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Exploration of Arithmetic Concepts in Jetis Batik at Namiroh Batik Shop, Sidoarjo, East Java

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Abstrak

Penelitian ini bertujuan untuk menggali konsep aritmatika dalam proses pembuatan Batik Jetis Sidoarjo di Toko Batik Namiroh, karena matematika sering tertanam dalam praktik produksi budaya tetapi tidak secara eksplisit diakui dalam konteks pembelajaran formal. Penelitian ini menggunakan metode kualitatif dengan desain etnografi. Teknik pengumpulan data dalam penelitian ini meliputi observasi, wawancara, dan dokumentasi. Teknik analisis data yang digunakan antara lain reduksi data, tampilan data, dan penarikan kesimpulan. Validitas data diperkuat melalui triangulasi sumber. Hasil penelitian menunjukkan bahwa terdapat konsep aritmatika dalam kegiatan produksi Jetis Batik, antara lain operasi pengukuran dan perhitungan dalam menentukan ukuran kain, perbandingan dan pecahan dalam proses pencampuran pewarna, perhitungan waktu dan konversi satuan pada tahap produksi, serta aritmatika sosial dalam menentukan harga jual. Temuan ini menunjukkan bahwa aritmatika berfungsi sebagai alat praktis dan kontekstual dalam kegiatan budaya kehidupan nyata. Oleh karena itu, produksi Batik Jetis dapat dimanfaatkan sebagai konteks yang bermakna untuk pembelajaran matematika di sekolah dasar, khususnya dalam pengajaran pengukuran, pecahan dan rasio, konversi waktu, rata-rata sederhana, dan konsep profit-loss.

Abstract

This research aims to explore arithmetic concepts in the process of making Jetis Sidoarjo Batik at the Namiroh Batik Shop, as mathematics is often embedded in cultural production practices but not explicitly recognized in formal learning contexts. This study employs a qualitative method with an ethnographic design. The data collection techniques in this study include observation, interviews, and documentation. The data analysis techniques used include data reduction, data display, and conclusion drawing. The validity of the data is strengthened through source triangulation. The results of the study show that there are arithmetic concepts in the production activities of Jetis Batik, including measurement and calculation operations in determining the size of the fabric, comparison and fractions in the dye mixing process, time calculation and unit conversion in the production stage, and social arithmetic in determining the selling price. These findings indicate that arithmetic functions as a practical and contextual tool in real-life cultural activities. Therefore, Jetis Batik production can be utilized as a meaningful context for mathematics learning in elementary schools, particularly in teaching measurement, fractions and ratios, time conversion, simple averages, and profit–loss concepts.

INTRODUCTION

Mathematics is a science that humans use to solve various problems in daily life. Mathematical concepts emerge in activities related to numbers (Szkudlarek et al., 2022) relationships (Wilkie & Hopkins, 2024) and space (Harris, 2023). A review (Thanheiser, 2023) states that mathematical concepts derived from everyday experience developed into a knowledge system for solving problems related to numbers, relationships, and space. Therefore, mathematics can be applied across various areas of life, including trade transactions, measurement, and production activities in society (Khasanah et al., 2025). At various levels of education, mathematics is a compulsory subject because it plays an important role in training logical, critical, and systematic thinking skills. Nevertheless, mathematics is often perceived as a difficult and abstract subject by many learners. This perception is reflected in students' performance on national assessments, particularly in the 2025 Academic Ability Test (TKA), where the average mathematics score was only 36.01 out of a maximum of 100 (Kemendikdasmen, 2025). Such results suggest that students continue to face significant

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challenges in mastering fundamental mathematical concepts. This finding is consistent with students' perceptions, as mathematics is frequently identified as the most difficult subject across elementary to high school levels (Aguilar, 2021). This is also because mathematics is often presented through symbols and variables, making it difficult for students to understand concepts meaningfully (Aguilar, 2021). Therefore, a learning strategy is needed that relates mathematical concepts to real experiences, making them easier to understand.

Culture is an integral part of human life (D'Ambrosio & Rosa, 2017; Rosa et al., 2016; Rosa & Orey, 2014; Susanto et al., 2022). Every community has customs, traditions, and cultural products that develop according to its social environment. In everyday life, mathematics and culture often coexist and are interrelated. Research (Iffah et al., 2025) states that cultural issues cannot be separated from the mathematics learning process. In addition, (Wibawa et al., 2025) emphasized that one approach that can bridge the relationship between culture and mathematics education is ethnomathematics.

Ethnomathematics is the study of how mathematical concepts arise and develop in a certain culture. According to (D'Ambrosio & Rosa, 2017) ethnomathematics is an approach that can be used to explain the relationship between environmental culture and mathematics learning. This approach can motivate students as well as overcome learning difficulties because mathematical concepts are directly linked to daily life (N. Sari et al., 2023). The research (Khasanah et al., 2025) also adds that ethnomathematics facilitates students' abstract thinking abilities through cultural contexts close to their lives.

One of the products of Indonesian culture that is rich in mathematical elements is batik (Farihah et al., 2024). Batik not only has aesthetic and philosophical value but also embodies the regularity of patterns, repetition, and calculation structures in its making. Batik activities involve measuring fabrics, mixing colors with certain ratios, calculating production time, and determining selling prices. Thus, the concept of arithmetic is evident in the community's cultural practices, where it plays a crucial role as a foundational mathematical competence that underpins essential daily activities, such as measuring, counting, and making informed decisions within socio-economic and cultural contexts. One of the written batik centers whose production process still maintains the identity of the local community and is still developing is Kampoeng Batik Jetis in Sidoarjo Regency, East Java. Jetis batik features characteristic flora-and-fauna motifs in bright colors and is produced by local artisans who maximize the potential of the surrounding environment (W & Trilaksana, 2015). In the production process, various activities involve arithmetic, such as determining fabric size, calculating dye mixing ratios, and calculating production costs.

Several ethnomathematical studies have been conducted on various batik motifs in Indonesia. According to (Rizqi & Lukito, 2021) Jetis batik has the potential as a source of mathematics learning based on local culture. In addition, (Kholid & Husodo, 2025) emphasized that the exploration of mathematical concepts in batik can enrich contextual learning innovations in schools. However, prior research on ethnomathematics in batik has largely focused on cultural motifs and geometric representations, with limited attention given to the embedded arithmetic practices within the production process. Furthermore, no empirical studies have specifically investigated the application of arithmetic concepts in the making of Jetis Sidoarjo batik, particularly within the production activities at the Namiroh Batik Shop, creating a clear research gap. Therefore, this research seeks to explore and systematically analyze the arithmetic concepts embedded in the process of making Jetis Sidoarjo batik, particularly within the production activities at the Namiroh Batik Shop. The novelty of this study lies in its focus on arithmetic aspects that have been largely overlooked in previous ethnomathematics research, which has predominantly emphasized geometric patterns. In addition, this study contributes to the development of contextualized mathematics learning resources based on local wisdom, thereby bridging abstract mathematical concepts with real-life cultural practices. Although several studies have examined mathematical patterns in batik motifs, the exploration of arithmetic concepts embedded in the practical production process remains underexplored. In fact, production activities provide a clearer representation of fundamental arithmetic operations that are directly aligned with elementary mathematics competencies.

This study is significant in advancing ethnomathematics research by uncovering arithmetic concepts embedded in cultural production practices that have been largely overlooked. Furthermore, it provides practical contributions to mathematics education by offering authentic, real-world contexts that can be utilized to develop contextualized and culturally responsive learning resources based on local wisdom. Based on these considerations, this study aims to explore the arithmetic concepts involved in the process of making Jetis Sidoarjo Batik at the Namiroh Batik Shop.

METHOD

This study uses a qualitative research approach to explore and understand social phenomena within their natural context. Within this approach, an ethnographic research design is employed to examine socio-cultural practices in Jetis Sidoarjo batik production. This design was chosen to describe and analyze the arithmetic elements contained in the process of making Jetis Sidoarjo Batik. Researchers play a key role in data collection and analysis in the field. The data source in this study was a single key informant, the owner of the Namiroh Batik Shop, who also serves as a Jetis batik craftsman. The informant was selected purposively based on criteria of experience, knowledge, and direct involvement in the batik production process. The phenomenon studied is Jetis Batik produced by the shop. The research was carried out at the Namiroh Batik Shop, Kampoeng Batik Jetis, Sidoarjo Regency, East Java, in November 2025. Data collection techniques include passive participatory observation, semi-structured interviews, and documentation. Observation is carried out using observation guidelines in the form of a record table to identify calculation activities, such as determining fabric size, mixing dyes, calculating production time, and determining selling prices. The interview uses a semi-structured question guide to gather information on the batik-making process, the way the craftsman calculates, and the cultural significance of the activity. Documentation in the form of photos of the production process, calculation notes, and an arithmetic proof of concept complements the research data and the scientific literature. Data analysis is carried out through the stages of data reduction, data presentation in a descriptive narrative, and concluding (Miles et al., 2014). The validity of the data is strengthened through source triangulation (Muzari et al., 2022) by comparing information obtained from the informant with relevant literature on Batik Jetis, Sidoarjo. Furthermore, prolonged engagement and careful observation during data collection were used to enhance the credibility and trustworthiness of the findings.

RESULTS AND DISCUSSION

RESULTS

The researcher summarized the results of interviews with subjects at the Namiroh Batik Shop related to calculation activities in the production process of Jetis Batik. The craftsman explained that fabric size is determined based on local standards (e.g., *"sak lawon"*), as stated: “We usually use ‘sak lawon’ as the standard size.” He also described that dyes are mixed using specific measurements or ratios to maintain color consistency, that production time is calculated based on work stages, and that selling prices are set based on material costs and working time. The findings of this study are summarized in Table 1.

Table 1. Summary of Arithmetic Concepts in Jetis Sidoarjo Batik Production

No	Production Activity	Arithmetic Concept	Description
1	Determining fabric size	Measurement and operations	Calculation of length and width using standard and local units
2	Mixing dyes	Ratio and proportion	Use of ratios and dosage to maintain color consistency
3	Production time	Time calculation	Estimation and division of time in each

No	Production Activity	Arithmetic Concept	Description
			production stage
4	Determining selling price	Social arithmetic	Calculation of cost, selling price, and profit

Based on the results of observations and documentation in the field, the findings of arithmetic concepts in Jetis Batik include: (1) measurement and calculation operations in determining fabric size, (2) comparison or ratio and measurement in the dyeing process, (3) calculation and time conversion in production, and (4) social arithmetic in determining selling prices. The identification of arithmetic concepts was conducted by mapping each stage of production to fundamental arithmetic operations found in the elementary mathematics curriculum. The following sections describe each finding in detail based on field observations and interview data.

Arithmetic in Determining Fabric Size

In the practice of batik, the fabric is determined through a standard size that is contextual. Subjects mentioned the standard size of the fabric as about 2 × 1.1 meters (called *"sak lawon"*), and then adjusted it to the type of product, e.g., 2 meters for clothes or sarongs, and about 2.5 meters for shawls. In addition, measurements were made using 20 × 20 cm cubic floors as auxiliary units. These units were used to simplify the measurement process and ensure consistency in estimating fabric dimensions, making it easier for the craftsman to perform practical calculations during production (Figure 1).

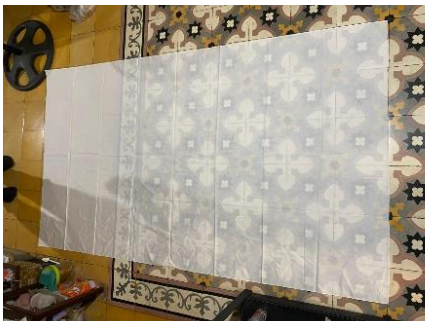


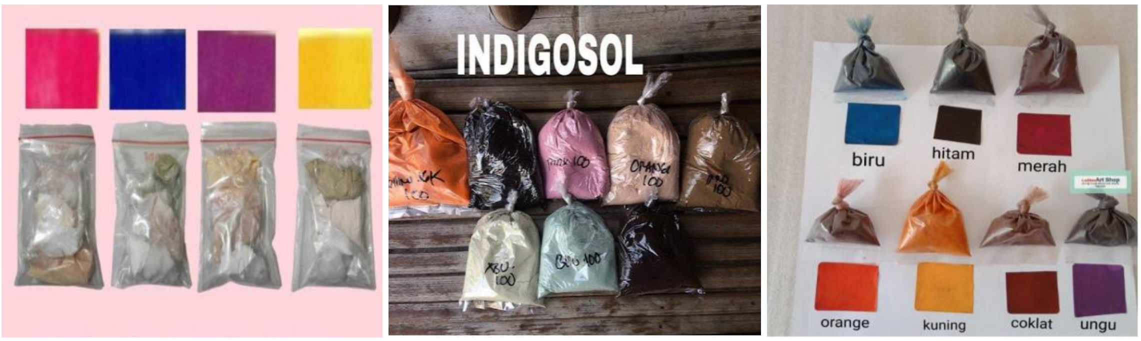
Figure 1. The Process of Determining the Size of Jetis Written Batik Fabric

To obtain a standard fabric size of 2 × 1.1 meters, craftsmen calculate the need for 10 × 5 $\frac{1}{2}$ cubic. These findings demonstrate explicit arithmetic operations as follows:

1 cubic = 20 cm
Length 10 cubic = 10 × 20 cm
= 200 cm
= 2 m
Width $5\frac{1}{2}$ cubic = 5.5 × 20 cm
= 110 cm
= 1.1 m
So, the size of the fabric obtained:
(10 × 20 cm) × (5.5 × 20 cm)
= 200 cm × 110 cm
= 2 m × 1.1 m

Arithmetic in Jetis Batik Coloring

It was found that several types of dyes, namely napthol, indigosol, and remasol, were used according to the needs of batik production. These types of dyes are shown in Figures 2.



(a) (b) (c)

Figure 2. (a) Types of Napthol Dyes; (b) Indigosol Dye Type; (c) Types of Remasol dyes

In addition to classifying dyes, artisans apply the concept of arithmetic clearly to the process of mixing colors, especially through the comparison of ratios and the dosage of the solution.

1. Color mixing ratio 2:1

Artisans use a 2:1 ratio (main color: reinforcing color) to maintain consistent coloring results. This ratio ensures that the dominant color remains balanced while the reinforcing color enhances the overall appearance without overpowering it. The composition of the mixture can be expressed as:

Main color $= \left(\frac{2}{3}\right)$ part of the mix

Reinforcing color $= \left(\frac{1}{3}\right)$ part of the mix

For example, if the total solution made is 900 ml, then:

Main color $= \left(\frac{2}{3}\right) \times 900$ ml = 600 ml

Reinforcing color $= \left(\frac{1}{3}\right) \times 900$ ml = 300 ml

2. Napthol Dosage 5 grams/1 liter of water

Artisans use napthol dye at a dose of 5 grams per 1 liter of water. If the need for a solution for one cloth is about 2 liters, then the need for napthol can be calculated as follows:

5 g/L × 2 L = 10 gram napthol

The craftsman dissolved the dye in 1 liter of hot water and 0.5 liters of cold water to produce 1.5 liters of the initial solution. If the target solution is 2 liters, then another 0.5 liters of water are needed. This process shows the application of multiplication and addition operations in volume measurement.

3. Dosage of Indigosol in Coloring

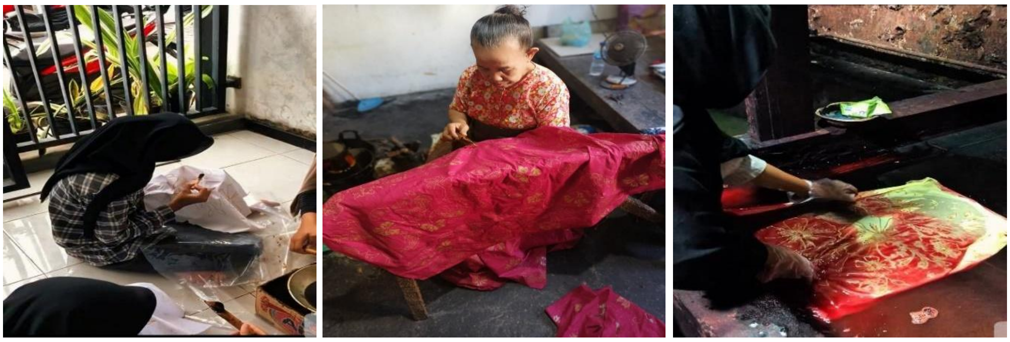
In addition to napthol, artisans also use indigosol dye to produce brighter and smoother colors. Using IndigoSol requires consistent dosage calculations to ensure the resulting color is evenly distributed. For example, if the artisan uses a dose of 4 grams of indigosol per 1 liter of solution, then to make 3 liters of dye solution 4 g/L is needed × 3 L = 12 grams of indigosol.

4. Dosage of Remasol in Staining

Remasol dye is commonly used for staining because it is easier to apply with the colet technique. Based on field observations, artisans determine the dosage by considering the ratio between dye powder and water. As the craftsman stated, "Usually, we use about 3 grams of Remasol for 500 ml of water." To produce 2 liters of solution, the calculation is as follows: 500 ml = 0.5 liters. Thus, 2 liters ÷ 0.5 liters = 4 times, so the required amount of Remasol is 3 grams × 4 = 12 grams.

Arithmetic in the Production Time of Jetis Batik

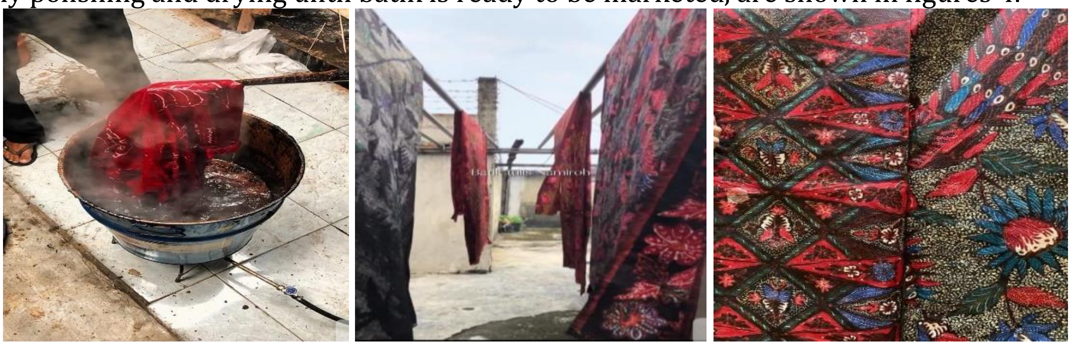
In the production process of Jetis Batik, artisans work in the following order: enchantment, then coloring, and finally color dyeing. The initial stages of production are shown in Figures 3.



(a) (b) (c)

Figure 3. (a) The process of initial casting (hollows) in written batik;
(b) The process of casting using night/candle;
(c) The dyeing process of color on the written batik

Each stage of production takes a different time. For example, the drying process takes about 5–10 minutes, while the drying process takes about 3–4 hours. The entire batik production process can take 1-3 weeks, depending on the level of difficulty, motif, and weather conditions. Arithmetic, this indicates the measurement of duration, the comparison of the length of time between stages, and the estimated total production time. The final stages of production, namely polishing and drying until batik is ready to be marketed, are shown in figures 4.



(a) (b) (c)

Figure 4. (a) The process of pardoning on a written batik;
(b) The process of drying batik tulis;
(c) Ready-to-market written batik

For mass production, artisans completed around 300 batik fabric pieces within ±4 months. If 4 months is assumed to be equivalent to ±120 days, then the average production rate can be calculated as follows:
300 sheets ÷ 120 days = 2.5 sheets/day.

In addition, artisans divide their working time between group or batch production. For example, the dyeing process is carried out for 20 pieces of fabric within 4 hours, so that the average dyeing time per sheet is:
4 hours ÷ 20 sheets = 0.2 hours/sheet = 12 minutes/sheet.
In the polishing process, 40 pieces of fabric take about 7–8 hours. If taken on average 7.5 hours, then the passage time per sheet is:
7.5 hours ÷ 40 sheets = 0.1875 hours/sheet ≈ 11.25 minutes/sheet.

Arithmetic in Selling Price Determination

In the practice of selling Jetis Batik, artisans distinguish the selling price based on the type of product, namely rough batik and alusan batik. Coarse batik is priced from around IDR 250,000, while batik alusan is priced from around IDR 900,000. The price difference is influenced by several factors, including the type of fabric used, the complexity of the motif, and the time required to work.

The determination of the selling price of batik is carried out by calculating production costs, including raw material costs and processing costs. Based on the interview results, the cost of raw materials includes standard white cloth at around IDR 50,000 per kilogram, batik night at around IDR 50,000 per kilogram, and dyes at IDR 200,000 to IDR 360,000 per kilogram. The process of determining the selling price can be modeled as follows:

Capital (M) = fabric cost + night cost + dye cost + labor cost
Selling Price (HJ) = Capital (M) + Profit (K)
Profit (K) = Selling Price (HJ) − Capital (M)

As an illustration of the calculation, if the total cost of raw materials used in one batik product consists of fabric costs of IDR 50,000, night costs of IDR 50,000, and dye costs of IDR 200,000, then the total raw material capital can be calculated as:

M = 50,000 + 50,000 + 200,000 = IDR 300,000

Furthermore, if the batik is marketed at a selling price of IDR 350,000, then the profit obtained can be calculated as:

K = HJ − M

K = 350,000 − 300,000 = Rp50,000

DISCUSSION

The discussion of findings is organized according to core arithmetic domains, namely measurement, proportional reasoning, time calculation, and social arithmetic, to demonstrate the structural alignment between cultural practices and formal mathematical concepts. This organizational structure allows for a systematic interpretation of how arithmetic concepts are embedded in each stage of the batik production process. By categorizing the findings into these domains, the analysis not only clarifies the conceptual mapping between informal practices and formal curriculum content, but also highlights the functional role of arithmetic as a decision-making tool in artisans' daily work activities.

The production process of Jetis Batik features an arithmetic structure systematically integrated into the artisans' work practices. Measurement activities, color mixing, production time management, and selling price determination are not only technical; they also represent a form of functional quantitative reasoning. These findings confirm that arithmetic concepts in the formal curriculum have a concrete connection with people's cultural practices. This result strongly supports (D'Ambrosio, 1985) theory of ethnomathematics, which argues that mathematical knowledge is not exclusively constructed within formal educational settings, but is inherently generated, developed, and applied within cultural contexts. The arithmetic practices observed in the Jetis Batik production process demonstrate how mathematical thinking emerges organically through daily activities, reinforcing the view that culture-based practices constitute a legitimate and meaningful source of mathematical knowledge.

At the stage of determining the fabric size, the use of local units, "*sak lawon*," combined with the 20 × 20 cm floor measurement, indicates a quantification process based on standard units. This finding aligns with previous studies on the integration of informal and formal measurement systems in students' mathematical reasoning. However, this study differs in that the quantification process emerges from culturally situated practices rather than structured classroom instruction. Consequently, this study contributes by demonstrating how ethnomathematical contexts facilitate the articulation of local and standardized measurement systems within authentic learning environments. In addition to this quantification process, calculating the length and width of the fabric through cubic iterations and converting from centimeters to meters demonstrates understanding of the structure of the metric system and the relationship between units of length. Conceptually, this practice aligns with the construction of long-term measurement learning at the elementary school level (Sarama et al., 2021). Furthermore, the use of decimal numbers in the representation of fabric sizes shows the operation of rational numbers in real contexts, which is related to the mastery of multiplication operations and decimal representations (Abdullah et al., 2025). Thus, measurement activities in batik production not only demonstrate procedural competence but also conceptual coherence with unit systems and numerical representations. This finding aligns with previous research on batik ethnomathematics (Kholid & Husodo, 2025; Rizqi & Lukito, 2021), which highlights the potential of batik as a context for mathematics learning. However, while prior research has predominantly focused on geometric aspects, this study emphasizes arithmetic practices embedded in the production process, thereby providing a more comprehensive perspective o mathematical applications in batik culture.

More complex arithmetic structures are seen in the coloring process. The application of a 2:1 ratio between the main and reinforcing colors reflects the principle of proportionality, in which the relationship between the components is maintained even as the total amount of solution changes. In practice, this ratio serves as a guideline for maintaining color consistency and reproducibility, suggesting that artisans apply implicit proportional reasoning to control dye composition. The representation of parts to the whole is consistent with the development of the concept of ratios and fractions in mathematics learning (Y. M. Sari et al., 2023). In the context of production, ratios serve as a quality control mechanism; Proportion inaccuracy directly affects color consistency. This shows that arithmetic operations in color mixing serve as a regulative strategy to maintain the stability of production outputs. The use of grams per liter in napthol, indigosol, and remasol shows a linear relationship between units of weight and volume. As the volume increases, the amount of dye increases proportionally through multiplication operations. The relationship between units of weight and volume is in line with the development of the concept of measurement in the basic curriculum (Montoro et al., 2021). In addition, unit conversion from milliliters to liters and the determination of volume multiples show the integration of unit division and transformation operations consistent with the development of the concept of comparison and calculation operations (Y. M. Sari et al., 2023). Thus, the Jetis Batik dyeing process represents a stable, measurable, and conceptual pattern of quantitative relationships. Beyond its mathematical structure, the color scheme also reflects ethnographic significance, as the selection and combination of colors embody cultural values, aesthetic traditions, and local identity that have been passed down across generations of artisans (D'Ambrosio & Rosa, 2017; Rosa et al., 2015).

In the aspect of production time, arithmetic functions as an instrument for managing work efficiency. Based on field data, artisans can complete approximately 300 batik pieces within ±120 days, indicating an average production rate of 2.5 pieces per day. This calculation demonstrates the use of division as the basis for representing productivity and reflects the concept of simple averages in a quantitative context (Vessonen et al., 2025). Furthermore, the division of total processing time by the number of fabrics produced, as seen in the dyeing and polishing processes, reflects time unitization, in which the total duration is transformed into time per unit of production. This practice reflects the development of numeracy skills, as artisans use quantitative reasoning to interpret, calculate, and apply time-related information in real production contexts, showing that time quantification is not only descriptive but also operational in planning and evaluating production performance.

At the stage of determining selling prices, artisans calculate the total production cost by summing the costs of fabric, wax, dyes, and labor, and then compare it with the selling price to determine profit. As shown in the results, a total capital of IDR 300,000 and a selling price of IDR 350,000 result in a profit of IDR 50,000. This practice demonstrates that the structure of social arithmetic is applied through the calculation of capital and profit. The sum of all cost components and the subtraction between the selling price and capital represents the concept of profit–loss as developed in mathematics learning (Vessonen et al., 2025). However, the practice of pricing in the production of Jetis Batik is not purely mechanical, as it also considers the quality of materials and the complexity of motifs as variables that determine value. Thus, numbers in this context serve not only as the results of calculations but also as representations of economic and labor value. This shows that social arithmetic plays a role in economic rationalization that supports the sustainability of the batik business.

Overall, the findings of this study show that length (Sarama et al., 2021) decimal number operations (Abdullah et al., 2025) ratios and fractions (Y. M. Sari et al., 2023) units of weight and volume (Montoro et al., 2021)), and social mean and arithmetic (Vessonen et al., 2025) not only present as an abstract concept in the formal curriculum, but articulated in real life in the production practice of Jetis Batik. These findings strengthen the argument that mathematics is contextual and integrated in the socio-economic activities of society. Thus, the production of Jetis Batik can be understood as an applicative space that reflects the coherence between the conceptual structure of formal mathematics and local cultural practices. However, this study is limited to observations within a specific production context and does not extensively compare variations across different batik centers or production scales. Therefore, future research may explore broader comparative studies or investigate other mathematical concepts embedded in diverse cultural production practices to enrich the understanding of ethnomathematics in wider socio-economic contexts.

From a pedagogical perspective, the findings can be developed into contextual tasks such as: (a) converting local-to-standard units (tile-based measurement to meters), (b) solving ratio problems based on dye mixing scenarios, (c) calculating average production rates and time per cloth, and (d) analyzing profit–loss using simplified cost structures. These tasks may support students' conceptual understanding because they connect arithmetic operations to meaningful and familiar cultural contexts.

CONCLUSION AND SUGGESTIONS

This study aims to explore the arithmetic concepts embedded in the production process of Jetis Batik at Namiroh Batik Shop through a qualitative, ethnographic design. The findings indicate that arithmetic is systematically integrated into artisans' practices, including measurement to determine fabric size, ratios in dye mixing, time calculation in production management, and social arithmetic to determine capital, selling price, and profit. These results show that arithmetic functions as a practical tool within real production activities. Thus, the production of Jetis Batik reflects the coherence between formal mathematical concepts and local cultural practices, while also demonstrating that arithmetic serves as a foundational domain embedded in socio-economic and artistic activities.

Practically, these findings support the development of culturally grounded mathematics teaching materials, particularly for elementary school arithmetic. Integrating the context of Jetis Batik into learning can enhance students' conceptual understanding, connect mathematics with real-life experiences, strengthen mathematical literacy, and contribute to cultural preservation by positioning local practices as meaningful learning resources within ethnomathematics. However, this study is limited to a single production setting and a limited number of participants. Therefore, future research is recommended to involve broader contexts, compare different batik production centers, and examine the implementation of ethnomathematics-based learning to evaluate its impact on students' understanding and mathematical literacy.

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