

Ethnomathematics of Buying and Selling Transactions Conducted by Traders in Beriman Tomohon Market

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Abstract

The goal of this study is to detail the purchasing and selling procedures employed by traders at the Tomohon faith market as well as the arithmetic computation techniques they employ. Research of this kind is qualitative. Interviewing and participant observation techniques were utilized to acquire the data. In this study, the data analysis is qualitative descriptive. Ten traders from the Tomohon faith market were chosen at random to participate as research subjects in this study. The study's findings demonstrate that Tomohon faith market vendors round up their prices when selling their items. The way that traders provide change is to round up the cash that needs to be paid in advance to the nearest tenth, then add it up until the whole sum matches the cash the buyer has paid. The methods used by research participants to calculate addition, subtraction, and multiplication differ significantly from those used in classroom instruction. The value 0, which functions as thousands, is always disregarded. Start by adding the thousands with the thousands, then the hundreds with the hundreds, to determine the total. Some people also finish first to the nearest tens value. If the number being decreased, for example, is 50,000 - 13,000, the reduction procedure is 13 to go to 20 less 7. Then $50 - 20 = 30$. The result is 37, which equals 37,000. In addition, you must deduct the first tens of thousands from the second tens of thousands before removing the remaining part of the second figure. Multiply the number from the front number first, for instance, tens of thousands, then thousands, and so on, to calculate the multiplication technique. Find the number that can be divided by the divisor to calculate the division. The outcome of the previous division is then applied to the divided number. This process is continued until all the divided number has been used. The outcomes of these divisions should then be added.

Keywords: Buying and selling transactions, ethnomathematics, Tomohon Market

Abstrak

Tujuan dari penelitian ini adalah untuk merinci prosedur jual beli yang dilakukan oleh para pedagang di pasar beriman Tomohon serta teknik perhitungan aritmetika yang mereka gunakan. Penelitian semacam ini bersifat kualitatif. Teknik wawancara dan observasi partisipan digunakan untuk memperoleh data. Analisis data dalam penelitian ini adalah deskriptif kualitatif. Sepuluh pedagang dari pasar kepercayaan Tomohon dipilih secara acak untuk berpartisipasi sebagai subjek penelitian dalam penelitian ini. Temuan penelitian menunjukkan bahwa pedagang pasar kepercayaan Tomohon membulatkan harga saat menjual barang mereka. Cara pedagang memberikan uang kembalian adalah dengan membulatkan uang tunai yang harus dibayarkan terlebih dahulu ke sepersepuluh terdekat, kemudian menjumlahkannya hingga jumlahnya sesuai dengan uang tunai yang telah dibayarkan pembeli. Metode yang digunakan oleh peserta penelitian untuk menghitung penjumlahan, pengurangan, dan perkalian berbeda secara signifikan dari yang digunakan dalam pengajaran di kelas. Nilai 0 yang berfungsi sebagai ribuan selalu diabaikan. Mulailah dengan menjumlahkan ribuan dengan ribuan, lalu ratusan dengan ratusan, untuk menentukan totalnya. Beberapa orang juga menyelesaikan pertama ke nilai puluhan terdekat. Jika jumlahnya berkurang, misalnya 50.000 - 13.000, prosedur pengurangannya adalah 13 menjadi 20 dikurangi 7. Maka $50 - 20 = 30$. Hasilnya adalah 37 yang sama dengan 37.000. Selain itu, Anda harus mengurangi puluhan ribu pertama dari puluhan ribu kedua sebelum menghapus bagian yang tersisa dari angka kedua. Kalikan angka dari depan terlebih dahulu, misalnya puluhan ribu, lalu ribuan, dan seterusnya untuk menghitung teknik perkalian. Temukan angka yang dapat dibagi oleh pembagi untuk menghitung pembagian. Hasil pembagian sebelumnya kemudian diterapkan pada bilangan yang dibagi. Proses ini dilanjutkan

sampai semua angka yang dibagi telah digunakan. Hasil dari pembagian ini kemudian harus ditambahkan.

Kata Kunci: Transaksi jual beli, etnomatematika, Pasar Tomohon

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INTRODUCTION

Education is the main thing that every individual must obtain because education has an important role in human life. The progress of a nation can be seen through its education. Education is a bridge to acquiring knowledge, values, skills and skills (Mangelep, 2017). Education can be obtained formally, informally, and non-formally following the Law of the Republic of Indonesia number 20 of 2003 concerning the national education system, namely formal education is a structured and tiered educational path consisting of basic education, secondary education, and higher education (Domu et al., 2023). Non-formal education is an educational path outside of formal education that can be carried out in a structured and tiered manner (Rompas, 2023).

Mathematics is one of the basic sciences that has an important role in efforts to master science and technology. There are many problems around mathematics and learning mathematics. However, it cannot be denied that mathematics has a significant role in providing various abilities to students to gather thinking skills and problem-solving abilities in everyday life (Kaunang, DF. 2018; Mangelep, 2020). As a basic science, mathematics plays a very important role in developing science and technology because mathematics is a means of thinking to develop reasoning power and logical, systematic, and critical ways of thinking (Hobri, 2008; Mangelep, 2013). Mathematics is very influential in everyday life. Mathematics is also a science that is very influential on other sciences, for example, accounting, chemistry, biology, and Islamic religious sciences. According to Dwi (2011), humans also use mathematical theory to help solve problems such as calculating the area and profit and loss in buying and selling activities.

Based on the previous explanation, one of the places to get knowledge of mathematics can be obtained at school, namely from elementary to tertiary level. However, there is still a community paradigm of mathematics as a frightening and boring subject; this happens because they think mathematics is difficult and the application of mathematics in everyday life is not very important (Mangelep, 2017; Domu, 2023). However, without realizing that mathematics is always present in daily human activities, this can be used as an alternative for the community, especially students, to introduce that mathematics is always related to everyday life (Mangelep, 2013). This is in line with the opinion of Khairadiningsih (2015), namely that one alternative to changing the perspective of society or students towards scary mathematics is to link the knowledge that students already have with students' understanding of situations in their environment. Therefore, in learning mathematics, it is

necessary to start with informal knowledge that students have learned from the life and culture of the community around where they live.

Based on the explanation above, we always encounter culture in social life. The relationship between mathematics and culture is called ethnomathematics. The term ethnomathematics was first coined and developed by a Brazilian mathematician, Ubiratan D'Ambrosio. According to D'Ambrosio, ethnomathematics is a study of the lifestyle, habits, or customs of a community in a place that is related to mathematical concepts but is not recognized as part of mathematics by that community (Suwito & Trapsilasiwi, 2016).

Based on the unique culture found in Tomohon City, the people of Tomohon City unknowingly carry out various mathematics-related activities, such as counting, counting and other mathematical concepts. This mathematical activity can be found in various fields, one of which is buying and selling transactions carried out by traders at the Faith Market in Tomohon City.

The research subjects were traders in the Tomohon faith market, to be exact, in Tomohon City. Sales and purchase transaction activities carried out by traders include preparation preparations made by traders, namely buying goods from collectors; the next activity is offering trade prices to consumers. Buying and selling transaction activities that interact directly with consumers carried out by these traders are the focus of research because the calculation algorithms carried out by traders are unique, fast, and precise and do not use a calculator. This can be used as an alternative to introducing students to the fact that mathematics is real and easy to find in everyday life. This follows Munawwaroh's (2016) opinion that arithmetic algorithms carried out by traders can be used as an alternative to learning mathematics at school. It helps students in learning mathematics. In addition to the calculation algorithm, traders have their way of packaging and selling at unit (retail) prices.

Based on the description above, this study will learn more clearly about what ethnomathematics activities are carried out by market traders of faith in Tomohon City in buying and selling transactions within the community. This study describes buying and selling transactions carried out by traders in the Tomohon faith market. It describes the methods of calculating arithmetic used in traders' buying and selling process in the Tomohon faith market.

METHOD

In this study, the type of research used was qualitative research with an ethnographic approach. This is because the research to be carried out is intended to describe the counting algorithms used by traders in buying and selling transactions in the Tomohon City community. Qualitative research is research that intends to understand theorems about what is experienced by research subjects, such as behaviour, perceptions, motivations, actions, etc., holistically and employing descriptions in the form of words and language in a special context that is natural and by utilizing a variety of natural methods (Moleong, 2015)

This study also uses an ethnographic approach. According to Moleong (2015), attempts to describe culture or aspects of culture are called ethnography. Ethnography emphasizes studying the whole culture; this approach aims to obtain an in-depth description and analysis of culture based on intensive field research. According to Bungin (2012), an ethnographic approach is a systematic depiction and analysis of a group culture, community or ethnic group collected from the field in the same period. Ethnographic research writes about society; writing refers to descriptive studies.

The research location intended in this study is a place to conduct research. The location used in this study is the Faithful Market of Tomohon City. The research subjects or respondents were the Belief market traders in Tomohon City, totalling 10 people. The reason for choosing the research was the Beriman Tomohon market, one of the most famous markets for extreme trade because it sells various types of extreme animal meat. Apart from that, the Tomohon Faith Market also has very busy activities every day. Data collection techniques in this study used observation, interviews, and documentation. After the data was collected, the researcher continued to analyze the data with the stages of data reduction, data presentation, and conclusion.

RESULT AND DISCUSSION

The buying and selling process of traders at the Tomohon faith market is very diverse; various ways are used by the traders at the Tomohon faith market in selling their wares, some use kilograms, placed on plates, units of litres and some are tied up such as vegetables (kangkong, gedi, spinach). The traders have rounded up the prices for merchandise at the Tomohon faith market so that no goods and calculated prices are missed. Also calculates the price of each item put into the plastic bag. In this way, no goods and prices are missed to be counted. In addition, the way the seller counts when putting the items one by one into a plastic bag and calculating the purchase price indicates that the seller's calculation method indirectly adds up all the items he bought at once. However, at the start of the calculation, that is by adding up the purchase price. The results are added up with the other purchase prices one by one until all the items purchased enter the plastic bag.

In the Tomohon Faith Market, goods that sell for Rp. 5,000.00 get 3 are no longer available or are rare. According to traders, this price could have occurred if the purchase price in the market had been very low. For selling vegetables, the minimum price now is IDR 2000.00. Prices in the market also fluctuate, sometimes cheap and sometimes expensive, so the prices sold daily also change. Some traders sell the goods they sell this way, but the price is not Rp. 5,000.00 for 3, but Rp. 4,000.00 for 2 or Rp. 6,000.00 for 3. Such sales are used to avoid buyers who buy retail if the price is Rp. 2000.00, so selling it for Rp. 4000.00 gets 2. Sales with this price model are usually used for selling vegetables.

In the return process carried out by the merchant in returning the remaining payment money, the method used, for example, the purchase price set by the seller, is IDR 13,000.00, and the buyer pays IDR 50,000. 00 in advance to fulfil the purchase price of IDR 13,000.00 to IDR 20,000.00. Then the seller adds Rp. 30,000.00 so that the total money back becomes Rp. 50,000.00, and the change

received by the buyer is Rp. 37,000.00. This method applies to whatever money the buyer pays regardless of the price determined by the seller. This method reduces the risk of errors and convinces the buyer that the remaining money is correct. However, there are sellers whose concept of calculation is not shown to the buyer, but the method used to calculate the change is the same.

In determining the selling price, traders must first look at the buying price in the big market and then determine the desired profit. To determine the selling price of vegetables, the vegetables sold in the market are tied up with 5 or 10 small bunches that are put together. After the seller sets the selling price, the seller divides the price of one bunch of vegetables containing 5 or 10 small bunches in anticipation of buyers buying retail. The term Minahasa people use to mention 1 bunch of vegetables containing 5 or 10 bunches is "bal". The contents, 1 small bond, are called "ties". When carrying out a sale and purchase transaction mentioning the vegetables purchased, some buyers mention bales, but some immediately mention 1, 2, 3 and so on.

When a sale and purchase transaction occur and during the process of adding up the goods purchased by the buyer, there are several methods used by the trader. In giving examples, the researcher also adjusts the nominal on the market, such as the nominal which has been rounded to five hundred or thousands, so that in the example when interviewing, the researcher divides the examples into 3, namely the sum of both only thousands (does not contain five hundred), sum one of the numbers contains five hundred. The sum of the two contains five hundred.

An addition containing only thousands, for example, is $16,000 + 42,000$. These numbers both also contain tens of thousands. Based on the data obtained, the addition can be completed by adding up the tens of thousands first, namely 10 with 40 first, and the result is 50. Then adding up the value of the thousands, namely 6 with 4, the result is 8. Then the sum results are added back to $50 + 8 = 58$, resulting in 58,000.

An addition in which one of them contains five hundred is, for example, $12,500 + 15,000$. The numbers both contain tens of thousands. Then the method used by research subjects is as follows. The first way is to ignore the number 500 first, then add up the thousands, namely $2 + 5 = 7$, then add up the tens of thousands, namely $10 + 10 = 20$. After that, add up the sum, namely $20 + 7 = 27$, then add 500 so that the result is 27,500.

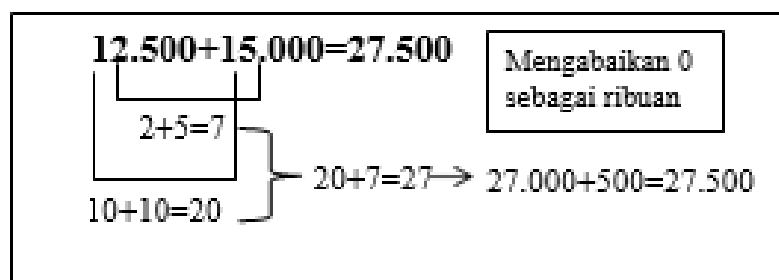


Figure 1. The first method of addition, one of which contains five hundred, is done by the trader

The second way is to ignore the number 500 so that it becomes 12,000. Next, add up the tens of thousands first, namely $10 + 10 = 20$, then add up the thousands, namely $2 + 5 = 7$, then add up the sum of the results $20 + 7 = 27$, then add 500 to make 27,500.

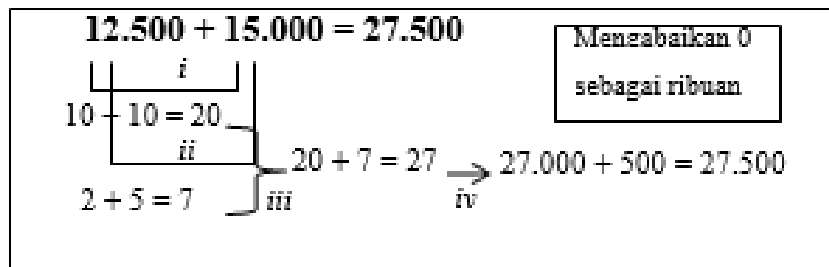


Figure 2. The second method of addition, one of which contains five hundred, is done by traders

An addition containing five hundred is, for example, $46,500 + 12,500$. These numbers both also contain tens of thousands. Based on research data, the way to calculate it is to add up the two five hundred numbers so that the result is 1,000, then add up the thousands number, namely $6 + 2 = 8$, then add 1,000 first to 9,000. Next, adding up the tens of thousands of numbers, namely $40 + 10 = 50$, then adding 9 to 59,000.

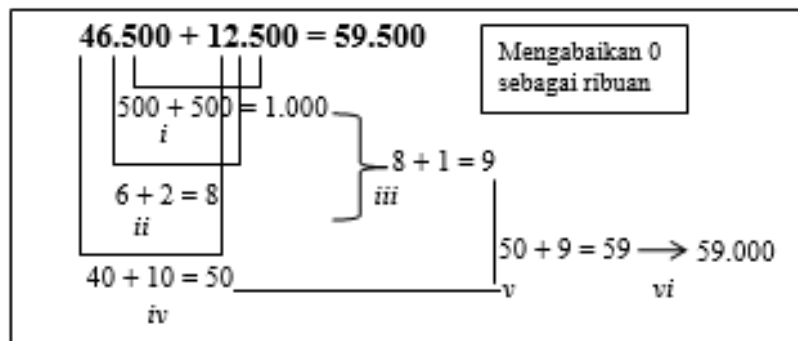


Figure 3. How to add up tens of thousands of numbers by traders

The total number is $23,500 + 6,500$. One of these numbers contains tens of thousands. The method is by adding the number 500 from a number that does not have tens of thousands to a number that has tens of thousands, namely 500, which belongs to the number 6,500, to the number 23,500 so that it becomes 24,000. Then the result is added by 6,000, which is $24,000 + 6,000 = 30,000$, so the result is 30,000. However, some add up the two five hundred last so that what is added first is $23 + 6$ first, which results in 29, and then add 1,000 to the sum of the two 500, so the result is 30,000.

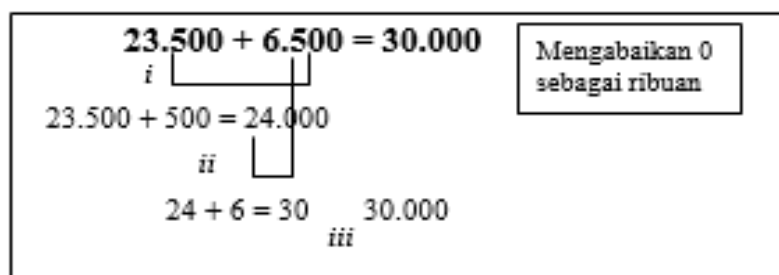


Figure 4. How to Add Numbers Containing Tens of Thousands by Merchants

How to reduce can be seen in the return process. Researchers in searching for data on the numbers asked are easy numbers. The researcher also uses nominals whose subtraction only contains thousands (does not contain five hundred) and numbers whose subtraction contains five hundred.

In deductions that do not contain five hundred, for example, 50,000-13,000. Based on the data obtained, all research subjects who act as sellers are calculated, namely the deduction is rounded to the tens first, namely the number 13 to go to 20, then it is less than 7. Then what is reduced is subtracted by the number that has been rounded, namely $50 - 20 = 30$. Then the result of the subtraction is added with the remaining number leading to the rounded number, namely $30 + 7 = 37$, so the result of subtraction is $50.0000 - 13.000 = 37.000$.

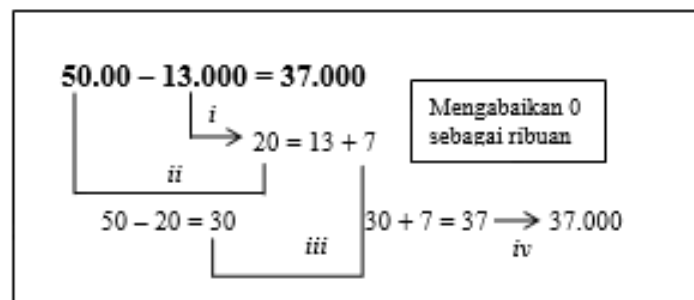


Figure 5. Merchant's Method of Reducing Numbers That Do Not Contain Five Hundreds

In addition, there is another way to get from the research data, namely $50,000 - 13,000$, so the method is to subtract the tens of thousands from the tens of thousands first, namely $50 - 10 = 40$, then the result is subtracted by the remaining thousands from the deduction, namely $40 - 3 = 37$. So the final result is 37,000. For subtraction that contains five hundred methods used are the same as before, and the research subjects use no other methods.

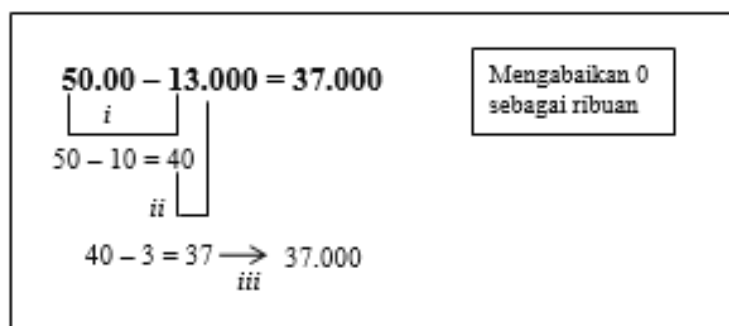


Figure 6. How Merchants Reduce Tens of Thousands By Tens of Thousands Numbers

For the thousands of values that are subtracted, it is greater than the thousandths of the subtraction number; for example, the form of the number is $31,000 - 26,000$; the method used is to change the value 31 to 30 first and subtract 26. $30 - 26 = 4$, then the result is added to the remaining numbers, which is $31 - 30 = 1$, so $4,000 + 1,000$, then the result is 5,000.

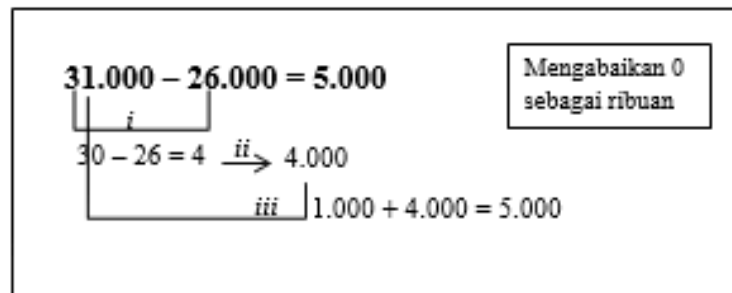


Figure 7. Methods of subtracting the value of the thousands from the reduced value is greater than the value of the thousands of deductions made by traders.

In multiplication, numbers that do not contain five hundred are also distinguished from numbers that contain five hundred. The method used by all research subjects to multiply all the concepts is the same, whether the numbers contain five hundredths or those that do not. The method used, for example, if the number contains five hundred, namely

$12,500 \times 3$. Multiply the tens of thousands number with the multiplier, which is $10 \times 3 = 30$, then the thousands of times the multiplier, which is $2 \times 3 = 6$. Then the multiplication results add up to $30 + 6 = 36$, which means 36,000. Then the hundreds are multiplied by the multiplier, which is $500 \times 3 = 1500$, and the added numbers are $36,000 + 1,500 = 37,500$, so the result is 37,500.

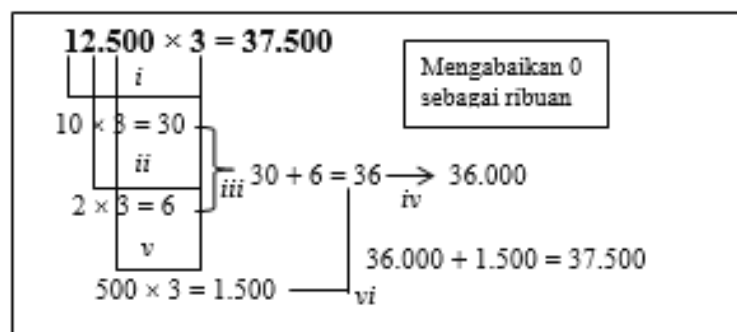


Figure 8. Find multiplication by traders

The distribution of questions asked was also adjusted to the price and goods sold. In knowing the method of division used by traders, the examples used are $30,000 : 2$ and $30,000 : 4$. The method used by all research subjects for $30,000 : 2$ is to estimate a number that is easy to divide by 2, namely $20 : 2 = 10$ because 20 of the 30 that have been used, the remainder is 10. Then 10 is divided by 2 again, which results in 5. After that, the results of the two divisions are added up to $10 + 5 = 15$. So, the result is $30,000 : 2 = 15,000$.

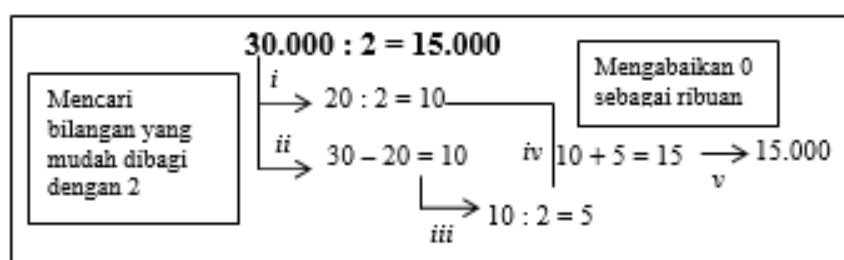


Figure 9. How the distribution is done by traders

For 30,000: 4, the method used is like the previous method. Initially, estimate a number close to 30 and can be divided by 4. The number is 28 because $28 : 4 = 7$. After that, the remainder of the 30 is 2, which means 2,000. Next, $2,000 : 4 = 500$. After that, add up the division's results, namely $7,000 + 500 = 7,500$. So, the result is $30,000 : 4 = 7,500$.

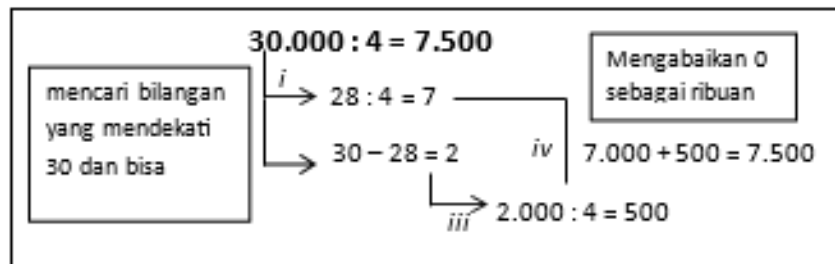


Figure 10. Method II of distribution by traders

The most appropriate way to divide numbers without a calculator is to memorize multiplication 1-10 because division is the opposite of multiplication. The method used if the number to be divided is large, then the method is to find a number that is close to and can be divided by the divisor; if it still has a remainder, then it is divided again until it runs out. Because in the buying and selling process that is carried out like the research subject, the numbers are relatively easy, and the divisors are small.

CONCLUSION

Based on the analysis and discussion results, conclusions can be drawn regarding ethnomathematics in the buying and selling process carried out by traders at the Tomohon Faith market as a mathematics learning material. Based on the first formulation of the problem regarding the buying and selling transactions carried out by Tomohon faith market traders, it can be concluded that the selling prices used by traders have been rounded up to five hundred or thousands. So that the calculation of the items purchased is not missed, the method is carried out, namely by counting each item one by one, which is put in a plastic bag. This also indicates that the method of calculation carried out by the seller is only added up in stages but one by one. To determine the selling price, you must look at the market price first because market prices fluctuate daily. For selling kitchen items such as chillies and tomatoes, some sell using scales, and some sell using estimates because buyers buy chillies or tomatoes based on the price of the goods to be purchased. The seller returns the remaining payment money by fulfilling it to the nearest tens first, then adding it up until it reaches the value of the money paid. During the bidding process, the seller can determine the agreed price if the price offered by the buyer is not the same as or less than the seller's price when buying in the big market.

REFERENCESS

- Bungin, B. (2012). Analisis Data Penelitian Kualitatif. Jakarta: PT Raja Grafindo Persada.
- Dwi, Renita. (2011). Matematika sebagai Ratu Ilmu. [Online]. Tersedia:

- <http://renitarindu.blogspot.com/2011/12/matematika-sebagai-ratu-ilmu.html> . [diakses 07 September 2022]
- Domu, I., Regar, V. E., Kumesan, S., Mangelep, N. O., & Manurung, O. (2023). Did the Teacher Ask the Right Questions? An Analysis of Teacher Asking Ability in Stimulating Students' Mathematical Literacy. *Journal of Higher Education Theory & Practice*, 23(5).
- Domu, I., Pinontoan, K. F., & Mangelep, N. O. (2023). Problem-based learning in the online flipped classroom: Its impact on statistical literacy skills. *Journal of Education and e-Learning Research*, 10(2), 336-343.
- Hobri. (2008). Model-model Pembelajaran Inovatif. Jember. Universitas Jember
- Kaunang, D. F. (2018). Penerapan Pendekatan Realistic Mathematics Education dalam Pembelajaran Matematika Materi Persamaan Garis Lurus di SMP Kristen Tomohon. *Mosharafa: Jurnal Pendidikan Matematika*, 7(2), 307-314
- Khairadiningsih, R. N. (2015). Eksplorasi Etnomatematika Masyarakat Suku Madura di Situbondo.
- Mangelep, N. (2013). Pengembangan Soal Matematika Pada Kompetensi Proses Koneksi dan Refleksi PISA. *Jurnal Edukasi Matematika*, 4(7), 451-466.
- Mangelep, N. O. (2015). Pengembangan Soal Pemecahan Masalah Dengan Strategi Finding a Pattern. *Konferensi Nasional Pendidikan Matematika-VI,(KNPM6, Prosiding)*, 104-112.
- Mangelep, N. O. (2017). Pengembangan Perangkat Pembelajaran Matematika Pada Pokok Bahasan Lingkaran Menggunakan Pendekatan PMRI Dan Aplikasi GEOGEBRA. *Mosharafa: Jurnal Pendidikan Matematika*, 6(2), 193-200.
- Mangelep, N. O. (2017). Pengembangan Website Pembelajaran Matematika Realistik Untuk Siswa Sekolah Menengah Pertama. *Mosharafa: Jurnal Pendidikan Matematika*, 6(3), 431-440.
- Mangelep, N., Sulistyaningsih, M., & Sambuaga, T. (2020). Perancangan Pembelajaran Trigonometri Menggunakan Pendekatan Pendidikan Matematika Realistik Indonesia. *JSME (Jurnal Sains, Matematika & Edukasi)*, 8(2), 127-132.
- Moleong, L. J. (2015). Metodologi Penelitian Kualitatif. Bandung: PT Remaja Rodakarya.
- Munawwaroh, I. (2016). Etnomatematika pada Transaksi Jual Beli yang Dilakukan Pedagang Sayur dalam Masyarakat Madura di Paiton Probolinggo.
- Runtu, P. V. J., Pulukadang, R. J., Mangelep, N. O., Sulistyaningsih, M., & Sambuaga, O. T. (2023). Student's Mathematical Literacy: A Study from The Perspective of Ethnomathematics Context in North Sulawesi Indonesia. *Journal of Higher Education Theory and Practice*, 23(3), 57-65.
- Rompas, V. D., Wenas, J. R., Sambuaga, O. T., & Mangelep, N. O. (2023). Analysis of Students' Difficulties in Completing Operational Problems with Algebraic Forms. *Jurnal Pendidikan Tambusai*, 7(1), 2696-2703.
- Suwito, Abi. & Trapsilasiwi, Dina. 2016. "Pengembangan Model Pembelajaran Matematika SMP Kelas VII Berbasis Kehidupan Masyarakat JAWARA (Jawa dan Madura)". *Jurnal Ilmiah Pendidikan Matematika*. Vol.4 No. 2, Maret 2016 hlm 79-84.