

INTERNATIONAL JOURNAL OF DEVELOPMENT RESEARCH



(INTERNATIONAL PEER REVIEWED JOURNAL: OPEN ACCESS: ISSN: 2230-9926: IMPACT FACTOR: 7.012)

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International Journal of Development Research



English title:

n/d

ISSN:

2230-9926

GICID:

n/d

DOI:

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Website:

<http://www.journalcra.com> (<http://www.journalcra.com>)

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ISSN: 2230-9926

Available online at <http://www.journalijdr.com>

IJDR

International Journal of Development Research

Vol. 11, Issue, 01, pp. 43968-43970, January, 2021

<https://doi.org/10.37118/ijdr.20947.01.2021>



RESEARCH ARTICLE

OPEN ACCESS

ANOMALY OF ACCURACY LEVEL IN NOISE METER APPLICATION

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ARTICLE INFO

Article History:

Received 17th October, 2020
Received in revised form
28th November, 2020
Accepted 29th December, 2020
Published online 30th January, 2021

Key Words:

Level of accuracy, Noise,
Android application.

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ABSTRACT

Currently the use of smartphones is not only used as a means of exchanging information, but the sophistication of this mobile phone also offers many applications that can be used in daily activities. One of the applications available on a smartphone is a noise meter. The many types of noise measuring applications available on smartphones make it easier for users to select and use these applications. Therefore, it is necessary to know the accuracy of the noise meter application available on smartphones. So that it can be an alternative for users in choosing a noise level measuring application. This study measured the noise level in Taman Kota Wisata Cibubu and the Physics Laboratory of the Christian University of Indonesia. This study compared 5 android-based noise meter applications with a sound level meter. Through this research it is known that the SPL Meter application version 1.0.3 has a high sensitivity level in noisy locations with an accuracy level of 93.96 percent, while the Sound meter application version 1.7.2 has a high sensitivity level at locations that have relatively small noise levels, with an accuracy rate of 82.41 percent.

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Citation: Faradiba Faradiba, Philipus, Taat Guswantoro and Nya Daniaty, 2021. "Anomaly of accuracy level in noise meter application" *International Journal of Development Research*, 11, (01), 43968-43970

INTRODUCTION

The very rapid development of technology has resulted in quite a lot of equipment that can be used to assist human daily activities (Chiarini et al., 2020; Li & Perkins, 2007; Rulyova & Westley, 2017). In the industrial era 4.0 human activities are based on the application of technology. Technology-based tool development is often more effective and efficient (Tassey, 2000; Yli-Renko et al., 2001). One of the products of technology development is a smartphone. Currently, the use of smartphones is not only used by people as a means of exchanging information, but the sophistication of this mobile phone also offers many applications that can be used in daily activities. (Kwapisz et al., 2011; Stankovic, 2014; Wang & Lu, 2006). The applications offered are also very diverse, from paid applications to free applications. One of the applications available on a smartphone is a noise meter. The many types of noise measuring applications available on smartphones make it easier for users to select and use these applications. Users can download and install applications based on ratings on the playstore/appstore. In addition, users can view comments from previous users, as a consideration in downloading. It is known that noise plays a role in various aspects of life (Klæboe et al., 2006; Ko et al., 2011; Quartieri et al., 2010). In a study entitled noise levels in schools around railroad crossings, it was concluded that noise is a sound that can cause discomfort and one of the factors that results in high noise is railroad tracks. The resulting noise has a negative impact on the surrounding environment (Faradiba, 2017). Similar research, which is in the form of sound noise levels in the

Environment of MTS Negeri 34 Jakarta on the quality of the teaching and learning process, found that apart from road activities, another source of noise that is quite disturbing in the school environment is flight activity from airports. This happens because the sound produced by an airplane is very large, which is above 90 dB with a radius of sound that can reach hundreds of kilometers (Lumbantobing & Assisi, 2019).

In general, the measuring instrument used to measure the noise of a place is a sound level meter. However, nowadays, with the features on smartphones that provide a device similar to a sound level meter, this meter is not that important in its use. Apart from the advantages of these applications which are very easy to access (Al Rekhawi, 2020; van der Merwe et al., 2012; Wei et al., 2012). The accuracy of this application must be really good if you want to use it, because it will affect the interpretation of the measurement results. From this background, it is necessary to know the accuracy of the voice meter application available on smartphones. So that it can be an alternative for users in choosing a noise level measuring application.

METHODS

In this study, testing the accuracy of the measurement results of several noise measuring applications available on smartphones. Five noise measurement applications were selected and then measurements were taken for each application in a noisy and quiet place, then the measurement results were compared with the measurement results using a sound level meter measuring instrument.

Noise measurements were carried out in two places, namely the Taman Kota Wisata Cibubur which is a combination of a house, amusement park, community center and fitness center, which is located at Jalan Transyogi KM 6, Cibubur, Gunung Putri District, Bogor Regency, West Java. This location represents a fairly noisy place because there is quite a lot of activity going on at that place. In the second location, the Physics Laboratory of the Universitas Kristen Indonesia (UKI) was chosen, which is located on Jl. Mayjen Sutoyo No.2, Cawang, Kramat Jati Subdistrict, East Jakarta City, DKI Jakarta, which is a place for student learning and practicum. This location represents a place with relatively little noise. Measurements at Taman Kota Wisata Cibubur were carried out on January 24, 2020 at 11.25-11.50, alternately for each application. In the same way, measurements at the Physics Laboratory of UKI are carried out on January 23, 2020, from 14.00-14.25. The tools used in this research are sound level meter, smartphone, and stopwatch. While the 5 smartphone applications used include sound meter version 3.5.1, sound meter version 1.7.2, noise meter pro version 1.0.9, SPL meter version 1.0.3, and sound meter version 5.1.1. After measuring the sound level meter with the Android application, then the accuracy level is calculated for each application (Baumgardner, 1983; Grubbs, 1973).

Table 1. Cibubur City Tourism Park

No.	Sound meter application	Measurement results	SLM results	Level of accuracy
1	Sound Meter, versi 3.5.1	53,98 dB	70,42 dB	76,52 %
2	Sound meter versi 1.7.2	72,98 dB	71,00 dB	92,96 %
3	Meter Kebisingan PRO versi 1.0.9	53,30 dB	70,36 dB	75,74 %
4	SPL Meter versi 1.0.3	69,44 dB	70,46 dB	93,96%
5	Pengukur Suara versi 5.1.1	70,48 dB	50,36 dB	71,49 %

Table 2. UKI Physics Laboratory

No.	Sound meter application	Measurement results	SLM results	Level of accuracy
1	Sound Meter, versi 3.5.1	26,46 dB	48,90 dB	54,51 %
2	Sound meter versi 1.7.2	41,20 dB	49,10 dB	82,41 %
3	Meter Kebisingan PRO versi 1.0.9	58,04 dB	49,10 dB	81,92 %
4	SPL Meter versi 1.0.3	93,58 dB	49,60 dB	53,00 %
5	Pengukur Suara versi 5.1.1	36,54 dB	49,52 dB	73,44 %

RESULTS AND DISCUSSION

The maximum level of noise that is allowed to be discharged into the environment from a business or activity has been regulated in the Minister of Environment Decree Number 48 of 1996 concerning noise level standards. Meanwhile, the noise threshold value in the workplace has been regulated in the Regulation of the Minister of Manpower and Transmigration Number 13 of 2011 concerning the threshold value for physical and chemical factors in the workplace. However, in practice it is often violated by certain parties. They tend to ignore the boundaries that have been determined, so that it has a negative impact on the lives of the surrounding community. From the measurement results at Taman Kota Wisata Cibubur, information is obtained that the highest measurement result in a predetermined time period using a sound level meter is 71.00 db. This condition is also shown by the android application which recorded the highest result of 72.98 db. This indicates that the Sound meter version 1.7.2 has good results. This result can also be confirmed by an accuracy rate of 92.96 percent.

If you observe in depth the voice meter application version 5.1.1 has the lowest level of accuracy when compared to other Android applications. Meanwhile, the application that has the highest level of accuracy is SPL meter version 1.0.3, with an accuracy rate of 93.96 percent. The sound level meter used has a tolerance limit of 5 percent, so if it is related to the measurement results using the android application in Taman Kota Wisata Cibubur, only the sound meter application version 1.7.2 and SPL meter version 1.0.3 have significant results when compared with a sound level meter. From the results of measurements at the UKI Physics Laboratory, information was

obtained that the measurement results in a predetermined time period using a sound level meter were 49.60 db. This condition is also shown by the SPL Meter application version 1.0.3 which recorded the highest result of 93.58 db. When observed in depth, the SPL Meter application version 1.0.3 has the lowest level of accuracy, when compared to other Android applications. While the application that has the highest level of accuracy is Sound meter version 1.7.2, with an accuracy rate of 82.41 percent. The sound level meter used has a tolerance limit of 5 percent, so if it is related to the measurement results using the android application at the UKI Physics Laboratory, none of the applications have significant results when compared to the sound level meter. In its application, measurement results may differ due to the smartphone used. The hardware and version of the system used by each cellphone may differ so that it can affect the level of accuracy.

This is in accordance with previous studies which assume that the measurement results may differ depending on the media used (Peng et al., 2007; Zandbergen & Barbeau, 2011). In this study only limited to 5 android applications. For further research, it is possible to use other applications and non-android based applications. In addition, for direct comparisons, measurements should be made at the same time.

CONCLUSION

The highest level of accuracy for 5 sound estimating applications is in the location that is quite noisy with SPL Meter version 1.0.3 and in locations with low noise levels is Sound meter version 1.7.2. Different levels of application accuracy may change based on location. This can be due to the level of sensitivity of the measuring instrument in capturing sound. Through this research, it can be seen that the SPL Meter application version 1.0.3 has a high level of sensitivity in noisy locations, while the 1.7.2 version of the Sound meter application has a high sensitivity level at locations that have a relatively small noise level.

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