Effect of noise on perception of residents nearby Commuter Line Rails regarding non-auditory annoyance

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Abstract. Scientific evidence which links environmental noise to health problems is starting to emerge. KRL Commuterline is an electric commuter rail system serving Greater Jakarta, Indonesia, and operated by a state-owned enterprise. This paper aimed to analyze the noise caused by KRL that occur to people’s house located around the KRL tracks between Depok stations and Tanjung Barat stations and analyze the effect of noise on residents’ perceptions KRL rails regarding non-auditory noise disturbances. A correlation test and regression test were conducted to measure the relationship and effect between variables. Statistical data showed that most respondents did not experience non-auditory disorders. Besides, the correlation test results showed that none of the variables (Gender, Age, and Length of Stay) significantly affected respondents’ perceptions of non-auditory disorders, but, through a follow-up question, it was found that there were complaints that they experienced as the residents who lived around the tracks. The noise caused by this KRL, which occurred to people’s houses located around the KRL tracks between Depok station and Tanjung Barat station, resulted in a noise value that exceeds the noise quality standard with the average measurement results of (showing for each measurement time) \(\pm 80.05\) dBA.

1. Introduction

Noise is known to have adverse effects on the mental and physical condition of humans. Research done by Oh \textit{et al.} (2019) confirmed that a high noise level (dB(A)) significantly affected cerebrovascular disease, hypertension, and heart disease [1]. Exposure to nocturnal road traffic noise and annoyance also affects sleep quality. Sleep disturbances will lead to excessive daytime fatigue, often accompanied by daytime sleepiness, with its specific effects being low work capacity and increased accident rate [2]. Its reduction or disruption is detrimental in the long term, as chronic partial sleep deprivation induces marked tiredness, increases low vigilance state and reduces daytime performance and quality of life [2]. Traffic noise is positively associated with more severe anxiety [3]. Both transportation noise level and noise annoyance are linked to the risk of depression [4]. More noise annoyance was associated with less social cohesion, and in turn with worse mental health; noise annoyance was also associated with lower neighborhood restorative quality, thereby with less social cohesion and physical activity, resulting a worse mental health [5].

Brandt and Maennig (2011) examine the influence of road noise on the prices of condominiums in Hamburg, Germany [6]. They have demonstrated that price discounts depend on the noise level and that
they are significantly lower for low levels of road noise as well as considerably higher for high noise levels than the price discounts estimated based on a linear trend [6]. Similar results have been found in Seoul. It is found that a 1% increase in traffic noise associated with a 1.3% decline in land price [7]. Aside from the effect on economic and human health, transportation noise has also been reported to be bringing adverse effects on wildlife. Traffic noise playback reduces the activity and feeding behaviour of free-living bats [8]. Urban noise also has extensive, disruptive impacts on sleep composition, architecture, and intensity in magpies [9]. Noises could also harm the reproduction process of wildlife [10].

Even though the other research has implied some evident results about the effect of noises on many aspects of life, this research kept on its intention in analyzing noise effect on the perception of the people (who lived around the KRL rail) about non-auditory noise annoyance (communication, psychologic and physiologic annoyances). Feeling disturbed (annoyance) is the most typical response conveyed by the populations exposed to environmental noise. Annoyance is responsible for a considerable proportion of healthy life years lost due to noise [11]. Not much research has been done on noise perception in Indonesia. After reviewing the literature, we found research from Sudarmadi et al. They researched the perception of environmental problems in a sample of two different social groups in Jakarta, Indonesia [12]. This is one reason we would like to know the people exposed to the noises and the effect of gender, age, and the length of stay on the people (living around the KRL rail).

2. Method
This research was conducted in some houses around the KRL rail between Depok station and Tanjung Barat station. According to the distribution map made by the Ministry of Agrarian Affairs and Spatial Planning or National Land Agency, the public’s houses, which were located in our research area, were generally possessing the land right type of ‘land ownership right’. That the building establishment of these public’s houses (located along the KRL rail between Depok station and Tanjung Barat Station) could be deemed legal. Why was the establishment of these houses be allowed? Most of these houses (situated along this road) were separated by a small road whose range from the rail was only ± 5 meters. We also observed the houses which were separated by highways to compare the noises. Most of these houses were not equipped with fences and yards that the buffer zone for the noises was also absent. The distance between one house to another was really close. The sampling point could be seen in Figure 1.
The eleven noise measurement areas and the questioner collection represented the 6 segments of the area between the 2 stations and the 7 segments (in the form of houses) located near stations. This research included 7 KRL stations: Depok station, Depok Baru station, Pondok Cina station, Universitas Indonesia station, Universitas Pancasila station, Lenteng Agung station, and Tanjung Barat station. During the data collection process, it was found that the segment between Universitas Pancasila station and Lenteng Agung station and the segment, which was located near Tanjung Barat station, did not have a residential area which directly faced the KRL rail that these two segments were eventually erasing form the measurement areas.

Figure 1. Map of Research Location.

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This research population was the people who lived in the houses that were directly facing the KRL rail and the houses that were directly facing the rail between Depok station and Tanjung Barat station. The sample was categorized according to the population’s definition: (1) staying home every day for more than 18 hours, (2) having the house whose distance was in line with the houses in the noise measurement areas.

The samples were chosen by conducting non-random sampling or accidental sampling. The samples were coming from 1 head of the family (KK). The calculation of the minimum amount of samples was conducted using the Slovin formula. According to this formulation, the minimum amount of samples should be 45. This minimum amount should be added by 10% in order to avoid outliers’ data. Also, the number of samples that should be taken in this research would be 50. The calculation of the number of samples was conducted in every number of samples taken from every area.

The analysis of population perceptions was measured by making 25 questions arranged using a Likert scale. Residents were asked to choose one of the possible answers, namely: strongly agree, agree, disagree, disagree, and strongly disagree. In addition to the 25 questions, there are open-ended questions asking whether there have been unpleasant experiences due to KRL noise on respondents and other family members. Although open-ended questions were asked for all respondents, only a portion of the respondents later shared the complaints they felt. All items in the questionnaire were asked directly by one researcher to 50 respondents to avoid differences in the way the questions were asked.

Measurement of noise level was conducted in 11 areas between Depok station and Tanjung Barat station by integrating sound level meter (Krisbow 10176566 Pro Series), which was equipped with LTM5 measuring facilities $Leq$ the once per 5 minutes measuring time. The measurement was conducted every time the train passed the areas. The trains’ period to pass the rail was 20 seconds to 70 seconds depending on their fastness. In every measuring area, the measurement was conducted twice, which was in the day and night. Besides, the noises from KRL Horn were measured three times, and it was found that the noise rates from the horns were 91.3 dB, 87 dB, and 88.5 dB.

3. Results and discussion

3.1. Noises Resulted from the KRL
A quantitative study was conducted to measure noise levels and people’s perceptions of noise. The results of the measurement conducted in the 11 areas along the KRL rail from Depok station to the Tanjung Barat station are presented in Table 1. The measurement areas were situated in Depok, Bakti Jaya, Beji Timur, Kemirimuka, Pondok Cina, Cipedak, Srengseng Sawah, Ciganjur, Jagakarsa, Lenteng Agung, and Tanjung Barat villages. The measurement was conducted by using Sound Level Meter in the living rooms and the public’s houses.

| No. | Location                                    | Distance between Rail and Houses (meter) | Measuring hour (WIB) | $Leq$ (dB(A)) |
|-----|---------------------------------------------|------------------------------------------|----------------------|--------------|
| 1.  | Jln. Stasiun Depok Lama (East)              | 22                                       | 09.54                | 70.1         |
|     |                                             |                                          | 22.10                | 68.5         |
| 2.  | Kampung Lio (West)                          | 24                                       | 11.33                | 80.4         |
|     |                                             |                                          | 22.45                | 82.9         |
| 3.  | Kompleks Perumahan Kereta Api (West)        | 9                                        | 11.40                | 81.5         |
|     |                                             |                                          | 23.05                | 91.3         |
| 4.  | Jln. Kedondong (West)                       | 6                                        | 12.10                | 75.4         |
|     |                                             |                                          | 21.03                | 85.4         |
| 5.  | Jln. H. Marsaid dan Jln. Kemirimuka (East)  | 11                                       | 09.18                | 70.2         |
|     |                                             |                                          | 21.22                | 81.3         |
| 6.  | Jln. Stasiun Pondok Cina (East)             | 22                                       | 10.00                | 89.1         |

3.2. Results and discussion


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The measurement conducted in the 11 points/areas between Depok station and Tanjung Barat station generated noise rates that surpassed the noise quality standard set out by Decision of Minister of State Environment Number Kep-48 MNLH/11/1996 for residential and settlement area, which was 55 dBA. In contrast, the average result of the measurement was ± 80.05 dBA in every measurement time. The result of noise measurement in the evening (in the Railway Residential Complex) did even reach the 91.3 dBA. A high level of noise was caused by the KRL horns, which were more commonly honked in the night to warn the people who passed the rail or did their activities around it. The noise measuring time was not performed based on the ministerial decision, assuming that the KRL sound tended to be constantly compared to the other land vehicles, and this assumption was why the minister made this decision.

Besides generating a noise rate that surpasses the noise quality standard (according to the Decision of the Minister of State Environment Number Kep-48 MNLH/11/1996) for residential and settlement areas, the noises in 11 measurement points were also beyond the requirement of the Local Regulation of the Province of West Java Number 11 of 2006 (on the Control Air Pollution) which was derived from Ministerial Decision and the recommendation from WHO. The rate of noise quality standard from this local regulation was similar to that from the Ministerial Decision. According to WHO, noise exposure occurred to bedrooms with a rate of 30 dB(A), and 8 hours might result in sleeping disorder [13]. The noise exposure occurred to the residence with a 35 dB(A), and 16 hours could generate distraction to the clarity of communication [13]. The number of KRL that passed the Pondok Cina station on workdays was 389 KRL (according to the travel itinerary from Commuter Line Update, which could be downloaded on the website krl.co.id). When the number of KRL which passed the rail daily was multiplied by the period of the passing (we used the middle duration, which was 45 seconds), it could generate a duration of noise exposure of 17,505 seconds or 4.8 hours. If we took the longest period, which was 70 seconds, then the assumption of noise exposure duration would be 7.5 hours. Even though the duration of exposure did not surpass the WHO’s duration, the noise rates were still considered excessive, and it might generate health risks.

The travel itinerary of Commuter Line Update (can be seen in attachment 3) shows that the houses located in the east of the KRL rail (whose distance was closer to the rail directing to Manggarai direction) might be exposed to the noise more frequently because the number of trains that passed the rail would be 202, while the number of trains passing the rail directing to Bogor was only 187. In addition, the houses located in the east would experience the noise more frequently in the morning (4 am to 12 am) while the west houses would experience noises in the afternoon (3 pm to 10 pm). During commuting, the frequency of trains passing the public’s houses would be once per 5 minutes. This frequency would certainly disturb the amenities for the people (living around the rail).

Research about noises resulted from KRL Commuter Line in Indonesia had been conducted by Faradiba (2017). Faradiba’s research is in line with this research. The result of measures implemented to SMA Negeri 37 Jakarta found that the average noise rate in the 5 measuring points is 70.50 dB [14]. The distance between SMA Negeri 37 Jakarta building and the KRL rail was ± 5 meters [14]. Such distance was also founded between the houses and the KRL rail (Depok station - Tanjung Barat station). According to field observation, the houses were not any firmer than the building of SMA Negeri 37

| Point | Street Name | No. of Times | Loudness (dB) |
|-------|-------------|--------------|---------------|
| 7.    | Jln. Sawo (East) | 4 | 10.36 | 83.5 |
|       |              |   | 22.10 | 87.7 |
|       |              |   | 11.55 | 79.2 |
| 8.    | Jln. Srengseng Sawah (West) | 46 | 21.45 | 70.0 |
|       |              |   | 12.32 | 85.2 |
|       |              |   | 22.10 | 92.3 |
| 9.    | Jln. Lenteng Agung (West) | 8  | 14.25 | 84.4 |
|       |              |   | 22.36 | 83.6 |
| 10.   | Jln. Lenteng Agung (East) | 29 | 13.12 | 83.2 |
|       |              |   | 22.15 | 70.2 |
| 11.   | Jln. Rawa Bambu (West) | 32 |            |        |
Jakarta, so it can be said that, by considering the measuring result, the noises occurred to the residents of these houses were even stronger than the noises occurred to the classes of SMA Negeri 37 Jakarta. A research conducted by Munandar (2014) is also in line with the measuring result obtained by us. Munandar’s research conveyed that the average noise rate in the distance of ≤ 10 meters from railroads is 94.8 dB(A) or 80.05 dB(A) for the distance of > 10 meters [15].

3.2. Residents Perception of Non-Auditory Noise Annoyance

The distributed frequency for the respondent having no non-auditory annoyance or who would not be unduly disturbed was 76%. Meanwhile, the frequency of those dealing with non-auditory annoyance and felt comfortable with the noise was 24%. The non-auditory disturbances experienced by the respondents of this research would be psychological and physical.

Communication disturbance would be the difficulty of hearing conversations, the problem of understanding the intent of conversations, and the intention to raise their voices during the KRL passes their houses. The distributed frequency for the respondents having no communication disturbance or did not feel disturbed were 20 people or 40%. Meanwhile, the respondents dealing with the communication annoyance or who felt uncomfortable with the noise were 30 people (60%). Through further questions, it was found that some respondents who lived near the railroad had complaints regarding the sound from KRL. Agus (61 years old, he has been staying for 19 years) said that it was difficult for him to communicate with guests despite being accustomed to noises due to his profession as a machinist.

The psychological disturbance would be reduced concentration power, nervousness, anxiousness, angerliness, and depression. The distributed frequency for the respondents having no psychological annoyance or did not feel disturbed was 82%. Meanwhile, the respondents dealing with such annoyance or did not feel comfortable with the noise was 18%. The statistical data suggested that the vast majority of respondents did not have psychological annoyance. However, through the subsequent questions, a few respondents said otherwise. A landlady named Susan (26 years old, she has been staying for 4 years) narrated that the students who rent the rooms were frequently complaining about the noise generated from the KRL, which completely disturbed their concentration during the study, particularly before the examination time. This statement was in line with Evans and Hygge’s (2007) research in which noise exposure negatively affects children’s study results and cognitive performance [16].

Several respondents were dealing with other annoyances that were not associated with the noise. Sulashih (45 years old, she has been staying for 20 years) was always feeling scared about trail accident potential because she ever witnessed an accident in front of her eyes. Bariah (47 years old, she has been staying for 47 years) was also frequently scared due to several accidents near her house. Nur Prihatini (38 years old, she has been staying for 38 years) was more disturbed by the vibration than the noise generated from KRL that were passing through. Agung (34 years old, he has been staying for 9 years) was feeling disturbed by the trail due to some brawls.

The characteristics of a physiological disorder are having disturbed sleep and a racing heart when a KRL passes. The distributed frequency for respondents having no physiological disturbance or who did not feel disturbed was 78% of 50 respondents. Meanwhile, the percentage of respondents dealing with physiological annoyance or who do not feel comfortable with it was 22%. It was discovered through further questions that Fira (29 years old, she has been staying 5 years) admitted that she often got startled when the KRL passed through.

Riswanto (52 years old, he has been staying for 24 years) narrated the unpleasant conditions experienced by other family members. When the KRL passed, particularly when it honked the horn, his parents, who suffer from heart disease, would experience a pounding heart, cold sweat, weakness, and shortness of breath. Moreover, an elderly respondent named Santi (>70 years old, she has been staying for >70 years) also complained that she frequently got fatigued and annoyed when the KRL’s passed. Santi said that she has been staying around the KRL trail since childhood. However, in recent years, as she gets older, she became extremely disturbed by any noise from the KRL.

Asides from the horn, a few of the respondents stated that they were uncomfortable with the existence of freight trains and stone trains (during trail improvement). They felt disturbed due to trains’ activities
at night, which result in house shaking and more noise than usual, interfering with their proper sleep. Umah (32 years old, she has been staying for 29 years old) stated that she was constantly disturbed when the stone/freight train passed because her home would certainly be shaking and vibrating. During rail improvement, the annoyance would be stronger, and this improvement occurred several times during the year, causing sleeping difficulty throughout the night to herself and her family. Syarifudin (37 years old, he has been staying for 7 years) also stated that stone/cement/water trains that passed at night were completely disturbing because of its more intense noises than the noises from KRL. Riswanto (52 years old, he has been staying for 24 years) said the same thing. His family was deeply disturbed by the trail improvement activity.

3.3. Effect of Noise and Distance between Houses and KRL Trail on Perception of Residents surrounding the KRL Trail

A correlation test was conducted before the multiple regression test. The results suggested that the correlation coefficient value between the noise and the non-auditory annoyance was -0.005, with a significance of 0.352. The correlation coefficient between house distance and non-auditory annoyance was -0.151, with a significance of 0.147. Meanwhile, the correlation between noise and house distance was 0.175, with a significance of 0.112. Considering that the significance value obtained by those correlation coefficients was >0.05, then it may be concluded that there was no significant correlation among the variables.

This regression test suggested that there were 2 independents (free) variables, namely noise, and house distance. Meanwhile, non-auditory annoyance was perceived as the dependent (bound) variable. The partial test was employed to partially analyze the effect of noise and house distance on the dependent variable, a non-auditory annoyance. The partial test result suggested that the coefficient value of noise influence was -0.102 with a significance value of 0.842 and a t-statistic value of -0.201. The coefficient value of house distance was -0.232, with a significance value of 0.324 and a t-statistic value of - 0.998. Considering that the significance value obtained by noise variable and house distance was less than >0.05, it might be concluded that those variables were partially possessing little direct influence on the non-auditory annoyance.

F test was conducted to collaboratively analyze the effects of independent variables on the dependent variables. The F Test result suggested that the F-value was 0.571, and the p-significance value was 0.569. Considering that the F test’s significance value was 0.569 > 0.05, it may be concluded that the noise variable and house distance variables had little simultaneous effects on the non-auditory annoyance.

3.4. Effect of gender, Age and Living Duration on Perception of Residents surrounding the KRL Trail

From the research results to 50 respondents, we obtained the distributed frequency of age and living duration. The age of the respondents was ranging from 15-70 years old. Age 15 is taken as the lower limit because, at that age, respondents are considered to clearly express their perceptions and understand the questions on the questionnaire. Age 70 is the upper limit because we wanted to know how noise affects older people. The average age of the respondents was 44 years old. The distributed frequency of respondent’s age is shown in Table 2 below.

Table 2. Distributed Frequency of Respondents’ Age

| Age          | Frequency | Percentage |
|--------------|-----------|------------|
| ≤ 25 years old | 4         | 8          |
| 26-64 years old | 41        | 82         |
| ≥ 65 years old  | 5         | 10         |
| Total         | 50        | 100        |
From the 50 respondents, it was discovered that 4 of whom (8%) were less than 25 years old, 41 of which (82%) were 26-64 years old, and there were 5 respondents (10%) who were 65 years old or older. Respondents’ staying duration was ranged from 1-86 years. The average of respondents’ length of stay was 23 years. The distributed frequency of respondent’s length of stay is shown in Table 3.

| Age         | Frequency | Percentage |
|-------------|-----------|------------|
| ≤ 3 years old | 5         | 10         |
| 4-10 years old | 14        | 28         |
| 11-30 years old | 11        | 22         |
| ≥ 31 years old | 20        | 40         |
| Total       | 50        | 100        |

From the 50 respondents, it was discovered that 5 of the fellow members (10%) have been living less than 3 years, 14 respondents (28%) have been living there for about 4-10 years, 11 respondents (22%) have been living there for 11-30 years, and 20 respondents (40%) have been living there for 31 years.

A correlation test was conducted before the multiple regression test. It suggested that the coefficient correlation value between Gender and Non-auditory Annoyance was 0.146, with a significance of 0.156. The correlation coefficient between Age and Non-auditory annoyance was -0.179, with a significance of 0.107. Meanwhile, the correlation between the Length of Stay and Non-auditory Annoyance was 0.031, with a significance of 0.415. Considering that the significant value generated from those correlation coefficients was >0.05, then it might be concluded that there was an insignificant correlation between the variables.

In this regression, there were 3 independents (free) variables, namely Gender, Age, and the Length of Stay. Meanwhile, Non-auditory annoyance was perceived as the dependent (bound) variable. The partial test was employed to partially analyze the effect of noise and house distance on the dependent variable, which was Non-auditory annoyance. The partial test result suggested that the coefficient value of the effect of gender was 6.056, with a significance value of 0.337 and a t-statistic value of 0.971. The coefficient value of the age effect was -0.349, with a significance value of 0.140 and a t-statistic value of -1.502. It was revealed that the coefficient value of the effect of staying duration (length of stay) and Non-auditory annoyance was 0.142, with a significance value of 0.492 and a t value of 0.693. Considering that the significance value obtained by the third variable and the independent variable was less than > 0.05, it might be perceived that those variables had an insignificant direct partial effect on non-auditory annoyance.

F test was employed to collaboratively analyze the effects of independent variables on the dependent variables. The F Test result suggested that the F-value was 0.103, and the p-significance value was 0.358. Considering that the significance value of the F test was 0.358 > 0.05, it might be concluded that variables of Gender, Age, and Length of Stay were simultaneously having no significant effect on the non-auditory annoyance.

The statistical data showed that the vast majority of respondents did not experience non-auditory annoyance. Furthermore, the correlation test results also suggested no variables (Gender, Age, and Staying Duration) that significantly affect respondents’ perception of non-auditory annoyance. Through follow-up questions, it was found that several respondents who had unpleasant experiences due to KRL noise were related to their age and staying duration. Fira (29 years old, she has been living there for 5 years) could be considered a newcomer compared to the other respondents’ staying duration. She said that she was frequently shocked when the KRL passed. Riswanto (52 years old, he has been living there...
for 24 years) narrated the other family members’ unpleasant conditions. His parents were suffering from a heart problem, and it made them experiencing heart racing, cold sweat, weakness, and shortness of breath when the KRL passed, particularly when it honked. Moreover, an elderly respondent named Santi (>70 years old, she has been staying there for >70 years) also complained that she frequently got fatigued and annoyed when the KRL passed. Santi said that she has been staying around the KRL trail since childhood. However, in recent years, as she gets older, she was extremely disturbed by any noise from the KRL. Aside from Santi, Taher (66 years old, he has been staying there for 17 years) was feeling uncomfortable with the noises from KRL, particularly when he was not in the mood.

In addition to the complaints conveyed by the elderly respondents, other complaints were conveyed by a few respondents who had infants. Newborns were highly sensitive to noises. They would be easily shocked and awoke from sleep when the train passed. Infants would also become fussy every time the KRL honks. Widya (34 years old, she has been staying for 16 years) said that her baby would constantly be awakening from sleep when a train passed during the first year. Lutfiah (29 years old, she has been staying there for 8 years) admitted that her children were often awakened from the sleep, resulting in her children becoming so fussy because they were shocked by any train noise passed. Ucok (20 years old, he has been staying there for 3 years) had a newborn baby who was initially disturbed by any KRL that passed through. However, after several months, his child got used to it. Tia (32 years old, she has been living there for 32 years) narrated that her baby was completely disturbed when a train passed through. Her baby would constantly be awakening from sleep at the beginning of her/his birth. Her baby would vomit when they felt shocked by KRL’s horn. Furthermore, another respondent named Siswo (68 years old, he has been living there for 9 years) narrated his grandchildren, who were easily disturbed during infancy. His grandchild was easily awakening from sleep and get shocked due to any passing train. Those statements were in line with Muzet’s (2007) research result, depicting that parents, children, shift workers, and sleeping disorders were perceived as a group at risk of sleeping problems induced by noise [2].

The other complaints submitted based on age classification (outside the elderly and infant) was that they did not feel disturbed by KLR traffic at noon. However, many respondents said they were disturbed by a horn from KRL, particularly at night, because it was frequently honked as a warning for the passerby who walked through the trail. The horn frequently made them awaken from sleep, and it resulted in a pounding heart.

Based on the results of this study, the suggestion that can be given is that PT Kereta Api Indonesia (Indonesian Railway Company) needs to build a green belt at the KRL rail border and add a wall along the rail that separates the rail from the residential area to reduce noise. Besides, the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency and the Ministry of Transportation need to make regulations that regulate the minimum distance of boundaries and arrangement of residential spatial arrangements along the KRL rail. The suggestion for further research is that it would be better if the measurement points were multiplied so that a Geographic Information System noise map could be made.

4. Conclusion
The noise resulting from KRL at the residential houses, situated around the KLR trail between Depok station to Tanjung Barat station, generates a noise that surpasses the noise quality standards. The average result of measurement in every time is ± 80.05 dBA. The noise measurement at night in the Railway Housing Complex (Kompleks Perumahan Kereta Api) even reaches 91.3 dBA. Statistical data suggest that the vast majority of respondents do not experience non-auditory annoyance. Furthermore, the correlation test results suggest that no variable significantly affects the respondents’ perception of non-auditory annoyance. But through follow-up questions, it was found that there were complaints that they experienced as residents living around the tracks. Also, the measured noise value exceeds the standard quality value, and although it is not realized that it will have an impact on the health of the population if referring to previous studies, it is estimated that the people around the KRL rail has adapted to noise so that the respondent's perception is not disturbed.
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