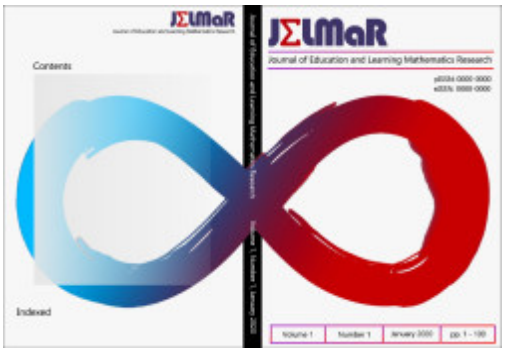

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Ethnomathematics in Buying and Selling Transactions of Cracker Traders at Puger Market

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***Abstract**: This study examines the application of ethnomathematics in the buying and selling transactions of cracker traders at Puger Market, Jember Regency. Ethnomathematics is a study that integrates mathematical elements with community culture. The purpose of this study is to identify how mathematical practices, particularly arithmetic operations such as addition, subtraction, multiplication, and division, are applied contextually by traders in their daily economic activities. This study uses ethnography with a descriptive approach, collecting data through observation, interviews, and documentation. The results show that traders are able to calculate prices and change manually quickly and accurately, even without formal mathematics education. This suggests that the practice of counting in trading activities reflects the real application of mathematical concepts in everyday life and can be used as a source of contextual learning in schools.*

***Keywords**: Ethnomathematics, Buying and Selling Transactions*

INTRODUCTION

Ethnomathematics is the study of combining elements of mathematics with the culture and social practices of a particular society. It studies the relationship between culture and mathematics.(Pathuddin & Raehana, 2019; Putra et al., 2023). Some groups of people have their own ways of applying mathematical concepts in their daily lives, showing that mathematics can be integrated into various contexts.(Inovasi et al., 2024; Lestari, 2019; Madu, 2024)Mathematics education is one of the most important sciences for life, because everything that happens in life contains many mathematical elements. Therefore, mathematics is called an exact science.(Broadhurst, 2020; Jannah et al., 2024)Mathematics is a compulsory subject from elementary school to university level and should not be considered difficult or scary.(Nu'man, 2023; Permatasari, 2021). Mathematics education is still taught and studied in schools because it has a colonial structure.(Meeran et al., 2024). In an effort to make learning mathematics more enjoyable, teachers can incorporate mathematical concepts into elements of students' everyday culture, such as games, snacks, crafts, traditional buildings, and traditional musical instruments. Students often unconsciously learn mathematics through various activities, because mathematics is universal and inseparable from everyday life.(Sutarto et al., 2021). Some communities or tribes with certain cultures have unknowingly integrated mathematical knowledge into their daily lives, for example, when making buying and selling transactions in shops or markets, both buyers and sellers use mathematical skills to calculate payments and change.(Pasar et al., 2025; Siregar & Yahfizham, 2023).

Ethnomathematic activities that are often seen in buying and selling transactions are counting.transactionBuying and selling usually involves calculations in the form of addition, subtraction, multiplication, division, profit and loss calculations.(Fradi et al., 2019). Understandprinciple-Arithmetic principles enable traders and consumers to optimize transaction processes, make decisions based on accurate calculations, and ensure financial balance in buying and selling activities. Therefore, arithmetic is not only a mathematical tool but also an essential foundation for everyday economic activity.

Arithmetic operations are a series of basic mathematical actions involving the manipulation or calculation of numbers, such as addition, subtraction, multiplication, and division. One of the activities carried out by cracker sellers at Puger Market is arithmetic. This process is seen when traders return money paid by buyers and determine prices based on the number of crackers. Based on the activities carried out by traders and buyers, calculations are carried out using arithmetic operations. Therefore, this research will examine ethnomathematics in the buying and selling transactions of cracker sellers at Puger Market using arithmetic operations.

METHOD

This research uses an ethnographic method with a descriptive approach. This method was chosen to explore and understand in-depth the mathematical practices that emerge in people's daily lives, particularly in the context of buying and selling transactions in traditional markets.(Ananda & Albina, 2025)Ethnography focuses on direct and participatory observation of the culture and social activities of a community, making it suitable for studying ethnomathematics practices that are not explicitly taught but are embedded in the daily activities of traders.(Sugiyono, 2018). A descriptive approach was used to describe in detail how cracker traders at Puger Market perform arithmetic activities in buying and selling transactions, as well as how they apply arithmetic operations such as addition, subtraction, multiplication, and division in their economic practices. The study was conducted at Puger Market, Jember Regency, East Java. The research subjects were two cracker traders who were selected purposively because they actively transacted with buyers and had more than five years of trading experience. Data collection techniques in this study included observation, semi-structured interviews, and documentation.

RESULT AND DISCUSSION

The research results show that ethnomathematics activity is clearly visible in the buying and selling process of cracker sellers at Puger Market. The two sellers who were the subjects of the study have their own unique methods for determining the price of crackers and giving change to buyers. Although they don't use tools like calculators, the calculations are carried out quickly and accurately based on experience and habit.

1. How to Determine Price Based on the Number of Crackers

- Trader 1

Trader 1 has two types of cracker packaging, namely:

The large pack contains 12 pieces at a price of Rp. 10,000, so the price per piece is Rp. 1,000.

A small pack containing 6 pcs costs Rp. 5,000, also equivalent to Rp. 1,000 per pc.

In practice, these traders use multiplication to determine the total price. For example, if a customer buys 3 large packs, then:

$$3 \times Rp10{,}000 = Rp30{,}000$$

Apart from that, trader 1 is also flexible in selling units, so when a buyer buys 4 pieces, the price is calculated as follows:

$$3 \times Rp1{,}000 = Rp3{,}000$$

- Trader 2

Trader 2 uses "string" units to package crackers, where 1 string contains 12 pieces. He has two types of prices:

1 rope (12 pcs) for Rp. 10,000⇒Rp. 1,000 per piece.

1 rope (12 pcs) for Rp. 5,000⇒Rp. 500 per piece, depending on the type of cracker (various qualities).

Example of calculation carried out by trader 2 when a buyer buys 2 strings of crackers @Rp. 5,000:

$$2 \times Rp5{,}000 = Rp10{,}000$$

If the buyer only buys 6 pcs of the Rp. 500/pcs type, then:

$$6 \times Rp500 = Rp3{,}000$$

Based on the activities of the two traders, it can be seen that the pricing process involves basic arithmetic skills, particularly multiplication and addition. They acquired this knowledge contextually, even though they did not formally learn it in school.

Table 1. Comparison of Price Determination Methods by Cracker Traders

Aspect	**Trader 1**	**Trader 2**
Sales unit	Large pack (12 pcs) Small pack (6 pcs)	Ropes (12 pcs) type A and type B
Price per pack/string	Rp. 10,000 (12 pcs) Rp. 5,000 (6 pcs)	Rp. 10,000 (12 pcs-type A) Rp. 5,000 (12 pcs-type B)
Price of PES pcs	Rp. 1,000	Rp. 1,000 (type A) Rp. 5.00 (type A)
Calculation method	Manual addition and multiplication	Manual addition and multiplication
Selling individually	Yes (calculated per piece)	Yes (calculated per piece)

2. How to Give Change

Observing the two vendors, it's clear that the pricing process involves arithmetic skills. They master this knowledge contextually. Interestingly, both vendors were able to give change manually and quickly without a calculator, demonstrating a practical and efficient mastery of basic arithmetic. For example:

If the total purchase is IDR 17,000 and the buyer pays with IDR 20,000, the trader will immediately give IDR 3,000 as change.

If a buyer gives a large amount of money (for example Rp. 50,000) for Rp. 35,000 worth of shopping, the trader calculates the difference:

$$Rp50{,}000 - Rp35{,}000 = Rp15{,}000$$

This ability to calculate change demonstrates that traders use subtraction and an understanding of monetary value in their economic practices. Some traders even round prices to simplify the change process, such as selling three strings of crackers for Rp5,000 for a total of Rp15,000 so that buyers can pay the exact amount. Furthermore, in practice, traders tend to use multiplication, addition, and subtraction without using mathematical terms. However, this process reflects the real integration of arithmetic concepts in their daily economic activities.

Table 2. Identified Ethnomathematics Activities

Activities	**Mathematical Concepts Used**	**Information**
Determine the price based on the number of pieces	Multiplication	Multiply the number of crackers by the unit price
Calculate total spending	Addition	Adding up multiple shopping items
Giving change	Subtraction	Calculate the difference between the money paid and the total
Selling in units and packages	Division and unit conversion	Determine the price per piece from the total packaging price

The findings of this study indicate that the buying and selling activities carried out by cracker traders at Puger Market contain distinct ethnomathematic elements. Basic arithmetic concepts such as multiplication, addition, and subtraction, along with practical contexts, are incorporated.(Susanti, 2022).

These skills are developed not through formal education, but through experience and repeated practice in division, applied contextually in the daily lives of traders, even though they do not use formal mathematical terms. The process of determining prices by traders is carried out through manual calculations based on packaging and units, reflecting mathematical understanding through direct experience. This aligns with the contextual mathematics approach, where mathematical knowledge is acquired from real-life experiences and social environments.(Maulida et al., 2015). In addition, the ability of traders to give change quickly without the aid of a calculator demonstrates strong numeracy skills and number sense, namely sensitivity tonumbers in activityThe learning process experienced by traders supports Vygotsky's theory of the zone of proximal development (ZPD), where knowledge is formed through social interactions and cultural contexts.(Hidayat et al., 2024). Thus, traditional economic activities such as these can be a source of contextual and relevant mathematics learning in schools. As Barton (1996) points out, ethnomathematics not only serves as a means of understanding mathematical concepts, but also as a way to appreciate and integrate local wisdom into the educational process.(Anjani & Fauziah, 2025). Connecting mathematics learning to students' daily lives, such as trading practices, can make the learning material more meaningful and easier to understand.

CONCLUSION

The buying and selling activities of cracker traders at Puger Market contain strong ethnomathematic elements. The traders apply basic arithmetic concepts such as multiplication, addition, subtraction, and division to determine prices and give change, although they do not use mathematical terms formally. This numeracy knowledge is acquired through direct experience and practice in trading activities, not through formal education. These findings support Vygotsky's theory of contextual learning and zone of proximal development, and demonstrate that the process of learning mathematics can occur naturally within local culture. Therefore, traditional economic activities such as these can be a source of meaningful learning in mathematics education in schools, while simultaneously preserving local wisdom.

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