the Jong boat game with the Jong boat festival every year.

Activities in the process of making a Jong boat cannot be separated from mathematical concepts. One of the previous studies regarding ethnomathematics on Jong boat is research conducted by (Syarmadi & Izzati, 2020) which aims to explore ethnomathematics on the shape of Jong sailboats, which contain elements of geometric shapes, triangles, rectangles, and mathematical concepts on translation methods, angles. Acute, right angle, trigonometry, straight line, and slope. One area that still frequently holds Jong boat races is Keter village in the Tembeling sub-district, Teluk Bintan sub-district, Bintan regency.

Based on the background and a number of previous studies, traditional games, one of which is the Jong boat game, stand out with their unique mathematical elements, especially in the manufacturing process. Therefore, this research aims to describe a number of activities and mathematical concepts contained in the process of making a Jong boat in the Tembeling sub-district, Teluk Bintan sub-district, Bintan district, thereby adding to the unique body of knowledge about this traditional game.

## METHODS

The type of study used is qualitative research using an ethnographic approach. Qualitative research is a systematic and subjective approach used to explain life experiences and give meaning to them. This research was conducted using an ethnographic research design. Ethnography is the work of describing a culture. Its main purpose is to understand a view of life from the perspective of the indigenous people. (Sukadari et al., 2015). Along with this, this research describes several mathematical elements contained in the traditional Jong boat game in Bintan Bay, which causes this research to focus on the traditional games of the people of the Riau Islands, especially in Bintan Bay, in terms of the manufacturing process.

The techniques used to collect data are observation sheets, interviews and documentation. Therefore, interview guide instruments and observation sheets are needed, which must be made by the research team, and validation must be obtained from the course lecturer, who is an expert in the field of study. The questions in the interview guide consist of 4 indicators, which were developed into 13 questions. Before conducting research in the field, the researcher validated the lecturer using a validation sheet that the researcher provided. After validating the research instrument, the instrument is used when the researcher goes into the field. Likewise, the observation sheet consists of 4 indicators developed into 12 statements. Before conducting research in the field, the researcher validated the lecturer using a validation sheet that the researcher provided. After validating the research instrument, the instrument is used when the researcher goes into the field.

The object of this research is the Jong boat, which is seen in the manufacturing process. The source for interviews to obtain information about the Jong boat manufacturing process is a Jong boat craftsman in Bintan Bay named Mr. Syaiful. The research was carried out in Keter village, Tembeling sub-district, Teluk Bintan sub-district, Bintan district, Riau Islands province, on Sunday, November 26 2023.

The researchers immediately embarked on fieldwork with the specific goal of collecting data. This data was then analyzed using the Miles and Huberman process, which is involved in ethnographical analysis steps such as domain analysis, taxonomy, components, and cultural themes. The following is a design or ethno-mathematical ethnographic framework for the Jong boat-making process.

Tabel 1. Ethnographical Framework of Constructing *Jong* Boat

| *Guiding Questions* | *Initial Responses* | *Analysis Stages* | *Point of View* | *Activity* |
|---|---|---|---|---|
| Where to start looking at it? | In the activity of making *Jong* Boats by craftsmen in Bintan Bay, there is potential for mathematical practice in inside. | Domain | Culture | Conduct observations and interviews with Jong boat craftsmen who are Teluk Bintan, Tembeling residents. |
| How to look at it? | See the aspects or details of making *Jong* Boats by Jong craftsmen, where there is potential for mathematical practice in the process making it. | Taxonomy | Alternative Thingking | Determine what potential ideas, methods or techniques craftsmen use in making *Jong* Boats related to mathematical practices or activities. |
| What is it? | Proof (mathematical activities/concepts as a result of alternative thinking) | Componential | Mathematics and philosophy | Recognize and distinguish the potential of certain characteristics in the activity of making related *Jong* Boats with mathematics |
| What does it imply? | Cultural values learned | Cultural theme | Anthropologist | Describe the ethnomathematics in creating Perahu Jong by focusing on the relationship between activities and mathematical ideas or concepts. |

The stages carried out in data collection include determining sources by selecting reliable sources to provide valid research data. After finding the data source, the researcher then conducts an interview.

In this study, the type of interview used is a semi-structured interview where the implementation follows the interview guidelines the researcher has prepared. However, questions can develop based on conditions in the field. The sources that the researcher interviewed also had a good attitude and were open to explaining their arguments to all questions presented by the researcher.

## RESULT AND DISCUSSION

Based on an interview with a Jong boat craftsman, it was revealed that the Jong boat, a traditional Malay game from the Riau Islands, is distinguished by its unique and captivating features. These characteristics, such as its intricate design and rich cultural roots, make it a popular attraction for tourists. The Jong boat, deeply embedded in tradition, is a regular feature at annual festivals. The craftsman explained that the Jong boat holds a profound meaning, serving as a symbol of love and skill in traditional Malay games, and as a means to preserve the games of our ancestors.

In the manufacturing process, the Jong boat craftsman carefully selects materials such as pulai wood, adhesive glue, crabs, rubber knives, and several other materials. The technique for making a Jong boat involves a meticulous process of wood selection, cutting, scraping, drying, carving, and decorating. The craftsmen use crabs and rubber knives to scrape the pulai wood, a practical and affordable choice compared to the more difficult-to-obtain teak wood. This interview revealed that the Jong boat not only has value as a traditional Malay game but also holds family value in the manufacturing process.

Apart from looking at the tools and materials needed to make a Jong boat, there are also several mathematical aspects to the manufacturing process. This is known as "Ethnomathematics". Ethnomathematics is a field of study that combines ethnography with Mathematics. In the context of making Jong boats in the Riau Islands, ethnomathematics can involve understanding and applying mathematical concepts to make these traditional boats.

An understanding of geometry, ratios, angles, and other things about making a boat, such as curves, angles, and other mathematical calculations, is used to shape boat parts with pinpoint precision. Within the realm of ethnomathematics, it's crucial to grasp that the creation of Jong boats in the Riau Islands is a practice steeped in cultural significance. These boats, with their unique design and construction methods, are not just vessels for transportation, but also symbols of the Riau Island's rich maritime heritage. This tradition, passed down from generation to generation, is a testament to the enduring value of cultural preservation. The following are the results:

### *Designing and Constructing Jong boat*

*Jong* boats use pulai wood from trees found in the Malay community. Pulai wood is considered more practical, cheap, and easy to obtain. Pulai wood has a light and sturdy texture, so the Jong boat is unique. Choosing the right pulai wood is crucial to producing a quality Jong boat. The pulai wood used

must be fresh and clean, have a sturdy texture and have no holes. Pulai wood is young and has a thicker and stronger texture. Clean pulai wood will create the desired shape and beauty of the wood on a Jong boat. Jong wood has a sturdy texture and can withstand strong waves when the boat is sailing. Pulai wood that does not have holes will prevent Jong's boat from leakingThis explanation can be found in the following interview conversation transcript.

| | | |
|---|---|---|
| Researcher | : | *"Ketika proses pembuatan dan merakit perahu Jong ini, bagaimana teknik yang Bapak gunakan?"* (When making and assembling this Jong boat, what technique did you use?) |
| Craftsman | : | *"Dalam pembuatan perahu jong tidak ada teknik khusus ya, hanya dari cara kita memilih bahan dan mengukur nya aja itupun mengukurnya hanya dengan tali. Untuk kayu yang bagus namanya kayu pulai karena lebih ringan dari kayu yang lain. Lalu sebelum di ukir, kayu tersebut dikeringkan dahulu dengan cara dibelah trus di bakar agar keringnya lebih cepat. Setelah itu barulah dibentuk dengan memperhatikan ukuran perahu jong, dibagian ini membutuhkan pengalaman karena semakin sering atau banyak pengalaman dalam membuat perahu jong ini kita akan semakin lihai dalam mengukur agar perahu jong ini berlayar dengan baik, lalu diukir sekreatif mungkin tergantung dari orang yang membuat nya."* (There is no special technique in making a *Jong* boat; it is just how we choose the material, measure it, and even then, measure it only with a rope. Good wood is called pulai wood because it is lighter than other wood. Then, before being carved, the wood is dried first by splitting it and then burning it so that it dries faster. After that, it is formed by paying attention to the size of the jong boat; this section requires experience because the more often or more experience in making this jong boat, we will be at measuring so that this jong boat sails well, then carving as creatively as possible depending on the person who makes it) |

It is found that Pulai wood must be cut to the right size. The size of the pieces of pulai wood to make Jong is different because each Jong has 3 categories, namely categories A, B and C, where category A ranges from 160 cm – 190 cm, category B ranges from 139 cm – 150 cm, and category C ranges from 110 – 130 cm.

Figure 1. *Jong* boat

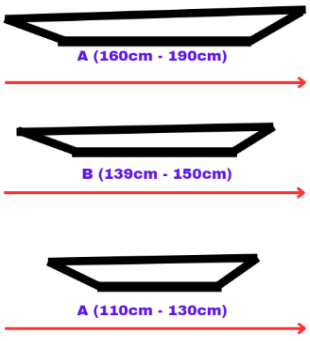


Figure 2. *Jong* boat illustration

In crafting the Jong boat, the resource person shaped it with size category A (160cm - 190cm) into a block shape commonly called a *Takir*.

Figure 3. Wooden block

The next step is to make Jong boat and Kate's house. The explanation about Kate's house can be found in the following interview conversation transcript.

Researcher : *"Baik, berarti dalam proses pembuatan perahu jong ini diperlukan pengalaman dan keterampilan dari pengrajin nya ya, lalu pak apakah Bapak melibatkan aktivitas matematika seperti menghitung, mengukur, ataupun aktivitas matematika lain saat membuat perahu Jong?"* (Okay, so in the process of making this Jong boat, experience and skills are required from the craftsman, right? Then, do you involve mathematical activities such as counting, measuring, or other mathematical activities when making the Jong boat?)

Craftman : *"Kalau lebih tepat nya saya kurang tau, tetapi umumnya itu ada di pengukuran agar bentuknya sesuai. Seperti mengukur panjang tongkat kate yang dibandingkan dengan panjang dari perahu jong nya. Lalu di Perahu Jong juga ada yang namanya tumah kate, kita juga harus memastikan ukuran lubang yang nya. Dan harus memastikan perahu jong ini beratnya maksimal 8 ons. Dalam pembuatan perahu jong harus diukur sesuai mungkin seperti mengukur rumah kate nya, kalau tidak sesuai perahu jong bisa bergerak tidak terarah apalagi mengukur nya hanya dengan tali saja."* (It is generally used in the measurement so that the shape is appropriate, like measuring the length of the kate stick compared to the length of the jong boat. Then, in the Jong Boat, there is also something called a *Kate* house; we also have to make sure of the size of the hole. Moreover, we must ensure this jong boat weighs a maximum of 8 ounces. A jong boat must be measured as appropriately as possible, like measuring the Kate house; if it is not appropriate, it can move undirected, let alone be measured only with a rope)

The following explanation entails the process.

a. After being shaped into a block shape, the back and front bases are scraped and slightly tapered to form a Jong boat. Where there are angles for the base and back of *Jong* boat, the front base of the boat has an angle of 30° - 40°, while the rear base has an angle of 20° - 30°.

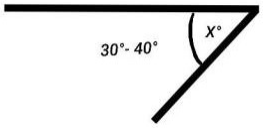


Figure 4. Front base angle of Jong boat

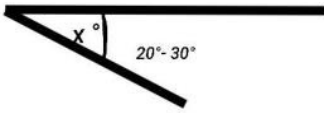


Figure 5. Rear base angle of Jong boat

b. The *Kate* house, or the connecting place between the *Kate* child and the *Jong* boat, has mathematical properties, namely the relationship between angles where the relationship between angles opposite each other is used.

Figure 6. *Kate* house

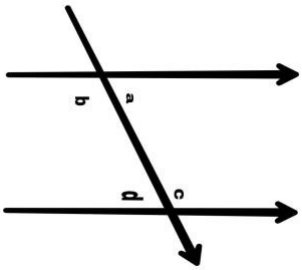


Figure 7. Angles illustration

c. The source's process for making *Kate's* house uses a comparison system where the length of Jong is divided into 3 so that the location of Kate's house is in the middle of Jong's boat, with a ratio of 1 : 3.

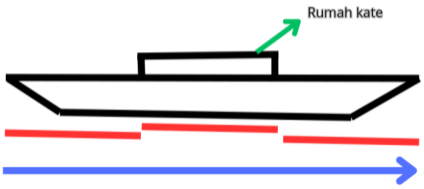


Figure 8. Illustration of *Kate* house

As for the research results table, the following table provides an overview of how the ethnomathematics search objectives were achieved in making the *Jong* boat.

Table 2. Ethnomathematics Identified in the Process of Making *Jong* Boat

| *Activities* | *Ides, Ways, Mathematical Technique* | *Emerging Mathematical Concepts* |
|---|---|---|
| Designing | Determining the geometrical design of the boat | - Flat-sided three-dimensional objects |

| | | |
|---|---|---|
| | | (cuboids and pyramids)<br>- Angles |
| Counting | - Counting on how much wood is used in making a *Jong* boat<br>- Making a hole in *Kate's* house in a rectangular shape aims to connect it to a stick by calculating the ratio of the lengths *Kate's* house. | - Numbers<br>- Angles<br>- Comparison (ratio and proportion)<br>- Flat-sided three-dimensional objects |
| Measuring | - Measure all the dimensions involved in making a *Jong* boat using non-standard units (using a rope) and express the results in *'mata'* units<br>- Measure the length of the *Kate* stick based on the length of the *Jong* boat being made<br>- Determination of the length of the *Kate* stick<br>- Determining the size of *Kate's* house and *Kate's* children<br>- Determination of the size and weight of the Jong boat<br>- Determination of the size of the sail (measurement)<br>- Form the *Jong* boat according to size because in the competition there are size categories. Size A (150-190 cm), size B (130-149 cm), size C (80-129 cm)<br>- The maximum mass of a *Jong* boat is 8 ounces (mass)/gauge<br>- Measure the length of *Kate's* house with a measuring rope.<br>- Measure the hole in the *Kate* house by dividing the length of the *Kate* house.<br>- Measure the length of the *Jong* to make a hole for the mast | - Length measurement with non-standardized unit<br>- measurement using a hypothesis presupposes<br>- Comparison (ratio and proportion)<br>- Relations between angles |

Based on research findings on the process of making Jong boats, there are specific mathematical activities involved. For instance, the process of forming wood involves geometric calculations to ensure the right shape and size. Similarly, making and calculating Jong boats requires arithmetic skills to determine the dimensions and weight distribution. This shows that mathematics is intricately woven into the fabric of daily activities in society.

Jong boat, a miniature boat, is a traditional Malay game. Jong is a sailboat imitation game that

can sail hundreds of meters. Jong has a length of 1.5 meters, a sail height of up to 2 meters, and the boat's width is only an adult's span. Making a Jong boat involves various stages, from selecting raw materials to finishing the boat. Usually, Jong is made of selected wood, namely Pulai wood (Evaliata Br Sembiring et al., 2018). The selection of materials shows the relationship between the community and their natural environment, where they utilize local resources sustainably. In an ethnographic context, making Jong boats also reflects rich local knowledge. This knowledge includes navigation techniques, understanding of the weather, and skills in managing marine resources (K. M. Maltby et al., 2023). By observing and participating in the boat-making process, researchers can identify how this tradition is maintained and adapted in changing times. Thus, making Jong boats is not only a technical practice but also a manifestation of coastal communities' culture, identity, and local knowledge. Ethnographic research in this context is important to document and preserve this valuable cultural heritage.

The mathematical concept of the Jong Melayu boat includes the use of mathematical principles in designing, manufacturing and operating the boat. For Jong boats, calculate the size of the boat, such as the length and mass of the boat. This calculation involves consideration of payload requirements, thrust, and desired performance. Mathematics is also used to determine the correct proportions between the boat lengths. Good proportions will ensure the balance and stability of the boat in the water. Several mathematical concepts are related to it, such as flat-sided shapes, geometry, angles, comparisons, numbers, measurements with non-standard measuring units, and measurements using presupposing hypotheses. The following are mathematical concepts that are involved in the process of making a Jong boat and can be studied by students:

1. Flat-sided three-dimensional figures (Cuboids and Pyramids)

   Forming a *Jong* Boat into a block shape is part of a mathematical concept, one of which is a flat-sided three-dimensional figures. Materials for building a regular flat-sided three-dimensional figures will be found in grades 5 and 6 of elementary school. However, to build a flat-sided three-dimensional figures, students study it again in grade 8 of junior high school.

2. Geometry

   Constructing a *Jong* boat to become a block and pyramid shape is part of the mathematical concept of geometry. Apart from that, the shape of the *Jong* boat itself also has geometric aspects. This geometric concept is found in mathematics learning for class VIII SMP students, with basic competencies 3.9 (Determine the surface area and volume of a cube, cuboid, prism and pyramid)

3. Angle

Forming the base and placing the stick on the Kate house uses several mathematical concepts. These angles are studied in mathematics learning for Grade III Elementary School (SD) students with Basic Competency 3.11 Identifying types of angles (right angles, acute angles and obtuse angles) and non-standard units of measurement, and estimating angle sizes through drawings. Moreover, 4.11 Identify types of angles through pictures and objects around them and measure the size of angles using a protractor and the relationship between angles at opposite interior angles.

4. Comparison

The comparison in making a Kate house for a Jong boat with a ratio of 3:1, this ratio is a mathematical concept studied in mathematics lessons for class VII students at Junior High School (SMP) with a basic competency of 3.7 Determining the ratio of equivalent and reciprocal values, as well as the ratio of two equivalent quantities. Moreover, 4.7 Solve problems related to comparisons of equivalent and reverse values and the ratio of two equivalent quantities.

5. Numbers

Numbers are a mathematical concept used for counting and measuring. In making Jong boats, it also uses the concept of numbers. Symbols or symbols used to represent a number are called numbers or number symbols. Numbers started to be studied in the 3rd grade of elementary school.

6. Measurement with Non-Standard Units

Measurements with non-standard sizes are measurements that use simple objects. For example, measurements can be made using rope, rope, thread, rubber, neata, etc. Measurements using standard units of measurement are measurements that use measuring instruments. We may have known this material since you were a child.

7. Measurement with a Presupposing Hypothesis

A hypothesis is a temporary or tentative answer to a problem the researcher raises. From these answers, it will be used to state whether there is a relationship and the form of the dependent independent variable or not. Usually, this material is studied in upper classes, namely in high school.

## CONCLUSIONS

From the results, mathematical activities and mathematical concepts were obtained in the process of making the Jong boat itself. In making a Jong boat and carrying out preparations until the Jong boat is finished, several mathematical aspects are obtained in the form of designing, calculating, and measuring, as well as the mathematical concepts present in the process of making Jong boats. Mathematical concepts in Jong's boat-building activities include flat-sided three-dimensional figures, geometry, angles, comparisons, numbers, measurements with non-standard units, and measurements

using hypothetical assumptions. Ethnomathematics in the process of making Jong boat provides a process to understand and give the impression that mathematics learning is not only carried out in schools but is also carried out in everyday life. For example, in the process of making local traditional games such as Jong boat, which is a traditional community game from Riau islands.

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