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# Comparative Analysis of the Noise Level of Klewer Surakarta Market with Nglano Tasikmadu Karanganyar Market

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**ABSTRACT.** The market is a place where traders and buyers can carry out buying and selling activities. The market sells a variety of human daily necessities, therefore its existence can provide an avenue for certain people to fulfil their desires. The purpose of this study was to determine the noise level in Klewer Surakarta Market and Karanganyar Nglano Market. This research was conducted in April 2022. This research was conducted using a sampling method which was taken at two sampling locations located at Klewer Surakarta Market and Nglano Karanganyar Market. In addition, the Comparative Study approach was used in this study by comparing the differences in noise levels between sample points and the causes of differences in noise levels at two sampling points. The results obtained from this study are that Nglano Market has a higher noise intensity of 59.79 while Klewer Market is only 57.69. From the average Leq of the five points, it is known that the resulting Leq value is 66.22 dBA, which means that it still meets the predetermined threshold. It can be concluded from the results of the noise level between the two markets, it can be stated that Klewer Market and Nglano Market still meet the average threshold of noise quality standards if you look at the Decree of the Minister of Environment No. 48 of 1996 concerning Noise Level Standards in the Market of 70 dB. However, the government and citizens must always maintain order, tranquility and cleanliness of the environment in the market.

**Keywords:** market, quality, noise, measurement, regulation.

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## 1. Introduction

Basically, the development of the times has resulted in human basic needs also increasing, humans need basic materials to meet their needs in life, and usually humans buy basic equipment in the market. The market is a place where traders and buyers can carry out buying and selling activities. The market sells a variety of human daily necessities, so that the existence of the market can be a solution for some people to meet their daily needs. Consumers come to the market to shop to pay the price (Mohareb and Massarani, 2019). A large market that provides complete needs at a relatively low price is called the parent market, such as the klewer market. In Surakarta City itself there are various kinds of markets with different needs such as Legi Market, Gede Market, Kliwon Market etc. Every day there are buying and selling activities between buyers and sellers to meet their basic needs. The high demand for buyers in the market is one of the advantages possessed by the market, besides that the market also has a more affordable price, but the market also has disadvantages, one of which is shabby, hot, very dense, and noisy. In consideration of the current location selection, it is based on the fact that the place is one of the iconic in Surakarta City. In addition to its strategic location, the place is also very crowded with buyers from within the city and outside the city.

The development of the times has also made the high basic needs in the market and the increase in market visitors. Pasar Klewer Solo is a traditional market located in the city of Solo with a dense level of activity. This market is also a center for batik and various kinds of textiles which have become the main place to make purchases in large quantities. The strategic location because it is close to historical buildings and cultural centers as well as the unique shape of the building is another reason why this place is crowded with visitors (Citaningrum dan Panglipurningrum, 2021). In Gajahan Hamlet, Pasar Kliwon District, there is this Klewer Market every day it is never empty of visitors, even many traders from outside Solo buy clothes or textile materials to be traded again. Klewer Market has a fairly large building with a western market area of 135 x 65 meters and consists of 3 floors and 1 floor for parking.

In addition to the Klewer market in Surakarta City, there is a Nglano market located in Tasikmadu Karanganyar. Nglano Market is one of the markets located in Tasikmadu, this market sells a variety of food needs, and not only food needs Nglano Market also sells a variety of clothing and home needs even to small snacks are also available at the Nglano market. Usually, residents around Tasikmadu shop at Nglano Market in the morning until noon, the advantages of the Nglano Market itself are very affordable prices and many foodstuffs sold are still fresh, but the shortcomings of the Nglano Market itself are the old-fashioned building and the unpleasant aroma due to the

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disposal of garbage in the market. The large number of visitors who visit Klewer Market and Nglano Market makes the high level of anthropogenic activity there because of the large number of sellers and buyers making buying and selling transactions and the presence of songs played in the market area gives a noisy essence and has an impact on noise.

Sound is the quintessence of air molecules that vibrate longitudinally in the form of waves that reach the eardrum (Hartati dkk., 2021). Sound in a confined environment can be occupational hazard if it is considered disturbing or physically and psychologically unacceptable. According to Permenaker No. 13 of 2011, the maximum threshold value in the specified category is 85 dB with an exposure period of 8 hours per day and 40 hours per week. The highest threshold value in the indicated category according to Permenaker No. 13 of 2011 is 85 dB with an exposure time of 8 hours per day and 40 hours per week. Meanwhile, people can easily receive votes up to 60 dB in normal life (Rusmayanti., 2021). Noise, usually known as what people don't like because of its annoying nature. Furthermore, noise can be described as a form of physical harm that we experience at work and that poses problems with occupational health, in particular hearing. (Quintero et al., 2018). Noise does not only arise in industrial companies but in public places there can also be noise, but if in production plants noise is produced by production tools if in public places the noise is caused by the large number of visitors who visit there.

Noise can interfere with the listener's senses, but it can also disturb the tranquility of a place (Hamzah dkk., 2020). Noise can also cause physiological, psychological, and communicative problems in the workplace. Noise is measured in three ways: sampling points, contour maps, and grids (Atina dan Safitri, 2020). In general, noise is divided into several zones. The noise areas are separated according to the allowable noise points according to Permenkes No. 718/Men/Kes/Per/XI/1978. (1) Zone A, with a decibel of 35-45 dB, is designated for research sites, hospitals, health/social care, and the like; (2) Zone B with an intensity of 45-55 dB, intended for housing, education and entertainment; (3) Zone C, with an intensity of 50-60 dB, is intended for offices, commerce, and markets; (4) Zone D, with an intensity of 60-70 dB, suitable for industry (Wahab dan Rahma, 2018).

Noise can be measured using a tool called a Sound Level Meter. A sound level meter is a device that measures the intensity of sound due to changes in air pressure (Atina dan Safitri, 2020). Basically, the sound causes the object to vibrate, and as the object vibrates, the pressure in the air changes, giving the meter a hint. The noise level detected by the Sound Level Meter tool is the expected value in the meter indication. Therefore, this article was created to find out the noise level in Klewer Surakarta Market and Nglano Karanganyar Market with the help of a tool called a Sound Level Meter.

## 2. Materials and Methods

### 2.1 Location

This research was conducted in April 2022 to be precise on April 6, 2022 and April 12, 2022. This study was conducted at two sampling location points located at Klewer Surakarta Market with coordinate points of -7.575157495991278, 110.82673407116464 and Nglano Karanganyar Market with the coordinate point location -7.5744382843475595, 110.93275808636498.

### 2.2 Sampling Method

The location point of the first sample is Pasar Klewer Surakarta and the location point of the second sample is at Pasar Nglano Surakarta. Every five points in one market, each noise sample point is repeated eight times for an hour. This study used primary data and secondary data. Primary data for the data collection approach were collected through field measurements, while secondary data were obtained from literature research. The data will be managed and then analyzed using a descriptive quantitative analysis method because this study analyzes the data by describing the data that has been obtained and comparing the data.

This study also used a comparative study method by comparing the difference in noise levels between sample points and the causes of differences in noise levels at two sampling points. The stages of this research itself consist of several stages in outline, namely the planning and preparation stage, the data collection stage, the data analysis stage, the results presentation stage, and the research article preparation stage.

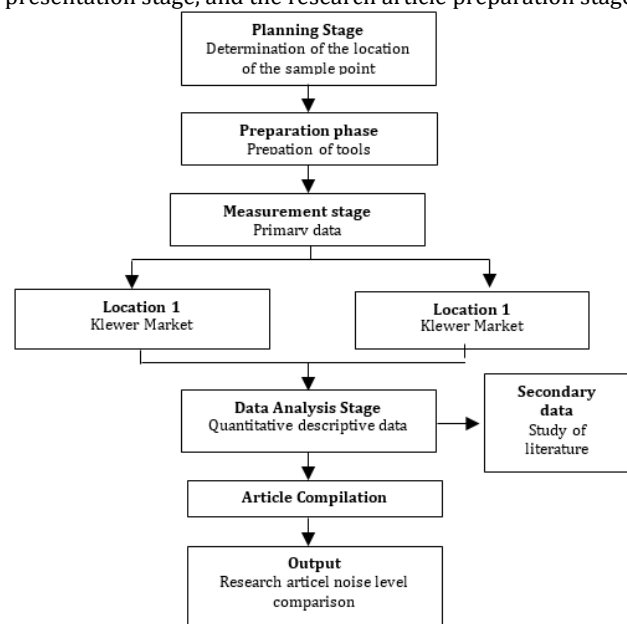


Fig. 1 Research Flowchart

## 3. Results and Discussion

### 3.1 Noise

Noise is an unwanted sound that may make the listener feel uncomfortable. Unwanted sounds from nature (such as sounds) and humans (such as the use of machines) will be classified as noise (Balirante dkk., 2020). The World Organization (WHO) defines noise as excessive noise that has a detrimental impact on the quality of life, health and human well-being (Hartanti dkk., 2021).

Noise is a physical component that negatively affects occupational health and safety (Rusmayanti dkk., 2021). Meanwhile, in the Decree of the Minister of Health of the Republic of Indonesia, "Noise is all unwanted sounds from work tools, and within certain limits it can be assumed that noise is all unwanted sounds or sounds that interfere with occupational safety and health.

Noise is defined as a destructive sound produced by an enterprise or activity at a certain level and period of time that can interfere with human health and the environment. The definition is a definition according to the Regulation of the Minister of Environment Number 48 of 1996. According to the

Regulation of the Minister of Health Number 718 / Menkes / Per / XI / 1987, noise can be interpreted as the presence of interference or the presence of noise that endangers health. Noise, as defined from some of the above notions, is unwanted noise. such as noise from an enterprise or human activity, which can interfere with human health and the environment. (Sudharson et al., 2021).

According to the Decree of the Minister of environment No. 48 of 1996, the quality standards of noise levels are given in the table 1.

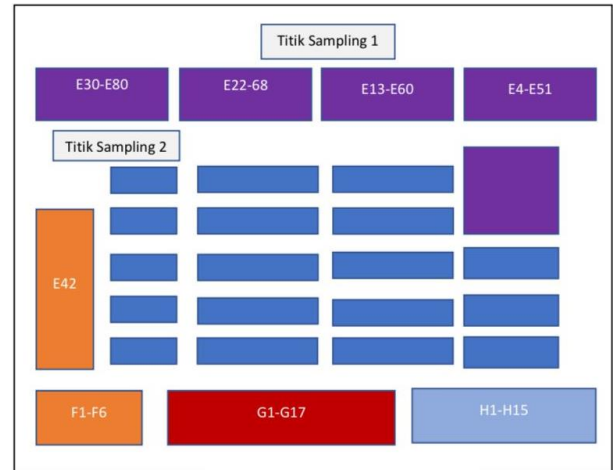
**Table 1**  
Area Designation or Health Environment

Area Designation or Health Environment	Noise Level dB(A)
a. Area Designation	
1. Housing and Settlements	55
2. Trade and Services	70
3. Offices and Commerce	65
4. Green Open Space	50
5. Industry	70
6. Government and Public Facilities	60
7. Recreation	70
8. Specifically :	
- Airport	60
- Railway Station	70
- Sea Port	55
- Cultural Heritage	55
b. Activity Environment	
1. Hospital or the like	55
2. School or the like	
3. Places Of Worship or the like	

Source: KMN LH No. 48 Tahun 1996

### 3.2 Noise Level in Klewer Surakarta Market

Table 2 above is a table of the noise level of The Klewer Surakarta Market. The noise level has a diverse value. The highest noise level value is at point 1 in the first hour with a value of 96.7 dB followed by point 1 in the fifth hour of 77.7 dB, point 1 in the third hour of 75.8 dB. Based on these results, the point that has the highest value is at point 1. Meanwhile, the lowest noise level value is at point 2 in the third hour with a value of 50.2 dB followed by point 4 in the fourth hour of 50.8 dB, point 4 in the third hour of 51.4 dB. According to the Decree of the State Minister of the Environment No. Kep-48/MenLH/11/1996, the noise level threshold for trade and service areas is 70 dB, then the noise intensity of the first 1 hour, fifth hour and third hour exceeds the threshold value of the noise level (Santoso, 2018). Meanwhile, for point 2 in the third hour, point 4 in the fourth hour and point 4 in the third hour almost all three exceeded the threshold. Based on the average noise value that occurs at each time from the first hour to the eighth hour at each point, it can be seen that the highest noise level is at point 1, which is an average of 72.5 dB where the figure is a number that exceeds the noise threshold. At that point it is the entrance and exit area of market visitors and many vehicles pass by at that point. While the lowest average is at point 4, with an average of 55 dB. This is because measurements are carried out at points that are rarely passed by market visitors.



**Fig. 2** Klewer Market Room Plan

**Table 2**  
Results of Measuring the Noise Level of klewer Surakarta Market

Hour	Point 1	Point 2	Point 3	Point 4	Point 5
1	96,7	57.9	55.5	57.4	53.6
2	64,8	51.6	54.8	56.1	57.4
3	73,5	50.2	66.9	51.4	60.9
4	75,8	58.1	56.8	50.8	59.2
5	77,7	62.4	55.4	55.0	58.2
6	66,7	57.9	59.4	53.4	54.2
7	63,3	65.3	62.7	59.6	54.2
8	61.2	58.8	61.5	56.7	63.8
Average	72.5	57.8	59.1	55.0	57.7

### 3.3 Noise Level in Nglano Karanganyar Market

The table above is a table of noise measurements carried out at Nglano Market, Karanganyar. In table 3 it is carried out five times every hour. Based on the results table, the highest value of noise measurement in Nglano Karanganyar Market was 75.9 dB in the first hour of the fifth point. Meanwhile, the lowest value of noise measurement at Nglano Karanganyar Market was 50.6 dB in the seventh hour of the second point. This shows that the noise in Nglano Karanganyar Market is still below the predetermined max limit, which is 70 dB. The different measurement results for each repetition are influenced by the number of people in the market, passing vehicles, and various other things that cause noise (Bactiar dkk., 2018).

Sound sources, according to Prasetio, are distinguished into two categories, namely inner noise and outside noise. Humans, home appliances, and construction machinery all contribute to interior noise. Meanwhile, traffic, transportation, industrial operations, mechanical devices in buildings, building construction sites, road repairs, sports activities, and other sources of noise outside the room or building are sources of outside noise. The aspects that affect the noise level are divided into two types, namely acoustic and non-acoustic aspects that need to be considered. The degree of loudness of the sound, the frequency, the length of time the sound appears, the variation in the loudness of the sound, and the time of appearance of the sound are acoustic variables. (Arabaci et al., 2021). Noise experience, activity, assessment of the possibility of developing

noise, the advantages of noise-producing objects, personality, environment and circumstances are included in non-acoustic aspects (Balirante, 2020).

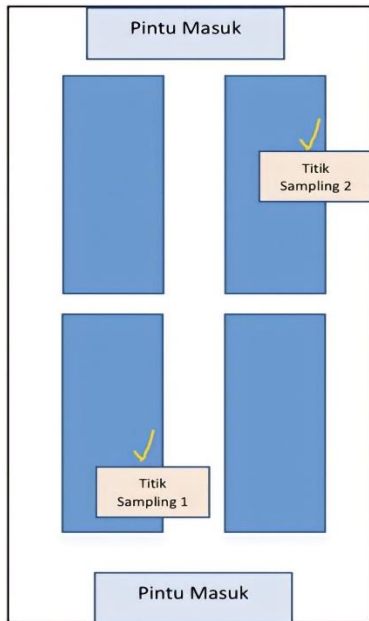


Fig. 3 Nglano Market Room Plan

**Table 3**  
Nglano Karanganyar Market Noise Level Measurement Results

Hour	Point 1	Point 2	Point 3	Point 4	Point 5
1	61.7	55.3	55.4	61.3	75.9
2	59.8	59.2	59.0	55.6	59.1
3	67.6	61.0	62.9	66.8	54.2
4	62.2	54.3	51.1	67.2	56.9
5	60.6	64.2	60.6	62.5	57.8
6	63.7	53.3	55.3	63.9	58.2
7	61.2	50.6	62.2	51.6	60.7
8	57.8	56.1	56.1	59.2	55.5

### 3.4 Comparison of Air Quality in Two Markets

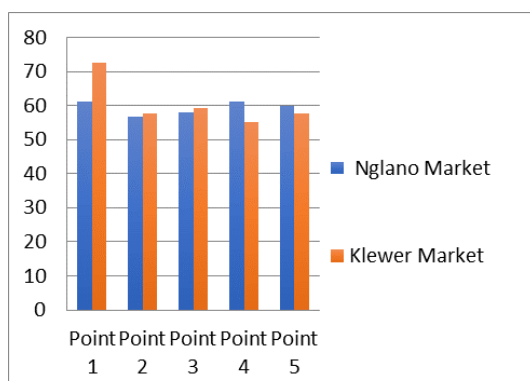


Fig. 4 Comparison of Noise in Nglano and Klewer Markets

To find out the comparison of air quality in Nglano and Klewer Markets, it is carried out by first averaging the measurement value at each point in each market, then comparing points 1 to point 5 in the two markets. On the chart,

it can be seen that the first point of Klewer Market is higher than Nglano Market with a ratio of 72.46 to 61.08. Then at point 2 Klewer Market is also higher than Nglano Market with a ratio of 57.78 to 56.78. Then at point 3 Klewer Market is also higher than Nglano Market with a ratio of 59.13 to 57.83. Unlike the case with point 4 where Nglano Market has a higher noise intensity of 61.03 while Klewer Market is only 55.05. Similarly, point 5 where Nglano Market has a higher noise intensity of 59.79 while Klewer Market is only 57.69.

Each point in each market is known to produce a different noise intensity value, this is because at each point measured based on each time the conditions are not always the same. There are several factors that influence the noise that occurs, namely the noise between merchants and sellers, the number of vehicles passing by and the use of tools by every merchant or buyer. Based on the Decree of the State Minister of the Environment Number 48 of 1996, it can be seen that the Threshold Value (NAV) of noise for trade and service areas is 70Db (Pumar dkk., 2019). So it can also be known that at the first point the Klewer Market exceeded the predetermined NAV with a dB value of 72.46. If noise that exceeds the NAV continues to occur for a long time duration, it will have the potential to create various disturbances in the community, both buyers, traders or other workers such as parking drivers, motorcycle taxis, rickshaws and so on (Hendrawan dan Hendrawan, 2020). The disorders that can be caused include communication disorders, concentration to health (Wati, 2020).

### 3.5 Leq Table To Know The Noise Intensity (compare the two markets)

The level of continuous noise or fluctuating noise comparable to constant noise at the same time is referred to as Leq (Ibili et al., 2022). Because the Leq value is influenced by the noise level equivalent, the total components measured, the noise level, and the frequency of occurrence of the noise level, the resulting Leq value is different in the two markets, namely Nglano Market and Klewer Market. It can be known that in the Nglano Market, the first point obtained a result of 64.07 dBA, the second point was 59.56 dBA, the third point was 60.66 dBA, the fourth point was 64.02 dBA and the fifth point was 62.72 dBA. From the average Leq of the five points, it is known that the resulting Leq value is 61.43 dBA, which means that it still meets the predetermined threshold. Then in the Klewer Market, it is known that the first point obtained a result of 76.02 dBA, the second point was 60.61 dBA, the third point was 62.03 dBA, the fourth point was 57.75 dBA and the fifth point was 60.52 dBA. From the average Leq of the three locations obtained, it can be seen that the average Leq of the three locations still meets the noise threshold for the market area, which is 70 dBA. From the average Leq of the five points, it is known that the resulting Leq value is 66.22 dBA, which means that it still meets the predetermined threshold.

### 3.6 Noise Disturbances in Nglano Market and Klewer Market

The respondents in this study were 30 people, where each market was taken 15 people, each point consisting of 3 respondents who were traders in both markets. In the first question related to communication disruption point 1 on Nglano Market 1 person said disturbed and at Klewer Market 2 person said disturbed. At point 2, Nglano Market did not experience communication problems while at Klewer Market 1 person experienced communication problems. Then at point 3 of Nglano market and Klewer no trader felt, while at titik 4 Nglano market 2 people felt disturbed but at Klewer Market no

trader felt communication breakdown. Finally, at point 5 of Nglano Market and Klewer, there was both 1 trader who was disturbed by communication. From the survey that has been carried out, it is known that merchants who say they are disturbed by communication due to noise are merchants who

are close to the highway and merchants who are close to other stores that have many buyers so that when they want to melzayani buyers, the merchants sometimes find it difficult to hear what buyers want to convey.

**Table 4**  
Nglano Market Noise Intensity Results Based on Leq Value

Eq	Calculation	6,41	5,96	6,07	6,40	6,27	Overall Result 3 Points	18,43
	$1/N \sum n_i \cdot 10^{Li/10}$							61,43
	10 Log	64,07	59,56	60,66	64,02	62,72		

**Table 5**  
Klewer Market Noise Intensity Results Based on Leq Value

Eq	Calculation	7,60	6,06	6,20	5,77	6,05	Overall Result 3 Points	19,87
	$1/N \sum n_i \cdot 10^{Li/10}$							66,22
	10 Log	76,02	60,61	62,03	57,75	60,52		

**Table 6**  
Noise Disturbances in Nglano and Klewer Markets

Point	Communication Disorder				Concentration Disorder				Health Problems			
	Nglano Market		Klewer Market		Nglano Market		Klewer Market		Nglano Market		Klewer Market	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1	1	2	2	1	0	3	1	2	1	2	2	1
2	0	3	1	2	1	2	1	2	0	3	1	2
3	0	3	0	3	0	3	1	2	0	3	0	3
4	2	1	0	3	1	2	0	3	1	2	1	2
5	1	2	1	2	2	1	1	2	1	2	0	3

Furthermore, regarding the disturbance of concentration at point 1 at Nglano Market, there were no traders who were disturbed while at Klewer Market there was 1 trader who felt disturbed by concentration. At point 2 of Nglano Market and Klewer both there was 1 person who was disturbed, but at point 3 of Nglano Market there were no traders who were disturbed, while at Klewer Market there was 1 trader who was disturbed. Then at titik 4 of Nglano market 1 person was disturbed but at Klewer Market there were no traders who felt that they experienced communication problems. Finally, at point 5 of Nglano Market there were 2 people who were disturbed and at Klewer Market 1 trader who felt disturbed by their concentration. From the results of the survey that has been carried out, it is known that merchants who feel disturbed by their concentration due to noise are merchants who are close to stores that are crowded with buyers where when the merchant wants to serve their buyers sometimes there are concentration disorders such as giving the wrong change, color or model desired by the buyer.

Then at point 1 Nglano Market 1 trader had a health problem and at Klewer Market 2 people said they were disturbed. At point 2 of Nglano Market, there were no traders who experienced health problems while at Klewer Market there was 1 person who experienced health problems. Then at point 3 of Nglano Market and Klewer both there are no traders who feel disturbed by their health due to noise. Furthermore, at point 4 of Nglano Market and Klewer, there was both 1 trader who was disturbed by their communication. Finally, at point 5 of Nglano Market, there was 1 person who experienced health problems, while at Klewer Market there were no traders who were disturbed in terms of health. From the survey that has been carried out, it is known that traders who experience

health problems due to noise are traders who trade near the road so that motor vehicle noise plus hot weather often causes traders to experience health problems such as dizziness, nausea and muscle pain. In addition, traders who complain about health problems are also traders who are in crowded areas of buyers.

#### 4. Conclusion

Based on the noise level data collection using sound level meters at all five points in Klewer Market and five points at Nglano Market. After that, the results were quantitatively analyzed, it was found that the total Eq results from the measurement of the five noise points in the Surakarta Klewer Market were 66.22 dBA. Meanwhile, the total Eq result from the measurement of the five points in the Karanganyar Nglano Market was 61.43 dBA. From the results of the noise level between the two markets, it can be stated that Klewer Market and Nglano Market still meet the average threshold of noise quality standards if you look at the Decree of the Minister of LH Number 48 of 1996 concerning The Standard Noise Level in the Market of 70 dB. However, the government and citizens must always maintain order, tranquility and cleanliness of the environment in the market.

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