

Ethnomathematics In Wayang (How to express it, and its philosophy)

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ABSTRACT

Ethnomathematics, is the basic substance of nature and life, including wayang among the existing branches. This article will try to describe 1. ways to express ethnomathematics in wayang, and 2. the philosophy of ethnomathematics in wayang. The way to obtain ethno-mathematical data in wayang is multi-disciplinary: hermeneutics, semiotics, dialectics and referentics, the approach is Javanese, namely a spiritual understanding of religion. The objects taken are wayang in general, especially those on YouTube, which are then extracted in such a way. As a result, 1. the way to express ethnomathematics in wayang is by: a. language, either: 1). verbal, meaning the language of words, or sentences spoken orally, 2). non-verbal means that it is expressed with gestures, it can be objects, or behavior, or b. numbers, either: 1). thank you, 2). approximately, and 3). tone. 2. Ethnomathematics philosophy in wayang, whether expressed by a. language: 1). verbally, 2). non-verbal, or with b. number: 1). thank you, 2). approximately, or 3). This tone is a Javanese understanding, namely spiritual religion, the magnitude of God whose magnitude is not measured by numbers, which is clearly beyond the limits of human reason.

Keywords: ethnomathematics, wayang philosophy

INTRODUCTION

A dalang is a person who presents wayang (Murtiyoso, 1977:17). Wayang is a depiction of nature and life (Soetarno, 1996:12). Because a dalang is a person who presents wayang, while a wayang is a depiction of nature and life, then a dalang is of course someone who is skilled in everything, both nature and life. So the dalang is skilled in everything, both nature and life, because nature and life are perfect things (Soetarno, 1996: 13).

Perfection in terms of nature can be conveyed, for example, that there is earth, sun, sky, moon, stars, mountains, oceans, humans, animals, plants, and so on (Nasir, 2021:23). perfection in terms of life, for example, there is human life complete with its main points such as politics, economics, social, culture, religion, and so on with all its branches, and all with its aims, knowledge and values (Suryana, 2004:40). Not to mention the perfection of this life, there is animal and plant life, even jinn, demons and angels which are untouchable by humans (Nata, A. 2013:27). It is towards the perfection of nature and life that the puppeteer is required for his skill in presenting (Soetarno, 1978:41).

If a dalang is not skilled in everything, both nature and perfect life, of course he will not be able to present wayang as a picture of nature and perfect life. Therefore, it is appropriate that during this time the title of greatness is: Ki. or the Kyai is attached to the mastermind.

The predicate Ki (Ki. dalang) is the greatness that is given to adalang because of the perfection of his knowledge, in the sense of being competent in various sciences, both natural and life sciences, both principal and branches (Sholihin, 2009:61). The predicate of Kyai (Kyai Dalang), because the dalang is a consistent muslim, in this case is being a muslim scholar, and a preacher who is associated with the Wali (people who are experts in preaching) (Abdullah, 2002:42). However, there is no denying the limitations of dalang, so there are levels of dalang based on their expertise - such as dalang wikalpa, dalang purba, and dalang sejati. A dalang wikalpa is a dalang who is still teaching and has not yet mastered his knowledge, dalang purba is a dalang who has mastered his knowledge, but is still controlled by the atmosphere and circumstances, and dalang sejati is a dalang who is already skilled in everything, has mastered his knowledge, and can also control the atmosphere and circumstances (Adrian, 2012:12).

Nature and life have principal and branches. This natural principle exists; earth, sun, sky, moon, stars, mountains, oceans, the basics of life exist: social, political, economic, religious, and so on (Leo Air Day, ND:10). All of nature and life can be seen in various scientific aspects such as the natural science side, the life side, the cultural science side, philosophical science, religious science, and so on, including the science of cultural unity and numbers or measurements, namely ethnomathematics (Ozias, 1990:4).

Based on the background as described above, this article aims to describe: 1. how to express ethnomathematics in wayang, and 2. the philosophy of ethnomathematics in wayang.

Regarding the aim of the article as stated above, an initial question was created which is expected to lead to the achievement of the final aim of this article, namely: 1. how to express ethnomathematics in wayang, and 2. what is the philosophy of ethnomathematics in wayang?

LITERATURE REVIEW

1. Ethnomathematics in Wayang

a. Ethnomathematics

Ethnomathematics in wayang, ethno or ethnic is explained by Abi (2016: 13), meaning culture as human reason and mind which is presented in life, mathematics is quantity which is presented in the form of numbers 1, 2, 3 and so on, in essence it is a measure that can achieved by humans, except within their limitations.

Thus, ethnomathematics is a combination of ethno (culture) and mathematics (numbers) (Euis Fajriyah 2018:4). Entnomathematics is a combination of culture and numbers, existence in nature and existing life. Even the substance of nature and existing life is ethnomathematics or culture and numbers.

Nature exists like the planets, rotating on their axis. The size of the planet is measured, the distance and proximity of the planets to each other are also measured, their weight is measured, their moving speed is measured, and so on, all are measured (Liu, 2021:22). The earth is big, the sun is even bigger, it is said that it is 1000 times the size of the earth. The sun is big, even bigger stars are said to be 1000 times the size of the sun. The distance between the sun and the earth is 1500 km (kilo meters), the distance between the sun and the planets is also 1500 km (S. Malik 2012:74).

Existing life, such as politics, economics, culture, religion, are all measured in size and distance. Political life for this nation, for example, is the rank of sampiran, the life of gadhohan, and children entrusted. This means that this politics is about magnifying God. God is great, humans are small. The greatness of God is immeasurable, the smallness of humans is very, very small compared to the magnitude of the earth, let alone the sun, especially the stars and the sky. The size of a human being that can be seen is slender, meaning it is not even a meter long. The distance of human life is adoh without wangenan, cedhak without touching (if it is far it is very far, if it is close it is very close, closer than its own jugular vein).

Starting from the statement that: in fact nature is serving (serving) humans in its efforts to be civilized towards God, so you can imagine what it would be like if this nature no longer served humans, because humans are no longer civilized towards God. If this nature no longer serves humans, because of the actions of humans who are no longer cultured towards God, then this nature will fall apart, its big and small are immeasurable, its far and near positions are immeasurable, its fast and slow movements are also immeasurable. Because nature is like that, life will also fall apart (Abdul Halim Mahmud, 2003:17).

Based on this statement, the nation continues to live its life in a measurable way in various main and existing branches, including the main art with existing branches such as wayang.

b. Wayang

Wayang is a puppet show presented by a dalang with: 1. facilities, 2. arrangement of furniture and actors, and 3. operational presentation (Amir, 1991:13).

The means in question are things that need to be prepared in the presentation, the arrangement of furniture and actors is the arrangement of the position of the furniture and actors when the facilities are to be put into operation, while the presentation operations in question are the operational presentation of the wayang from what has been prepared.

c. How to Express Ethnomathematics in Wayang

How to express ethnomathematics in wayang, borrowing thoughts (Sutarno, 2004:16), in expressing the ethnomathematics of nature and life in general, can be done with: 1. language, either: a). verbal, meaning words or sentences, or non-verbal meaning symbols of goods or signs, and 2. the number of something that is measurable: 1, 2, 3, and so on, specifically in wayang the meaning is: a). thuthukan, b). count, and c). tone.

2. Philosophy

a. Understanding

Philosophy is Indonesian, Arabic is falsafah, English is philosophy, Dutch is filosofie (Mulyono, Sri, 1976:13). Philosophy is the most basic meaning of something, or the most substantive meaning of something, or the deepest meaning of something (whichever language or sentence is easy to understand).

Philosophy is not what is on the surface, but what is behind the surface (Magniz Suseno, 1975:13). In addition, Magniz Suseno explained the meaning behind what appeared in these words: "Son, you should have passed your exam this year, but for some reason, you may pass your exam next year." Based on Magniz Susena's explanation, what appears is that he will be allowed to graduate next year, which does not appear to be due to some reason.

b. Ways to Get a Philosophy of Something

The way to get a philosophy from something can be done using hermeneutics, semiotics, dialectics and referentics (Lasio, 1918:17). By hermeutics, what is meant is by interpreting existing words (Umar Kayam, 2001: 20), by semeotics, what is meant by being interpreted by symbols and signs (Sri Mulyono, 1995: 15), by dialectics, what is meant by being asked about their meaning (Sunardi, 1982:67), with referentiality by searching for its meaning based on existing references (Rachel, 2004:14).

3. Approach to the Meaning of Ethnomathematical Philosophy in Wayang

The approach to ethnomathematics philosophy in wayang is Javanese. The Java referred to is not Java in the sense of: place, tribe, race or class, but an understanding based on spiritual religion, especially Islam. So it is based on the spirituality of religion, especially Islam, because Javanese culture is theoretically derived from religion (Ministry of Education and Culture, 1982: 13), then especially Islam, because Islam in Java reached the peak of its glory and is still continuing to this day. has not faded (Sujuddin, 1981:47). It is against this Islamic religion (which reached the peak of its glory and has not faded to this day) that it is said that Sri Sultan Hamengku Buana (HB) IV said that: Jawa ki Islam (Java is Islam) (Sujuddin, 1981:17).

4. Wayang

Wayang are presented by variousb dalang, various plays, events and places. For example, this wayang was presented by Ki dalang Anom Suroto in the play Semar mBangun Kayangan, at the Independence Day of the Republic of Indonesia (youtobe <https://www.youtube.com/watch?v=Ct9Gq4HVqVw>), in Klaten. Another one was also

presented by Ki the puppeteer Slank, Makutharama's play at the in-laws event, in Solo (youtube <https://www.youtube.com/results?search=>). Presented by Ki puppeteer Cahyo Kuntadi, the play Gatutaca Kridha, at supitan events, in Boyolali (youtube <https://www.youtube.com/results?search=>), and so on.

Soetarno (2007:17) explains that wayang, whoever the dalang is, whatever the play or event, wherever the place is, can be summarized from the discussion: 1) facilities, 2) arrangement of furniture and actors, and 3) operational presentation.

1) Wayang Facilities

If you can point out the wayang facilities in detail, there are many, but basically there are only 3, namely: 1. story, 2. furniture, and 3. actors.

a. Story

The stories (wayang stories), are the Mahabarata and the Ramayana. Mahabarata tells the story of the Pandavas and Kurawas fighting over wealth and the throne was won by the Pandavas, for more details see Ki. Dalang Puspa Pandaya, on YouTube: <https://www.youtube.com/watch?v=EGaNIxewdUs>, while Ramayana tells the story of Rama-Ravana in the war over the woman Dewi Sinta, Rama's wife, who was won by Rama, for more details also see Ki. Dalang Manteb Sudarsono on YouTube: <https://www.youtube.com/watch?v=Yws82nNPwYY>.

b. Furniture

Wayang furniture, namely: 1) wayang (doll) as the main one, two-dimensional in shape, flat made of buffalo or cow skin with slanted images, not like a four-dimensional human being which is methok or facing, 2) wicket-kelir, 3) blencong, 4). gedebog, 5) box, and 6). Gamelan consists of: kendang, gendher, kenong, balungan dhemung, saron, centhe, kempul and gong (see YouTube https://www.youtube.com/results?search_query=penataan+perabot+wayang+)

c. Perpetrator

Wayang perpetator, namely 1) the dalang as the main one, has full authority over the wayang including the facilities, the arrangement of furniture and actors, as well as the presentation, 2) the dalang consist of: pengendhang, penggendher, pengenong, pembalung, pengempul and pengegong, 3) pesindhen, all as a supporting actor (see YouTube <https://www.youtube.com/watch?v=Ct9Gq4HVqVw>).

2) Arrangement of Furniture and Wayang Perpetrator

The arrangement of furniture and wayang perpetrator is an initial pre-condition before wayang (Sastroamidjojo, A. Seno. 1964). As for the arrangement of the furniture and wayang prepetator, the screen is at the very front, with gedebog, wayang simpingan (wayang arranged on the right and left opposite each other), and kothak. The gamelan is behind the wayang and so are the actors in accordance with the gamelan being played. Especially for singers, it's at the back (see the gamelan arrangement on YouTube: https://www.youtube.com/results?search_query=).

3) Wayang Presentation Operations

The operations of wayang presentation are sequential from beginning to end: a. uyon-uyon, b. talu, c. wayang (see Nartosabdo the play Bima Sakti on YouTube: <https://www.youtube.com/watch?v=mSd33Z7jIH4&t=53s>).

a. Uyon-uyon

Uyon-uyon, is a musical performance that is played when the audience arrives (see Nartosabdo in the play Bima Sakti on YouTube: <https://www.youtube.com/watch?v=mSd33Z7jIH4&t=53s>). The musical pieces that are played when the audience arrives include: the musical piece ladrang Slamet. Here are the notations and verses:

Notation

Buka: 132 6123 1132 .126
2123 2126 33.. 6532
5653 2126 2123 2126

Verse

Parabe Sang Smara Bangun
Sepat domba kali Oya
Aja dolan lan wong priya
Gerameh nora prayoga

b. Talu

Talu, is a musical piece that is played when the wayang is about to start (Hastanto, Sri. 2009:18). The musical pieces that are played when the wayang starts are: Cucur Bawuk to Sampak. To be clear, 1. Cucur Bawuk, 2. Pareanom, 3. Sukma Ilang, 4. ayak-ayak, 5. srepeg, and 6. sampak. Following are the notations and verses of the piece Cucur Bawuk:

Notation

. 3 . 2 . 3 . 2 . 5 . 3 . 2 . 1
2321 2321 3532 3532
5356 5356 5356 5321
2321 3532

Verse

Tunggal basaning prasangka
Ramane thole
Amiwiti sindhen sendhoning pradangga

c. Wayang

Wayang (wayang presentation), is sequential starting from: bedhol kayon, to golek (see on YouTube Anoman Maneges, by Ki dalang Anom Suroto: <https://www.youtube.com/watch?v=4yyDTBlgbNo>). Clearly, bedhol kayon up to golek are: 1. bedhol kayon, 2. jejer, 3. jaranan, 4. Perang gagal, 5. kapdhitan scene, 6. Perang kembang, 7. perang amuk-amukan, 8. tanceb kayon scene, 9. golek.

1. Bedhol Kayon

Bedhol kayon, is pulling out the kayon in the middle of the screen when the wayang starts. Pulling out the kayon in the middle of the screen when the wayang starts, is done using the technique of pulling the kayon with the fingers of the right hand upwards, then pulling it down 3 times, holding the top of the

kayon in the left hand and massaging it while praying, when finished, then rotate it 3 times and stick it in the goal. on the right (see YouTube Ki dalang Sayoko, Dewaretno's play at: <https://www.youtube.com/watch?v=dhC-I363jV0>)

2. Jejer

Jejer, is the first wayang scene that came out. Jejer, as the wayang scene that first came out, is a kingdom, where the king is faced by a patih, senapati, priest, and soldiers (see YouTube Ki dalang Sayoko, Dewaretno's play at: <https://www.youtube.com/watch?v=dhC-I363jV0>).

3. Jaranan

Jaranan, is the departure of soldiers to a place, it could be a country, it could be a padhepokan, or whatever, basically they go by horse or horsean (see YouTube Ki dalang Sayoko, Dewaretno's play at: <https://www.youtube.com/watch?v=dhC-I363jV0>).

4. Perang Gagal

The perang gagal, it was the first war between the Pandavas and the Kauravas. This failed war was sometimes won by the Pandavas, sometimes also won by the Kauravas. Regardless of whether it was won by the Pandavas or the Kurawas, what is clear is that this war is not over yet, each of them is still continuing their efforts to achieve their goals ((see YouTube Ki dalang Sayoko, Dewaretno's play at: <https://www.youtube.com/watch?v=dhC-I363jV0>).

5. Kapandhitan Scene

The Kapandhitan scene is a scene where a warrior learns knowledge from a Pandita, in this case his own grandfather, namely Begawan Abiyasa from the Sabtaharga hermitage, to gain enlightenment (see YouTube Ki Nartosabdo, lakon Narasoma: https://www.youtube.com/watch?v=wyTgw5_v-j0).

6. Perang Kembang

The perang Kembang is a war between warriors and blind cakils, with an unreasonable, meaningless problem, namely simply because warriors are not allowed to pass on a road. This war was won by the knights, Blind Cakil lost and was killed by his own dagger (see Bayu Aji's YouTube: <https://www.youtube.com/watch?v=co7VUY6jvsI>).

7. Perang Amuk-amukan

The perang amuk-amukan was the core war, where the Pandavas succeeded in achieving their goals, while the Kurawas did not. The Kurawas were jealous of the Pandavas who succeeded in achieving their dream, until it became a perang amuk-amukan, won by the Pandavas, the Kurawas lost and ran away (see YouTube of the puppeteer Ki Nartosabdo's play Bima Sakti at: <https://www.youtube.com/watch?v=mSd33Z7jIH4>).

8. Tanceb Kayon Scene

The tanceb kayon scene is the final scene of the wayang when it is finished, where the Pandavas are grateful for their success in achieving their goals. This scene is then continued with tayungan, namely Werkudara dancing (see YouTube of puppeteer Ki Nartosabdo: <https://www.youtube.com/watch?v=mSd33Z7jIH4>)

9. Golekan

Golekan, is a game of wayang golek dancing (see YouTube <https://www.youtube.com/watch?v=QB-Vfczzc5c>). This wayang golek has a four-dimensional shape, somewhat like a human, compared to shadow puppets. Golekan is served after the wayang is finished (tanceb kayon). This golekan has nothing to do with the story or puppet presented. Golekan is played accompanied by the ladrang piece Kijing Miring. (see YouTube <https://www.youtube.com/watch?v=QB-Vfczzc5c>). Here are the notations and verses:

Notation

33 3635 1621 3216

2126 2126 2321 6532

5352 5352 3635 2126

Verse Ladrang kijing miring, Anelasak uga tansah eling Rehing rasa rasaning warna warna, Aja sembrana tansah gawe cuwa

(<http://liriklanggam.blogspot.com/2016/10/ladrang-kijing-miring.html>)

Wayang in sequence starting from the bedhol kayon up to the golekan, contain the following elements: a. chess, a. sabet, and c. accompaniment (see YouTube: https://www.youtube.com/watch?v=M1_oK5GFAr8).

10. Catur

Catur, is the language of dalang when mendalang (puppeteering). This catur has: (1) janturan, (2). pocapan, and (3). ginem. Janturan is the language of the dalang accompanied by gendhing sirep (gending that are beaten in a low voice). Pocapan is the language of the dalang, while ginem is the wayang dialogue. The following is janturan as an example of chess (not all chess is presented here, because it will a huge amount):

“Swuh rep data pitana, anenggih wau kocapa negari pundi ta ingkang kaeka, adi, dasa, purwa. Eka sawiji, adi linuwih dasa sepuluh. Purwa wiwitan. Nadyan kathah titahing dewa ingkang kasongan ing akasa akasa kasangga ing pratiwi, naging datan kadi negari ing angke ingih punika nagai Hastina. Tuwu negara kang panjang-punjang gemah ripah loh jinawi, tata raharja. Panjang dawa pocapane, punjung luhur kawibawane, pasir samodera, wukir gunung.....” (for the rest see janturan:

(https://www.youtube.com/results?search_query=wayang)

11. Sabet

Sabet, are the movements of a wayang, starting from cepengan (how to hold a wayang) to fighting (see Ki. Manteb Sudarsono's YouTube in the play Arjuna Wiwaha: <https://www.youtube.com/watch?v=9epiRVpqhtk>). There are many specific movements for this wayang, there are nglorot kayon movements, worship movements, walking movements, dancing movements, war movements, and so on (not all are mentioned).

An example of the kayon nglorot movement is that the kayon is pulled out with the fingers of the right hand, pulled down three times, the tip is massaged with the fingers of the right hand, then rotated three times and stuck in the right goal.

12. Accompaniment

The accompaniments are: sulukan (a type of song), gendhing (wayang music), tembang, dhodhogan (a box hit with a tool called a cempala) and keprakan (an iron plate struck by the puppeteer's feet) which are used to accompany wayang scenes. There are many sulukan, gendhing, tembang, dhodhogan and keprakan used to accompany this wayang scene. The following is an example of Nem's pathet sulukan, Nem's srepeg accompaniment and the song:

Sulkan

nDan sembah niring ulun

Kapurba risang murbeng rat O

Ing sahananingkang O

Hyang kanang sih ing dasih

Maweh boga sawegung

Sagung mring delahan O

Hyang kanang mamujweng rat O"

(see sulukan: <https://www.youtube.com/watch?v=wfMjxq9ezEk>)

Srepeg Nem Notation

6565 23535353

5235 i653 6532

3232 35656565

2353 5353 5235

1653 6532 3232

3532

3232 3532

Song Srepeg Nem

Kawi Dewa

Giwanging wulan purnama

Yan dhuk anjentara

Limpating pasang nggraita

d. How to Express Ethnomathematics in Wayang

The way to express ethnomathematics in wayang is by: 1. language, either a. verbal, or b non-verbal, and 2. numbers.

e. Ethnomathematics Philosophy in Wayang

Ethnomathematics philosophy in wayang is collectively a human offering to the Almighty God, whose magnitude can no longer be measured by numbers, nor can the human mind reach it. Furthermore, the ethnomathematics philosophy contained in wayang in detail is as follows.

1. Ethnomathematics Philosophy Expressed in Language

a. Verbal

Ethnomathematics philosophy expressed verbally in wayang presentation operations: 1). uyon-uyon, 2). talu, 3). wayang.

1) In Uyon-uyon

In uyon-uyon, the piece that is played when guests arrive is the piece ladrang Slamet whose poetry is sung in the following language, words or sentences:

*Parabe Sang Smara bangun
Sepat domba, kalioya
Aja dolan lan wong priya
Gerameh nora prayoga.*

The philosophy in Slamet's uyon-uyon gendhing ladrang, whose poetry is sung using this language, words or sentences, is to remind people of God not to act carelessly when going out to play with other women, because that is not good.

2) In Talu

In talu, the karawitan chants poetry in the form of language, words or sentences:

*Tunggal basaning prasangka
Ramane thole
Amiwiti sindhen sendhoning pradangga*

The philosophy in talu on karawitan, which recites poetry in the form of language, words or sentences, is to remind humans of God who has ordained all humans.

3) In Puppet

In wayang, the chess element: janturan, expresses the greatness of the country:

"Swuh rep data pitana, dan seterusnya melukiskan sebuah negeri yang panjang-punjung, panjang dawa pocapane, punjung luhur kawibawane.....".

The philosophy in the catur janturan element that expresses the greatness of the country is: a prayer offered to God so that everything will be good and especially for this country it will also be a blessing for the long term.

In the accompaniment elements of the srepeg, it says:

*Kawi Dewa
Giwanging wulan purnama
Ya ndhuk anjentara*

Limpating pasang grait

The philosophy in the accompaniment element of the srepeg song is that all men and women should always see God's signs.

In wayang, the accompaniment elements of sulukan express:

Ndan sembah niring ulun

Kapurba risang murbeng rat O

Ing sahananing kang O

Hyang kanang sih ing dasih

Maweh boga sawegung

Sagung mring delahan O

Hyang kanang mamujweng rat O"

The philosophy in the sulukan accompaniment element is to remind all humans to make offerings to God

In the wayang golek presentation, there is the Kijing Miring ladrang karawitan which accompanies the dancing puppets, where the Kijing Miring ladrang karawitan who accompanies the dancing wayang sings poetry in the following language, words or sentences:

Ladrang Kijing Miring,

Anelasak uga tansah eling Rehing rasa rasaning warna warna,

Aja sembrana tansah gawe cuwa

The philosophy of the Kijing Miring ladrang poetry in the golek wayang presentation is to remind humans of God, that humans, by His will, will not be able to escape death.

b. Non Verbal Language

Ethnomathematics philosophy expressed in non-verbal language, in 1). means, 2). arrangement of furniture and actors, and 3). serving operations.

1) In Means

In the form of wayang stories, these are the Mahabarata and Ramayana. The Mahabarata tells of the Pandawa-Kurawa war fighting over the Pandawa's property and the throne was won by the Pandawas. Meanwhile, the Ramayana tells the story of Rama-Ravana in the war over the woman Dewi Sinta, Rama's wife, who was won by Rama.

The philosophy of ethnomathematics in the wayang story is a war between good and evil, won by good. Pandawas as a symbol of goodness, Kauravas as a symbol of evil. Likewise, Rama is a symbol of goodness, Ravana is a symbol of evil.

In terms of furniture, expressed in non-verbal language, there are wayang, wicket-kelir, blencong, kothak, and gedebog.

The ethnomathematics philosophy in the furniture items: wayang, gawang-kelir, blencong, kothak, gedebog and gamelan, is to remind humans of nature as a sign of God's greatness. Wicket color: sky, blencong: sun, gedebog: earth, kothak grave.

In the means of the actors, expressed in non-verbal language, there are: 1 puppeteer, 12 musicians, there are pengendhang, penggong, pembalung, and pesindhen.

Ethnomathematics philosophy in the form of actors: 1 dalang, 12 musicians, there is a pengendhang, pengegong, pembalung, and 1 pesindhen, is to remind humans of the existence of God who has full authority over nature and life, because of all this, God created it.

2) In Arranging Furniture and Actors

In the arrangement of furniture and actors, the arrangement of furniture and actors: kelir is at the very front, with gedebog, wayang simpingan, and kothak. The gamelan is at the back of the wayang and the performer according to the gamelan being played, the pesindhen, is at the back.

The ethno-mathematics philosophy of arranging the furniture and actors is an offering in the form of the shari'a, which means not committing an offense where women who are not the mukrim (not relatives) are not allowed to be seen, so that they are positioned at the back, far from the mastermind.

3) In Wayang Presentation Operations

(a) Bedhol Kayon

The operation of presenting the bedhol kayon wayang is to remove the kayon in the middle of the screen when the wayang starts. Pulling out the kayon when the wayang starts is done by pulling it with the right hand upwards, then rotating it, lowering it down 3 times, holding the top of the kayon in the left hand, massaging it while praying, then rotating it 3 times and sticking it in the right goal.

The philosophy of bedhol kayon ethnomathematics is a prayer offered to God so that the life lived is always protected, so that one can survive.

(b) Jejer

Jejer, is the first wayang scene that came out. The wayang scene that first appeared was a kingdom, where the king was faced by a patih, senapati, priests and soldiers.

The ethnomathematics philosophy of jejer is that humans are born without any problems, everything is still fine, in fact they are highly glorified and respected, like a king whose opinion cannot be challenged.

(c) Jaranan

Jaranan, is the departure of soldiers to a place, either a country or a hermitage, by riding a horse or horse

The philosophy of jaranan ethnomathematics is learning to control lust, where lust always controls humans. Lust is not killed, but controlled.

(d) Perang Gagal

The perang gagal, it was the first war between the Pandavas and the Kauravas. This war was sometimes won by the Pandavas, sometimes also won by the Kauravas. Regardless of whether the Pandavas or Kurawas won, what is clear is that this war is not over yet, each of them is still continuing their journey in an effort to achieve their goals.

The ethnomathematics philosophy of failed war is a war against lust. This war against lust, even though we have studied in such a way, still fails, meaning it has not succeeded, so we still have to study again and again;

(e) Kapandhitan

The Kapandhitan scene is a scene where a warrior learns to gain enlightenment in a knowledge from a Pandita, in this case his own grandfather, Begawan Abiyasa from the Sabtaharga hermitage.

The philosophy of kapandhitan ethnomathematics is to study with a teacher who knows how to control one's desires properly.

(f) Perang Kembang

The perang kembang is a war between warriors and blind Cakils, with a problem that doesn't make sense, or has no weight, namely simply because warriors are not allowed to pass on a road. This war was won by the warrior, Blind Cakil lost and was killed by his own dagger.

The ethnomathematics philosophy of kebang war is a war against lust. Here people are able to control their own desires, to the point that blind Cakil as a symbol of lust dies when they are hit by their own keris weapon.

(g) Perang Amuk-amukan

The perang amuk-amukan was the last war in which the Pandavas succeeded in achieving their goals, while the Kurawas did not. The success of the Pandavas in achieving this goal made the Kurawa jealous and then fought the Pandavas. This perang amuk-amukan was won by the Pandavas, the Kauravas lost and ran away.

The ethnomathematics philosophy of rampage, is success in achieving goals, so it is described as a perang amuk-amukan which the Pandavas won, the Kurawa lost and ran away.

(h) Tanceb Kayon scene

The tanceb kayon scene is the final scene of the wayang, after the Pandavas succeed in achieving their goals. In this scene there is tayungan, namely Werkudara dancing.

The philosophy of ethnomathematics, tanceb kayon, means that someone has succeeded in achieving their goals and giving thanks to God, symbolized by tayungan or dancing Werkudara.

(i) Golekan

Golekan, is a wayang golek dancing game. This puppet show has a four-dimensional shape like a human. Golekan is served after the wayang is finished (tanceb kayon). This golekan has nothing to do with the story or wayang presented. Golekan, in the game is accompanied by ladrang pieces including the Kijing Miring.

The philosophy of golekan ethnomathematics is an invitation to look for good teachings in the wayang presented, to be carried out and bad ones to be abandoned.

2. Ethnomathematics Philosophy Expressed by Numbers

Ethnomatics philosophy expressed in numbers: a. thuthukan, b. count, and b. tone.

a. With Thuthukan Numbers

The ethnomatics philosophy expressed in thuthukan numbers can be seen in the operations of wayang presentation: a. uyon-uyon, b. talu, c. wayang, where everything is in the form of musical and song accompaniment.

1) In *Uyon-uyon*

In the wayang presentation: uyon-uyon, ethnomathematics is expressed with thuthukan numbers. It can be seen that there is the piece ladrang Slamet with the following notation

Buka: 132 6123 1132 .126

2123 2126 33.. 6532

5653 2126 2123 2126

The ethnomathematics philosophy expressed in numbers in the notation of the Slamet ladrang piece that is beaten, is a prayer so that humans will always be safe.

2) In *Talu*

In the presentation of wayang: talu, ethnomathematics is expressed using thuthukan numbers, you can see the musical notation Cucur Bawuk, Pareanom, Sukmailang, Srepeg, and Sampak. The following are the notations for the srepeg piece:

Dd (5)

6565 23535353

5235 i653 6532

3232 35656565

2353 5353 5235

1653 6532 3232

3532

3232 3532

The ethnomathematics philosophy, which is expressed in numbers in the notation of the srepeg piece that is beaten, is a prayer that humans will always be in nyrepeg obedience or that there is no more time to delay God's commands.

3) In *Wayang*

In the presentation of: wayang, ethnomathematics is expressed with thuthukan numbers, you can see the notation of gendhing srepeg and sampak in each pathet, here is the gendhing srepeg one of them:

D d 5
 6565 23535353
 5235 i653 6532
 3232 35656565
 2353 5353 5235
 1653 6532 3232
 3532
 3232 3532

The ethnomathematics philosophy expressed by the thuthukan numbers in the notation of the srepeg and sampak pieces that are beaten, is a prayer that humans will always obey the nyrepeg and sampak meaning that there is no more time to delay God's commands.

In the presentation of ethnomathematical wayang which is expressed with thuthukan numbers, apart from being able to see the notation of the piece srepeg and sampak in each pathet, you can also see the notation of the piece Kijing Miring to accompany the dancing golek as follows

33 . . 3635 1621 3216
 2126 2126 2321 6532
 5352 5352 3635 2126

The ethnomathematics philosophy, expressed in numbers in the notation of the Kijing Miring piece that is played, is a prayer so that humans will always remember death.

b. With Tone Numbers

The ethnomatics philosophy expressed in tone numbers can be seen in the wayang presentation: a. uyon-uyon, b. talu, c. wayang, where everything is in the form of musical accompaniment and songs.

1) In *Uyon-uyon*

In the presentation of the wayang: uyon-uyon, ethnomathematics is expressed in note numbers. It can be seen that there are songs in the piece Ladrang Slamet as follows

Parabe Sang Smara Bangun
Sepat domba kali Oya
Aja dolan lan wong priya
Gerameh nora prayoga

The ethnomathematics philosophy expressed in the notes in the song gendhing ladrang Slamet, is that humans should never carelessly go out with other women who are not their wives or relatives.

2) In *Talu*

In the presentation of wayang: talu, ethnomathematics is expressed by means of note numbers, it can be seen that there are songs such as Cucur Bawuk, Pareanom, Sukmailang, srepeg, and sampak. The following are some of the srepeg gendhing songs:

Jarweng jalma, jalma kang koncatan jiwa

The ethnomathematics philosophy expressed in the notes in the song that is played, is for humans to always be obedient to God, who no longer has time for nyrepeg.

3) In *Wayang*

In the presentation: wayang, ethnomathematics is expressed in song numbers, it can be seen that there are gendhing srepeg songs in each pathet, here is one of them:

Kawi Dewa

Giwanging wulan purnama

Ya ndhuk anjantara

Limpating pasang nggraita

The ethnomathematics philosophy, which is expressed in numbers in the notation of the srepeg piece that is beaten and the song that is sung, is a prayer that humans will always be in their nyrepeg obedience and there will be no time to delay God's commands.

Types of ethnomathematics expressed in numbers: songs can be seen in the musical composition Kijing Miring to accompany golek dancing as follows:

Ladrang kijing miring,

anelasak uga tansah eling Rehing rasa rasaning warna warna,

Aja sembrana tansah gawe cuwa

The ethnomathematics philosophy expressed in numbers in the Kijing Miring gending song that is played and the song that is sung, is a prayer that humans will always remember death.

CONCLUSION

Based on the results of the article which has been described at length above, conclusions can be drawn regarding: 1. the way of expressing the ethnomathematics contained in wayang, and 2. the philosophy of ethnomathematics contained in the wayang.

1. How to Express Ethnomathematics in Wayang

The way to express ethnomathematics in wayang is by: 1. language, and 2. numbers. With this language there are: a. verbal, b non-verbal, while with this number there are: a. thuthukan, b. count, and c. tone.

A lot of ethnomathematics in wayang is expressed in language, both verbal and non-verbal. Wayang, which are expressed in verbal language, exist throughout the operational presentation starting from uyon-uyon to golek, where with verbal language there are many poems or tembang, as well as chess: janturan, pocapan, and ginem which are sung with lesan. What is expressed through non-verbal language can be seen in the means and operations of presentation. In the facilities there are furniture and actors, in the wayang there are bedhol kayon and golek. There is also a lot of ethnomathematics in wayang which is expressed using numbers, both thuthukan, counts and tones. With thuthukan it can be seen in each piece's notation which must be thuthuk, in the count it can be seen in the bedhol kayon, in the notes you can see various songs and sulukan which must be sung according to the tune.

2. Ethnomathematics Philosophy in Wayang

Ethnomathematics philosophy in wayang is a Javanese understanding based on spiritual religion, which magnifies a God whose magnitude cannot be measured by numbers, which is clearly beyond the limits of human reason.

The philosophy of ethnomathematics in wayang as a Javanese understanding based on religious spirituality that magnifies God, has many details, some of which are expressed in language and numbers, both verbal and non-verbal language, including numbers, thuthukan, counts and tones.

Ethnomathematical philosophy expressed in verbal language: poetry in uyon-uyon: "parabe Sang Smara Bangun...", the philosophy reminds people of God not to act carelessly with women. In talu: "jarweng jalma jalma kang koncatn jiwa ": reminds humans of death. Janturan: "swuh rep data pitana....": prayer for salvation, srepeg poem: "jarweng jarma jalma kang koncatan jiwa": reminds of death. The sulukan poem: "ndan sembah nireng ulun....": reminds us to worship God, the Kijing Miring poem reminds us of death. Which is expressed in non-verbal language: wayang, gawang kelir, blencong, gedebong remind us of the signs of God's greatness, dalang reminds people of God's authority, stories remind people of good and bad. Which is expressed with numbers, thuthukan, ladrang Slamet notation: prayer for salvation, srepeg notation for carrying out God's commands without any more time, and the same goes for sampak. The count of ngelot kayon: to always pray to God. Tone: ladrang Slamet poem: asking for safety, srepeg poem: so that people carry out God's commands without delaying time, Kijing Miring poem: reminds of death.

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