

Sari Oneng Parakansalak Gamelan Tuning System and Its Comparison with Machjar's Theory

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ABSTRACT

The research of measuring *laras* of Sari Oneng Parakansalak *gamelan* uses convergent parallel mixed methods. It attempts to find out the interval arrangement, which forms a scheme called *laras* system. This research gives a provides clues about the existence of *pelog gamelan* in Sunda which is still debated until nowadays, which becomes the main reason why the writer is interested to measure the *laras* of Sari Oneng Parakansalak *gamelan*. In this research, *laras* theory of R.M.A. Koesoemadinata is used as the comparison to investigate what kind of *laras* is the *laras* scheme resulted from Sari Oneng Parakansalak *gamelan*'s interval arrangement. The result of this research is in form of presentation numbers which reveals the similarity between *laras* system of Sari Oneng Parakansalak *gamelan* and *laras* theory of R.M.A. Koesoemadinata. Besides giving a conclusion about the conformity between *laras* theory of R.M.A. Koesoemadinata and the fact found in the field, this research also informs about Sundanese *pelog gamelan*, which its existence is still hesitated/questioned by some Sundanese society. This study uses *Da Tuner Lite* which is validated with *Korg Orchestral Tuner (OT-12)* as the measuring instrument. The data of each *waditra* and the average of whole measured *waditra* are used to analyze the data of measurement result. From those two techniques, it can be detected that there are some *waditra* which are inappropriate to be used as samples. Therefore, the result of this study is taken from three *waditra saron* which indicates that Sari Oneng Parakansalak *gamelan* tends to have *laras pelog djawar* with its 87,19% of similarity. That result can also reveal that *pelog gamelan* really exists in Sundanese culture, proven by Sari Oneng Parakansalak *gamelan* which is made in Sumedang in 1825.

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1. Introduction

Sari Oneng Parakansalak Gamelan is one of the oldest *pelog gamelan* in West Java. According to the data from Prabu Geusan Ulun Museum, it was made around 1825 in Sumedang, which at that time became the cultural center in West Java. If we examine the description board like in Figure 2 which is placed in front of the gamelan like Figure 1, we may discover a brief interesting story which rarely known by most people.

Sari Oneng Parakansalak Gamelan, as one of the precious cultural heritage, has several underlying reasons to be chosen as an interesting object to be observed. One of the main reasons is that even though it is old enough, it still can be seen and can be used especially in Prabu Geusan Ulun Museum in Sumedang.



Fig. 1. Gamelan Sari Oneng Ansamble

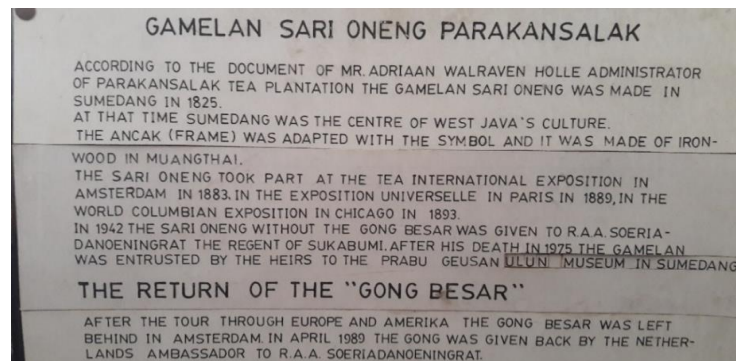


Fig. 2. Description Board of Gamelan Sari Oneng Parakansalak

Therefore, it can provide information related to the existence of *pélog gamelan* in Sundanese area which is still be questioned until nowadays. Most of people believe in an assumption that a *laras pélog* exists in Sundanese is *laras pélog degung*, which is neither the original *laras pélog* like one exists and develops in Javanese, nor *laras pélog* according to the theory from R. M. A. Koesoemadinata. The difference in addressing the terms of *laras pélog* with *laras pélog degung* is in line with an article written by Nano S., who states that Koko Koswara is one of the artists who has different opinion about addressing the terms of *laras pélog* and *laras pélog degung* (Nano S, n.d: 10).

On the other hand, *laras* theory by R. M. A. Koesoemadinata is a theory which discuss about *laras* in Sundanese karawitan that is still used among the society and academic field especially in SMKN 10 Bandung and in ISBI (Institut Seni Budaya Indonesia) Bandung. Some studies have been conducted by researchers in attempt to answer questions and critics by foreign musician who assume that there are several weaknesses in that theory in relation with the appropriateness between the theory itself and reality in the field (Hermawan 2001: 2).

There are several studies that have been conducted related to the topic. Deni Hermawan in 1999 conducted a related study which focused on *laras saléndro*, *degung* and *madenda*. This study measured *laras* in *kacapi indung* (*waditra* used in *tembang Sunda cianjuran*) that was played by several artists. The result of the study showed that musical scale according to the theory from R. M. A. Koesoemadinata is not completely suitable because the interval of similarity is far from the ideal one (Hermawan 2001). The inappropriateness between *laras* theory by R. M. A. Koesoemadinata with the actual practice in the field caused by several factors. One of them is the difference of *laras* feeling from each artist.

The next study is one conducted by Heri Herdini which reveals that there is no *laras saléndro padantara* because the result of the study shows that *laras saléndro* scheme is *bédantara*, even though *bédantara* which is addressed by him is different with *bédantara* scheme according to R. M. A. Koesoemadinata. It concludes that *laras degung* and *madenda* are not derivative from *laras saléndro* (Herdini 2004).

The results of some studies mentioned above indicate different conclusions, and thus make the writer more interested to investigate about how is the *laras* concept in Sundanese *karawitan* in certain, whether it is still relevant with Machjar's *laras* theory, which is still widely used until now

for both practical and academic purposes. Besides, those studies mentioned earlier indicate that they specifically focused on *laras saléndro*, *degung* and *madenda*. Therefore, in this research, the writer investigate the *laras* system in Sari Oneng Parakansalak gamelan, which is assumed as *laras pèlog* gamelan, and then compare it with *laras pèlog* theory by Machjar.

A general description about several interesting topics mentioned above, especially one which is related to Sari Oneng Parakansalak gamelan and *laras* theory by Machjar, is actually can be investigated from various aspects. However, considering the limited time, this study is only focused on the *laras* system and then it will be calculated in order to find out its similarity level with *laras* theory by R.M.A. Koesoemadinta, which in turn can determine to which *laras* this gamelan includes to.

2. Method

In order to carry out scientific research, steps must be taken carefully in order to get accurate results. To answer the research questions, the appropriate method is needed, so that the aim of this study can be achieved. This research uses convergent parallel mixed methods, which is a method where the researcher gather or combine both quantitative and qualitative data, so that they can provide the analysis of the research problem comprehensively (Creswell, 2016: 21). Furthermore, Cresswell defines a parallel convergent mixed method in two ways. First, as a research phase from the start the researcher collects both qualitative data and quantitative data, analyzes them separately, and then compares the results to find out the results confirm or not confirm each other (Creswell, 2016: 293). Second, as a form of mixed method design, researchers gather or combine both quantitative and qualitative data in order to provide a comprehensive analysis of research problems (Creswell John W 2018: 21).

Generally, the design of a convergent parallel mixed method consists of four main stages which include (1) Data collection; (2) Analysis of data; (3) Interpretation, and Validation. In the measurements activity, this study uses *Da Tuner Lite* application which is validated with *Korg Orchestral Tuner (OT-12)* as the measuring instrument.

3. Results and Discussion

3.1. Definition of Laras and Machjar's Theoretical Laras Pelog

According to R.M.A Koesoemadinata (Koesoemadinata 1969: 16-17) *laras* comes from the word *raras* (ra=sun=beautiful, ras=feel). It is a set of tones which has regular interval on every *gembyang* and in line with art-feel. From the definition above, we know that the main thing in *laras* Sunda is interval which also know as scale. The word scale properly means ladder, because the notes thus sounded gives us the sensation of ascending by definite distances (Ellis 1885: 486). Writing *laras* in Sundanese *Karawitan* (Sundanese musical scale) uses a notation system which is symbolized with a number notation, such as 1,2,3, 4, and 5 which is read as *da* (1), *mi* (2), *na* (3), *ti* (4), and *la* (5).

Furthermore, R. M. A. Koesoemadinata states that, *rakitan pèlog* in form of gamelan its *kempyung* interval is $666\frac{2}{3}$ **sen**, which is obviously different with western musical scale, *kempyung*¹, which is 700 sen (Koesoemadinata 1969: 52). *Rakitan pèlog*, according to R. M. A. Koesoemadinata consists of nine notes on each *gembyang* which have the same interval that is $\frac{1}{9}$ *gembyang* ($133\frac{1}{3}$). From nine notes on *rakitan pèlog*, five notes become *murdaswara* (*lulugu* voice). They are tones 1 (*da*), 2 (*mi*), 3 (*na*), 4 (*ti*), 5 (*la*) and the other four tones which are 5+ (*leu*), 2+ (*meu*), 3- (*ni*), and 1- (*di*) become *uparénggaswara* (*papaés* voice).

On *laras pèlog* hit instruments or *tatabuhan* each *gembyang* has seven *raras* in form of *wilahan* and *penclon*. The seven *raras* are *deret kempyung* or *banjar kempyung* such as shown in Figure 3 follow:

¹ The used of *kempyung* word in the Western Music tuning system as the R. M. A. Koesoemadinata opinion actually can't find and never known in the western musical dictionary.

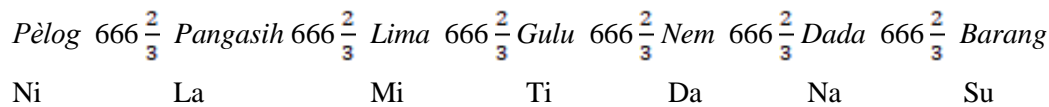


Fig. 3. Raras Pèlog Kempyung Line

(Source: Koesoemadinata 1969: 52)

On each *gembyangan*, the seven *raras* form the *raras* scale which structured as shown in Figure 4.

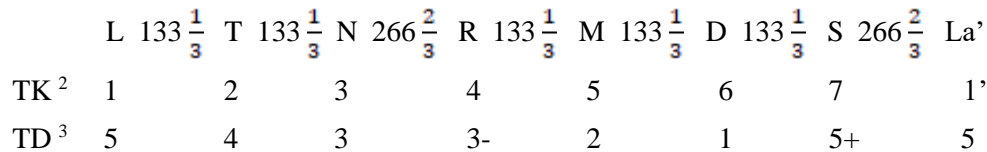


Fig. 4. Structure of Raras Scale in One Gembyang

(Source: Koesoemadinata 1969 : 52)

Explanation:

L	= La	M	= Mi
T	= Ti	D	= Da
N	= Na	S	= Su
R	= Ri	La'	= La High Octave

Because having the same interval on every tone, the nine tones *rakitan pèlog* can be 1 (*da*), on the other word it has nine *surupan*. Whereas, the nine tones in *rakitan pèlog* are divided into *Tugu*, *Sorog*, *Pamiring*, *Singgul*, *Galimer*, *Panelu*, *Panangis*, *Bungur*, and *Loloran*. Two tones from the nine tones on *rakitan pèlog* as mentioned earlier, which are *Panangis* and *Pamiring*, is not exist on gamelan. Thus, he states that there are three *surupan* on *laras pèlog*, which include:

1. *Surupan Liwung / Pèlog Liwung* (da= *Galimer*)
2. *Surupan Djawar/ Pèlog Djawar* (da=*Tugu/ Barang*)
3. *Surupan Sorog/ Pèlog Sorog* (da = *Panelu*)

(Source: Koesoemadinata, n.d: 15)

Besides, on his other book, R. M. A. Koesoemadinata also mentions the interval composition on the nine tones *laras pèlog* on the following Figure 5:

Fig. 5. Interval Composition of the Nine Notes *Laras Pèlog*

Interval $133 \frac{1}{3}$ sen is rounded up to be 134 sen, Interval $266 \frac{2}{3}$ sen is rounded down to be 265 sen, The difference between $133 \frac{1}{3}$ sen with 134 sen is meaningless, and the difference between $266 \frac{2}{3}$ sen with 265 sen is meaningless (Koesoemadinata 1969: 61). Based on the interval composition number above, assisted with the attached explanation, it is found that the small different number in $133 \frac{1}{3}$ with 134 is meaningless. Hence, it also occurs with the different number between $266 \frac{2}{3}$ with 265. In this case, the reseracher uses interval composition of *laras pèlog* which its interval is $133 \frac{1}{3}$

² K is an acronym used by R. M. A. Koesoemadinata and it is not explained further about its actual meaning. However, after discussed it with some people, such as with Priadi Dwi Hardjito, it is assumed that TK is an acronym of *Teknik Kepatihan*, which is a notation system in Javanese *Karawitan*.

³ In line with TK, TD is also an acronym used frequently by R. M. A. Koesoemadinata, that its actual meaning has not been found yet. Nonetheless, having discussed it with Dika Dzikriawan, the writer assumes that TD is an acronym from *Teknik Daminatila*, which is a notation system used in Sundanese *karawitan*.

as a result number from dividing 1200 sen as the number of interval in one *gembyang* by nine as the number of the nine tones *laras pélog*.

Furthermore, R. M. A. Koesoemadinata argues that playing *waditra rebab* and singing have different *laras* feel. It is because playing *rebab* and singing *laras pélog* are usually *diembat*. Hence, the result of its interval is deviate from *laras pélog* as mentioned earlier. The interval of *laras pélog* in playing *rebab* and singing is sometimes enlarged up to 150 sen, and reduced until 120 sen or less (Koesoemadinata 1969: 83).

Embat laras pélog on *rebab* and singing are various. It is affected by the *laras* feel from each artists, such as the *rebab* players or singers (*pasinden*, *ronggeng*, *tledek dalang* and *wiraswara*). There are two *embat* on *laras pélog* that is usually played in *rebab* and song as shown in Figure 6 and Figure 7.

1. Laras Pélog Embat Malang



Fig. 6. Scheme of Laras Pélog Embat Malang

2. Laras Pélog Embat Miring



Fig. 7. Scheme of Laras Pélog Embat Miring

(Source: Koesoemadinata 1969: 83)

Both *embat laras pélog* above are only used in playing *rebab* and singing accompanied by *gamelan* music. Meanwhile, in playing *rebab* and singing without accompanied by *gamelan*, the resulted interval structure will be different, which is in line with the following statement (Koesoemadinata 1969: 83), "However, if *rebaban* and singing are only accompanied by *waditra* for *wirama*, for instance as in *gending kemanak* or in *gending ketuk tilu*, or without accompaniment at all, such as in *sekar matjapat*, then *rebab* and singer, if they have to present a song in *raras Pélog*, usually play and sing in *raras* or *pasijeupan*", which its structure can be describe as shown in Figure 8.



Fig. 8. Interval Structure of Laras Pélog in Playing Rebab and Singing Without Gamelan

(Source: Koesoemadinata 1969: 83)

If the interval structure above is examined, it will be found several numbers which are also contain in interval structure of *laras saléndro*, *degung*, and *madenda*. The number are 212, which exists in *laras saléndro*, *degung* and *madenda*, 424 and 70 which are found in *laras degung* and *madenda*. The odd number is only 141, which is only found in *rakitan* 17 tones by R. M. A. Koesoemadinata. Because its difference with the nine notes *rakitan pélog* as what stated by R. M. A. Koesoemadinata, therefore, the interval structure as mentioned above is called as the true *laras pélog* or *sejatining laras pélog*, that is *laras*, which its note in 4 (*Ti*) is enlarged up to 71 sen (Koesoemadinata 1969: 84).

Having observed the interval structure of *laras pélog* above, and compared it with the interval structure of the other *laras*, it is found that every *laras* in Sundanese *karawitan* has different interval (note distance), which in turn can emerge exclusive characteristics on each *laras*. Interval or in Sundanese *karawitan* is known as *swarantara* is the height difference between two tones which in the other words is known as *srutianada-jarak* (Koesoemadinata 1969: 14).

There are several interval terms in Sundanes as those in western music, such as *tanpantara*, *nyampar*, *adu manis*, *adu laras*, *kempyung*, *adu sari*, *salah gumun*, and *gembyang* (Hardjito 1982: 26). Those intervals have their own positions on either *laras pélog* or *saléndro*. Table 1 shows the interval terms (*swarantara*) in *laras pélog* according to R. M. A. Koesoemadinata.

Table 1. *Swarantara Laras Pélog*

Swarantara term	Explanation	Example
Tanpantara	Same note	1 to 1, 2 to 2, etc
Nyampar	Swarantara $\frac{1}{2}$ gembyang	1 to 2, 2 to 3, etc
Adumanis-Alit	Swarantara $\frac{2}{3}$ gembyang	1 to 3-, 2+ to 4, etc
Adumanis –Ageung	Swarantara $\frac{3}{4}$ gembyang	2 to 3, 1 to 5'
Aduraras	Swarantara $\frac{4}{5}$ gembyang	1 to 3, 2 to 4
Kempyung	Swarantara $\frac{5}{6}$ gembyang	1 to 4, 2 to 5,
Adusari-Alit	Swarantara $\frac{6}{7}$ gembyang	1 to 5, 3 to 2
Adusari-Ageung	Swarantara $\frac{7}{8}$ gembyang	5' to 3
Salah-gumun	Swarantara $\frac{8}{9}$ gembyang	5' to 4, 4' to 3
Gembyang	Swarantara $\frac{9}{10}$ gembyang	1 to 1', 2 to 2'

(Source: Koesoemadinata, n.d: 45)

Meanwhile, based on another explanation, the interval terms in *laras pélog* include in Table 2

Table 2. *Swarantara Laras Pélog*

Sum of note between two notes	Example	Term
Same note	Between note 1 with note	Tanpantara
Between two notes, no other notes	Between note 1 with note 2	Nyampar
Between two notes, separated by one note	Between note 1 with note 3-	Adu Manis
Between two notes, separated by two notes	Between note 1 with note 3	Adu Laras
Between two notes, separated by three notes	Between note 1 with note 4	Kempyung
Between two notes, separated by four notes	Between note 1 with note 5	Adu Sari
Between two notes, separated by five notes	Between note 1 with note 5+	Salah Gumun
Between two notes, separated by six notes	Between note 1 with note 1'	Gembyang

(Source Palgunadi 2002: 460)

From the two arguments above related to the terms of *swarantara* in *laras pélog*, this study uses the terms of *swantara* as stated by Bram Palgunadi (Palgunadi 2002: 460). It is chosen based on several considerations, such as its more general and common usage, as well as the researcher's learning experience in *karawitan* department of ISBI Bandung, especially while learning the accoustic subject.

Without neglecting the process of analyzing the data, this study uses six *swantara* only for five main tones in calculating the data. It is because the reseracher finds a calculating method which compares *laras pélog* by only using five frequency data from five main tones from a book entitled *Tone Measuremenrs Of Outstanding Javanese Gamelans in Yogyakarta and Surakarta* which is arranged in 1972. This book generally summarizes the result of calculating the similarity between *laras pélog* and *saléndro* in reality on the field and Machjar's pattern as well as Surakarta's pattern, which concludes that Machjar's pattern possesses the more ideal similarity percentage.

3.2. Tone Measurement on Sari Oneng Parakansalak Gamelan

This section describes the result of measuring *laras* on Sari Oneng Parakansalak gamelan which is obtained by the researcher through field observation. The following are the frequency data from each tone on *waditra-waditra* as the result of measurement by using Da Tuner Lite application. The

results of measuring *laras* on *saron waditra* using Da Tuner Lite application is described on the Table 3.

Table 3. Frequency Data and Interval of the 1st Saron

Tone Name	Measured Frequency (Hz)	Interval (sen)	Explanantion
Singgul (5)	548,2	0	5-5
Galimer (4)	587,2	118.979568	4-5
Panelu (3)	649,8	294.3520986	3-5
Bungur (3-)	736,2	510.4745059	(3-)-5
Loloran (2)	816,3	689.276555	2-5
Barang (1)	868,8	797.18613	1-5
Sorog (5+)	977,3	1000.918996	(5+)-5

Meanwhile, based on another *waditra saron*, the results of measuring *laras* using Da Tuner Lite application include in Table 4.

Table 4. Frequency Data and Waditra Interval of the 2nd Saron

Tone Name	Measured Frequency (Hz)	Interval (sen)	Explanantion
Singgul (5)	549,6	0	5-5
Galimer (4)	589,9	122.506086	4-5
Panelu (3)	650,2	291.0018622	3-5
Bungur (3-)	735,5	504.4120048	(3-)-5
Loloran (2)	816,5	685.285058	2-5
Barang (1)	869,5	794.1648281	1-5
Sorog (5+)	975,2	992.7793462	(5+)-5

The last for *waditra saron*, the results of measuring *laras* using Da Tuner Lite application include in Table 5.

Table 5. Frequency Data and Waditra Interval of the 3rd Saron

Tone Name	Measured Frequency (Hz)	Interval (sen)	Explanantion
Singgul (5)	549,7	0	5-5
Galimer (4)	587,8	122.1911157	4-5
Panelu (3)	650,4	291.2193336	3-5
Bungur (3-)	735,2	503.3907447	(3-)-5
Loloran (2)	814,5	680.7242633	2-5
Barang (1)	867,8	790.4617281	1-5
Sorog (5+)	977,8	997.0739112	(5+)-5

The results of measuring *laras* on *waditra demung* using Da Tuner Lite application is described on the Table 6.

Table 6. Frequency Data Frekuensi and Waditra Demung Interval

Tone Name	Measured Frequency (Hz)	Interval (sen)	Explanantion
Singgul (5)	278,9	0	5-5
Galimer (4)	298,5	117.5795965	4-5
Panelu (3)	325,5	267.4915308	3-5
Bungur (3-)	367,8	479.0082545	(3-)-5
Loloran (2)	407,3	655.612656	2-5
Barang (1)	434,2	766.3341499	1-5
Sorog (5+)	484,5	956.0984775	(5+)-5

The results of measuring *laras* on *waditra bonang* using Da Tuner Lite application include in the Table 7.

Table 7. *Bonang Frequency Data and Waditra Bonang Interval*

Tone Name	Measured Frequency (Hz)	Interval (sen)	Explanantion
Singgul (5)	274,7	0	5-5
Galimer (4)	306,3	188.5061478	4-5
Panelu (3)	328,6	310.1706838	3-5
Bungur (3-)	383,2	576.2887808	(3-)-5
Loloran (2)	406,3	677.626145	2-5
Barang (1)	439,9	815.182429	1-5
Sorog (5+)	491,4	1006.849137	(5+)-5

The results of measuring *laras* on *waditra rincik* as the last sample *waditra* using Da Tuner Lite application include in the Table 8.

Table 8. *Frequency Data and Waditra Rincik Interval*

Tone Name	Measured Frequency (Hz)	Interval (sen)	Explanantion
Singgul (5)	551,8	0	5-5
Galimer (4)	613,7	184.0657521	4-5
Panelu (3)	657,3	302.887834	3-5
Bungur (3-)	740,9	510.1600524	(3-)-5
Loloran (2)	824,7	695.6687411	2-5
Barang (1)	866,4	781.0653435	1-5
Sorog (5+)	986,5	1005.808313	(5+)-5

The last, Table 9 includes the results of measuring *laras* from average all the samples *waditra* using Da Tuner Lite Application.

Table 9. *Result Data of Average Measurement*

Tone	Sum	Average
Singgul	3306.5	551.083
Galimer	3570.2	595.033
Panelu	3915.9	652.65
Bungur	4449.8	741.633
Loloran	4899.2	816.533
Barang	5220.7	870.116
Sorog	5868.6	978.1
Singgul'	6613	1102.166

3.3. Laras Similarity Percentage

This section is the main point of this research. It involves observation and analysis of the data obtained from measurement.

3.3.1. Sari Oneng Parakansalak Gamelan Measurement Result of Jaap Kunst by using Theory of Laras Pélog by R. M. A. Koesoemadinata

The following is presented the tone frequency data of Sari Oneng Parakansalak gamelan by Jaap Kunst in 1949 which is written in a book entitled "Music In Java" (Kunst 1949:573). The measuring data as the result of measuring *laras* by Jaap Kunst is describe detaily on the Table 10.

Table 10. Frequency Data of Sari Oneng Parakansalak Gamelan

Tone	Measured Frequency by Jaap Kunst	Embat Machjar	Interval
Singgul	266 Hz	Tanpantara	0
Galimer	289,5 Hz	Nyampar	146,564523
Panelu	317,5 Hz	Adu Manis	306.396415
Bungur	365 Hz	Kempyung	547.764262
Loloran	395 Hz	Adu Sari	684.511689
Barang	430 Hz	Adu Laras	831.492497
Sorog	479,5 Hz	Salah Gumun	1020.12548
<i>Singgul</i>	532 Hz	<i>Gembyang</i>	1200

From the Table 10, the similarity level of frequency data and interval from Sari Oneng Parakansalak Gamelan with *laras pélog* theory by R. M. A. Koesoemadinata can be found. It is presented in form table which is made with Microsoft Excel program by using formula mentioned earlier. There are several columns which are filled with the data, and then calculated by using the following formula:

- *Embat Machjar* column, consist of the interval terms or *swarantara laras pélog*, frequency is the data frequency in Hz (Hertz) which is obtained from the measurement result from the measured *waditra*.
- Factual data cloumn (f), consists of interval in sen from each measured tones in the field.
- Expected data column (e) is the data interval in *laras pélog*, such as explained on the earlier *laras pélog* scheme.
- The calculated data result, which is input on the square chi table, especially on the formula column $\frac{((f_i - e_i)^2)}{e_i}$

The table format with the data columns such as explained above, is used in all the process of calculating and analyzing the data in order to find out the *laras*' similarity level. For more details, the following is the result of data analysis and calculation to figure out the similarity between frequency and interval from Jaap Kunst's research in 1949 with *laras pélog* theory by R. M. A. Koesoemadinata. It is presented in form of an image as a result of data conversion from Microsoft Excel as a number processing program used in this research.

Based on the result of a study conducted by Jaap Kunst in 1949, it was found that the frequency struture and interval of Sari Oneng Parakansalak gamelan showed a tendency into *laras pélog liwung*. It is identified from the data analysis result and calculation, such as implied on the tables provided above, which indicate that 98, 2272% as the highest percentage of similarity level is shown on the calculation of the *laras pélog liwung* table.

3.3.2. The Research Result of Sari Oneng Parakansalak Gamelan by Using *Laras Pélog* Theory by R. M. A. Koesoemadinata

This section presents the result of data analysis and calculation by using formula mentioned earlier, in form of image converted from Microsoft Excel file. Analyzing the data is conducted by calculating the similarity level of each *waditra*, and calculating the similarity with the average frequency of all *waditra*. Calculating the measurement data is conducted in order to find out the more accurate result, for it can detect the *waditra* which is not suitable for use as a sample.

On contrary, analyzing the data by calculating the average frequency (in one octave or *gembyang*) of all *waditra* tends to be unable to detect the improper samples. However, to find out the different calculating result from the two methods above, the following is presented the result of analyzing the data by calculating the similarity level of each *waditra*, also by calculating the average of all *waditra* in form of a table in Table 11.

Table 11. Result of Calculating Analysis of the Similarity Level between Sari Oneng Parakanasalak Gamelan with *Laras Pélog* Theory by R. M. A. Koesoemadinata

Measured <i>Waditra</i>	<i>Surupan</i>	Percentage of similarity
Measurement result by Jaap Kunst	<i>Djawar</i>	64,36 %
	<i>Liwung</i>	98,23 %
	<i>Sorog</i>	38,86 %
<i>Saron 1</i>	<i>Djawar</i>	80,98 %
	<i>Liwung</i>	69,89 %
	<i>Sorog</i>	32,46 %
<i>Saron 2</i>	<i>Djawar</i>	87,19 %
	<i>Liwung</i>	76,22 %
	<i>Sorog</i>	44,79 %
<i>Saron 3</i>	<i>Djawar</i>	75,99 %
	<i>Liwung</i>	75,84 %
	<i>Sorog</i>	27,25 %
<i>Demung</i>	<i>Djawar</i>	34,26 %
	<i>Liwung</i>	48,56 %
	<i>Sorog</i>	65,83 %
<i>Bonang</i>	<i>Djawar</i>	45,08 %
	<i>Liwung</i>	9,85 %
	<i>Sorog</i>	35,06 %
<i>Rincik</i>	<i>Djawar</i>	0,73 %
	<i>Liwung</i>	0 %
	<i>Sorog</i>	16,332 %
The average of all measured <i>Waditra</i>	<i>Djawar</i>	73,73 %
	<i>Liwung</i>	92,4 %
	<i>Sorog</i>	41,24 %

From the result above, the red percentage numbers refer to the measurement result which includes in the ideal category of calculation. The ideal category in this context is not an absolute because musically, there are number of terms which are described using the word relative as adjective is an implication of reality that sometimes something can only be expressed when it is in connection with its ambience (Wisuttipat 2015 :189).

The highest similarity level (87,19%) is on *waditra saron two surupan djawar*. The three measured *waditra saron* tend to show the identical result that they have *pélog djawar laras*. While for the other three *waditra*, which are *demung*, *bonang* and *rincik*, are considered to be inappropriate to use as samples. The inappropriateness of those *waditra* is discovered from the sound produced during the measuring process. It also can be seen from the resulted percentage numbers, that are not prominent and they do not reach 75%, which is the ideal percentage of similarity level.

3.3.3. The Research Result of Sari Oneng Parakansalak Gamelan by Using *Laras Degung* Theory by R. M. A Koesoemadinata

As what stated in the background of this research, besides answering the *laras* system of Sari Oneng Parakansalak gamelan and its similarity with *laras pélog* by R. M. A Koesoemadinata, this research is also able to give guidance and answer related to the issue which is still discussed among the society who still hesitate the existence of Sundanese *pélog* gamelan. The opinion about Sundanese *pélog* gamelan, which its existence is still hesitated, develops in accordance with the number of artists or society in general who use different terms for *pélog gamelan*. Koko Koswara, a well known Sundanese artist, oriented on *kacapi* playing mentions *laras pélog* as *pélog degung*. In line with this, Nano S in Sundanese Newspaper 181 edition, page 10 also states:

“Nu janten masalah saleresna mah sanés antar pribadina, namung pasalia paham soal istilah. Pa Koko anu oriéntasina kana kacapi, nu berkembang di masarakat, nyebatkeun pélog degung. Sedeng Pa Machyar, antawis pélog sareng degung téh bénten pisan,

dumasar kana tiori anjeuna anu oriéntasina kana gamelan. Masalahna téh béda panginditan. Mang Koko dumasar kana kanyataan, yén di masarakat upama ngalaras/nyétem laras pélog dina kacapi, swarantara sora na (3) sareng ti (4) téh renggang." (Nano S, n.d: 10)

Translate:

"The actual problem between R.M.A Koesoemadinata with Pa Koko is not about personal but in using terms in *laras*. Based on *kacapi* as Koko's orientation, most of Sundanese people using *pelog degung*. Furthermore, R. M. A. Koesoemadinata distinguishes the use of the term *Pelog* and *Degung* based on the discovery of his *laras* theory with the gamelan orientation. The difference comes from the different background. Mang Koko's statement is based on his discovery in the practice in the field where the scale of tone between 3 and 4 is far apart"

From the quotation above, it is found that the term of *pélog degung* used by Koko Koswara can only be proven through the process of *pelarasan kacapi*. Meanwhile, the recent process of *pelarasan* in Sundanese art instruments only rely on *laras* feel from each artist. However, in science and academic field, feeling is a very relative standard and thus can not be determined as a standard in discussing a theory or a phenomenon occurred in the society. Koko Koswara's assumption, which is based on *kacapi* playing, in fact affects some people's comprehension. It is possible, because Koko Koswara is a famous and influential figure in Sundanese *Karawitan* (especially as the creator of *Wanda Anyar*⁴) both as practitioner artist and as academic artist.

However, in order to solve the problems and phenomena occurred in the society, a theory that can be used to analyze the data is needed so that the expected result can be produced. Based on that assumption, the researcher uses *laras degung* theory by R. M. A. Koesoemadinata as an instrument to answer the assumptions mentioned earlier. There are several reasons which underly the selection of that theory. First, it has the definite knowledge base. Besides, it is still used as the only basic theory of *laras* in Sundanese *karawitan* until nowadays.

In the book entitled *Seni Raras*, R. M. A. Koesoemadinata refers to the result of a research he conducted in 1942, at which he presented two kinds of *laras degung* which derive from 15 tones *rakitan saléndro* and 10 tones *rakitan saléndro* to his uncle named Raden Emung Purawinata. According to his uncle, *laras degung* which derives from 15 tones *rakitan saléndro* is more *mardawa* atau more melodious. The following is the interval composition or *swarantara laras degung* which derives from the 15 tones *rakitan saléndro* (Figure 9).



Fig. 9. Laras Degung from the 15 tones Rakitan Saléndro

(Source: Koesoemadinata 1969: 32)

Moreover, still on the same book, R. M. A. Koesoemadinata mentions *laras degung sedjati* which is resulted from 17 tones *rakitan saléndro* inspired by *rebab* playing by Madjasik when playing a song entitled *Banjar Sinom* from *laras madenda* 9 tones (Herdini, 2004: 60). Then, the *laras madenda* 9 tones is developed by increasing and decreasing the tones by half, so it forms 17 tones *rakitan laras* 17 which the interval of each tone is $70 \frac{10}{17}$ sen. In 17 tones *rakitan saléndro*, there is an interval composition or *swarantara laras degung* as shown in Figure 10.



Fig. 10. Laras Degung from 17 tones Rakitan saléndro

(Source: Koesoemadinata 1969: 79)

Both interval composition or *swarantara laras degung* above is then called as *expected* data (e), which is compared with *factual* data (f) that is data result from measuring the appropriate samples from *waditra-waditra* Sari Oneng Parakansalak gamelan. The intended data then is re-calculated to

⁴A musical genre in Sundanese Karawitan.

find out the percentage of similarity level with the interval composition of *laras degung* in order to answer the research problems.

Based on the scheme, it can be said that the data calculation and analysis result in finding the similarity level of the *waditra* samples of Sari Oneng Parakansalak gamelan with *laras degung* theory by R. M. A. Koesoemadinata reveals the relatively same result. All of the final numbers can not be input into square chi table, because they are too big. Hence, it can be concluded that the *laras* similarity percentage is less than 0,1%. The number is certainly too far from the ideal similarity level. In conclusion, Sari Oneng Parakansalak gamelan is not *laras degung* gamelan. It is based on the comparison with *laras degung* theory by R. M. A. Koesoemadinata, either *laras degung* which derives from 15 tones *rakitan saléndro* or 17 tones *rakitan saléndro*. On the other words, it is certain that Sari Oneng Parakansalak gamelan does not include into *laras degung* or *pélog degung*. This finding can be a hint as well as a supporting evidence of Sundanese *pélog* gamelan existence.

4. Conclusion

The conclusion of this research is presented in form of *laras* scheme in order to find out the *laras* system of Sari Oneng Parakansalak gamelan. It provides the measurement result conducted by the researcher, which includes the measurement result and the percentage of *laras* similarity level from both each *waditra* and the average from all *waditra* by employing *laras* theory by R. M. A. Koesoemadinata. In accordance with the reality faced by researcher in the field, it is believed that the calculation of each *waditra* is more precise, rather than the calculation the average of all *waditra* *laras*.

Therefore, it can be concluded that Sari Oneng Parakansalak gamelan, is a *laras pélog* gamelan. It is confirmed with its percentage of similarity level with *laras pélog* theory by R. M. A. Koesoemadinata, which is on the three analyzed *waditra saron*, is more than 75%. The analysis result is also a strong evidence about the existence of Sundanese *pélog* gamelan which is often questioned by Sundanese people.

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