The Residential Soundscape Preferences in Indonesia: The Real and The Expectation

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Abstract. The soundscape approach is one of the acoustic assessment tools which has an important role in shaping sustainable and healthy cities. The quality of the acoustic environments needed to be considered because when such quality is poor, it will affect the quality of life and well-being of a human. In a residential environment, people have their expectations of soundscape preferences in order to achieve a good quality of the acoustic environment. But the existing condition often is contradictory with the expectations. This study aims to compare the in-situ and expected soundscape conditions of urban residential and gated-residential in Indonesia. The perceived affective quality and sound sources aspects will be analysed in order to achieve this purpose. The research method used a mix of the quantitative and qualitative method through an online questionnaire to identify the sound sources that perceived by respondents who lived in urban and gated-residential in several cities in Indonesia. The result of this study shown both urban residential and gated residential in Indonesia have the same soundscape conditions. People still perceived the in-situ soundscape condition differently than their expectations, where their existing soundscape conditions haven’t met with their soundscape preferences. The results of this study can be references for government or private sectors in designing residential areas with good quality of soundscape in order to achieve sustainable communities and cities.

Keywords: sustainability, soundscape, preference, residential, perceived affected quality, sound sources

1. Introduction

For shaping sustainable and healthy urban communities and cities, the quality of the acoustic environments need to be considered. When such quality is poor, it will generate noise pollution, which affect public health issues, like the quality of life and well-being [1] Soundscape approach is one way to access and improve those acoustic environments.

Soundscape exists through human perception of the acoustic environment [2, 3]. The term soundscape was popularized by a music composer, Murray Schafer in 1977. He described soundscape as “[a]n environment of sound (or sonic environment) with emphasis on the way it is perceived and understood by the individual, or by society” [2, 4]. Recently, the soundscape has been defined by ISO as “an acoustic environment as perceived or experienced and/or

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understood by people, in context” [3]. The term context inferring that individuals may respond differently depending on their given acoustic environments. Sounds that are acceptable in some communities may be perceived as unacceptable to others [5]. To assess soundscape quality, Axelsson [6] proposed a two-dimensional model of perceived affective quality, which consists of eight sound dimensions that relate to human perception: Pleasant, Exciting, Eventful, Chaotic, Unpleasant, Monotonous, Uneventful, and Calm.

In the context of a residential environment, the quality of the acoustics is one of the aspects that can affect the comfort of its residents. It is expected to have good quality acoustics, but the existing condition often is contradictory to these expectations.

There are some types of residential in Indonesia, two of them are urban residential and gated-residential. Both have different characteristics, and so it is assumed that they have a different form of the soundscape. Urban residential, or also known as kampung, is the main urban settlement typology which exhibits rural characteristics of irregular laneway patterns, narrow alleys, fine grain infrastructure, and basic public facilities [7]. Gated residential, or also known as gated communities, are term given to gated residential developments with limited access and boundaries surrounding the area [8]. It has several characteristics, such as built on a relatively small plot of land, small numbers of units, the limited size of dwelling and facilities provided, and tends to support the formation of a small family.

Several researchers have studied soundscape in various contexts, but only some of the studies discussed the soundscape in residential areas [9]. Therefore, the aim of this study was to compare the in-situ and expected soundscape conditions of urban residential and gated-residential in Indonesia. The perceived affective quality and sound sources aspects will be analysed in order to achieve this purpose.

2. Research Method

This research is generally a mix of quantitative and qualitative research. Soundscape data collection can be done in-situ (current) environment, laboratory environment, and recalled in memory [2]. This study used the in-situ environment which was assessed by a questionnaire. The data collection used an online questionnaire, due to the pandemic of COVID-19 condition. The online questionnaire contains a mix of open and closed-ended questions.

In the closed-ended question, the respondents were asked to assess their in-situ and also their preference (expected) soundscape perceived affective quality in their residents with semantic differential scales of 1 to 5. The greater the number indicates the strength of that dimension. The soundscape dimensions used are a modification of the soundscape dimensions mentioned by Axelsson [6], namely: Pleasant, Calmness, Vibrant, Eventful, Softness, Relaxing, and Variant. The modifications were made by adjusting to the studied context, which is residential.

In the open-ended questions, the respondents were asked to identify the existing sound sources and their preference sound sources as many as they can. The sounds were then categorized into “natural sound” (e.g. sound of rain, water, wind, etc.), “animal sound” (e.g. chirping birds, dog, cat, etc.), “motorized transport” (e.g. car, motorcycle, heavy vehicles, horn, etc.), “electromechanical sound” (e.g. electrical equipment, construction, domestic, etc.), “human sound” (e.g. children's voices, neighbours speaking voices, music, human activities, etc.) and “signals” (e.g. adzan! prayer calling, announcements from the mosque, etc.).

There was a total of 381 respondents who came from various cities in Indonesia. From all of the respondents, 241 respondents lived in urban residential, and 140 respondents lived in gated-residential. All respondents are over 17 years old, with the largest demographic between 25 - 60 years.
Data analysis was conducted by comparing the average in-situ and expected perceived affective quality dimensions of urban residential and gated-residential in Indonesia with radar graph. Distribution analysis was also conducted for the in-situ and expected sound sources.

3. Result and Discussion

3.1. The Comparison of the In-situ and Expected Perceived Affective Quality in Urban Residential and Gated-Residential

In order to have insight into the perceived affective quality in a residential environment in Indonesia, each of the values for the in-situ and expected dimensions in the urban residential and gated-residential was analyzed and compared. The purpose is to identify whether the existing condition has met the desired of perceived affective quality, and what needs to be done to achieve it. The comparison of perceived affective quality comparison between in-situ condition and expectation in urban residential and gated-residential can be seen in figures 1 and 2 below.

![Figure 1. Comparison of the perceived affective quality between in-situ and expectation in urban residential](image)

The results which is seen in Figures 1 and 2, it can be analyzed that both in urban residential and gated-residential have the same pattern of the soundscape in the perceived affected quality.

For urban residential (Figure 1), it can be seen that only variant dimension that needs to reduce its value. The current condition shows, the value of 3.65, while the expectation is only 3.24 out of 5 scales. Other dimensions have lower values of in-situ conditions compared to their expectations. The pleasant dimensions have a value of 3.54 for the in-situ environment, while the expectation valued up to 4.52. For calmness, resident's expectations reached the value of 4.39, still far from their in-situ condition (3.41). The same thing is shown in the vibrant dimension, where the expectation level reached 4.37, and the current in-situ is only 3.36. In the case of eventful, the value gap is not that big, but the in-situ (3.85) still haven’t met the expectation (3.97). In softness, the gap becomes contrast again, where the in-situ valued 3.14 with the expectation of 4.31. The same thing happened for relaxing, the residents expect to reach a value of 4.54, while the in-situ condition was only 3.49.
As for gated-residential (Figure 2), has the same overall result with urban residential, only the difference was with the values. The value for variant in the in-situ environment resulted a slightly higher than the expected condition (3.22), with a value of 3.40 out of scale 5. And also like in urban residential results, other dimensions have lower values and quite a big gap with the expected acoustic quality. The pleasant scores 3.69 for in-situ and 4.55 for expectation; calmness has a value of 3.64 for in-situ and 4.34 for expectation; vibrant scores 3.28 for in-situ and 4.24 for expectation; eventful has a lower gap with 3.84 for in-situ and 4.09 for expectation; softness scores 3.25 for in-situ and 4.32 for expectation; and lastly, relaxing has a value of 3.56 with the expectation of 4.50.

Figure 2. Comparison of the perceived affective quality between in-situ and expectation in gated-residential

The majority of the perceived affected qualities between the in-situ measurement have a gap with people’s expectations of their residential acoustic environment. Only one dimension, which was a variant, which was over the desired expectation, and other dimensions were below the expectations. These differences show the current sound quality in their residents hasn’t been the ideal condition and it can cause discomfort. In a long term, it will cause stress, and worse it will affect the health and well-being of the residents.

Based on the graphics, it can be assumed that each of the levels of the dimensions of perceived affective quality affects others. The expected perceived quality becomes the indicator of the success of the residents’ desired acoustic environment. Improvements need to be done to the in-situ environment to meet these expectations. In order to increase the pleasant level, other perceived affective qualities with unreachable values, such as calmness, vibrant, eventful, softness, and relaxing need to be increased too. Vice versa, the dimensions that are higher than the expectation, in this case, variant, needs to be decreased in order to increase the values of other dimensions.

By reducing the variety of sounds and unwanted sounds (noises), and considering adding the low intensity of sounds to increase quietness might create a more comfortable and peaceful residential environment. These might lower the level of variant and increase calmness, softness, and relaxing dimensions. Another interesting result was the in-situ dimension for eventful has a very little gap and almost reach its ideal expected acoustic condition. This shows that in the current residential, both in urban residential and gated-residential has already provided
opportunities, with the spaces and facilities provided, for creating an eventful perception for the residents. Although it still needs the presence of enthusiastic sounds of residential life for creating a lively environment, thus it might increase the satisfaction of the pleasant and vibrant sounds.

3.2. The Comparison of the In-situ and Expected Sound Sources in Urban Residential and Gated-Residential

Analyzing the preference of sound sources by comparing the in-situ and expectation sound sources for both urban residential and gated residential will strengthen the result for the perceived affected quality above. The purpose is to identify whether the existing condition has met the expected sound sources, and what needs to be done to achieve it. The comparison of the in-situ and expected sound sources in urban residential and gated-residential in urban residential and gated-residential can be seen in Figures 3 and 4.

Figure 3. Comparison of the least favourite sound sources between urban residential and gated-residential

Figure 4. Comparison of the least favourite sound sources between urban residential and gated-residential
According to the results, both in urban residential and gated residential, the dominant sound sources identified in in-situ conditions were different from the dominant sound sources expected. Also, the difference gap for most of the expectation and in-situ sound sources in both of the residential were quite large. From both of the results in urban residential and gated residential it can be concluded that the most desired sound sources of “animal sound” and “natural sound” haven’t met with the in-situ condition. While other in-situ sound sources that are least desired were above the expectations, like “signals”, “human sound”, “electromechanical sound”, and “motorized transport”. The highest gap was in the “motorized transport”. Therefore, the sound for “motorized transport” needs to be decreased significantly, as the expected amount of sound for this source is categorized as the least wanted (noise). Open spaces and various vegetation might be needed to be added more to increase the values of “animal sound” and “natural sound”.

4. Conclusion

Based on the result of the comparison of perceived affected quality, the result for urban residential and gated residential was similar. The in-situ conditions were still far from the respondents’ expectations. Only the sound dimension variant was over the desired expectation, and all of the other dimensions were below the expectations. This dimension needs to be decreased to increase other sound dimensions, so the residents’ preferences on the perceived affected quality can be achieved.

From the comparison of in-situ and expected sound sources, also resulted in the same for both urban residential and gated residential. The dominant sound sources identified in the in-situ condition were different from the dominant sound sources expected. Also, the difference gap for most of the expectation and in-situ sound sources in both of the residential were quite large.

From overall results, it can be concluded that both urban residential and gated residential in Indonesia have the same soundscape conditions, in the term of perceived affected quality and sound source aspects. People still perceived the in-situ soundscape condition differently than their expectations, where their existing soundscape conditions haven’t met with their soundscape preferences. These unideal conditions may result in discomfort thus affecting the mental health of the residents. Therefore, the improvement of the acoustic environments in urban residential and gated-residential, especially for the perceived affected quality aspect and sound sources, are still very much needed.

This research is the initial research, future studies need to be conducted in order to enrich the information on the soundscape of residential in Indonesia. The results of this study can be references for government or private sectors in designing residential areas with good quality of soundscape to achieve sustainable communities and cities.

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