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Science, Engineering and Social Science Series
ISSN/e-ISSN: 2541 – 0369/2613 – 988X
DOI: 10.51971/joma.v6n1.09005022
Vol. 6, No. 1, 2022, Printed in the Indonesia

Ambient Air Quality Perception of *Embung*'s Visitor in Institut Teknologi Sumatera

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Public open space or Urban open space as a means of outdoor activities are not only become part of the lifestyle but also the needs of the community especially for people who live in urban areas with a daily work routine. One of the public open spaces is the retention basin called *Embung*, where people carry out various activities both individually and in groups. Here, Institut Teknologi Sumatera (ITERA) as a state university located in South Lampung Regency Lampung Province has several *Embung*s from *Embung* A, B, C, D, E, and F. *Embung* A is the most frequently visit due to its position adjacent to the Terusan Ryacudu street that makes it easy to be accessed not only by ITERA academicians but also by surrounding communities in the morning and afternoon. However, this location which is close to a busy highway makes it potentially get negative impacts from transportation activities, one of which is air pollution. In this research aimed to determine the perceptions of the visitors about the ambient air quality in *Embung* A. Our research was carried out before the pandemic, more precisely in 2019. The results of the questionnaire found that most of the visitor consider the ambient air quality is in good condition (72%) with more than half of them (59% of the respondent) said that the *Embung* air quality were important. The statistical analysis results show a significant result ($p\text{-value}=0.001 < 0.05$) between perceptions of air quality with the duration of visits. In conclusion the *Embung* A visitors have a good perception of *Embung*'s ambient air quality and its importance. Further research is needed to better understand the motives behind the visit to *Embung* or other public open space and their relation to other environmental parameters.

Keywords: Air Quality, *Embung*, ITERA, Perception.

1. INTRODUCTION

Public open space is a place that is freely accessed by anyone to carry out various activities in it that can provide benefits for health, social interaction, and the economy [1]. Public open space is an important part for a city because it has a positive impact in all fields of social, environmental and economic. Open spaces have different functions depending on size, location, accessibility, design and landscape facilities [2] Studies showed that the level of visitor satisfaction with environmental quality is the most important indicator for a public open space [3]. Therefore visitors' perceptions have an important influence regarding visits to public open spaces. The perception of good environmental quality has a relationship with an increase in the number of visits. The environmental quality includes quality related to natural conditions, plants absorbing pollution, reducing noise,

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and clean air [4]. Institut Teknologi Sumatera is one of the state college in Lampung Province. Not only facilities for indoor learning activities, but ITERA also has several outdoor facilities, one of which is a *Embung*. *Embung* or retention basin is a surface water that is designed to contain water or hold rain water [5]. Surface water such as pond or *Embung* is example of public open space that provide esthetical benefit but also ecological benefit. People in all age enjoy this open space as means for recreation [2]. Among all of *Embung* in ITERA, *Embung* A, which located in the northern part, has the most frequent visit. Most notably for its location in the side of the Terusan Ryacudu Road so that people from different areas of Bandar Lampung City or Lampung Selatan Regency could come to visit. They are doing many activities such as doing sport, gathering, or just sightseeing. The location of *Embung* A which is on the side of a busy road that is passed by various motorized

vehicles makes it vulnerable to negative impacts from the transportation sector. One of them is air pollution. A study by Chan [3] showed that the most important indicator perceived by park users is ‘the level of satisfaction of environmental quality.’ The park users or other public open space tend to be more concerned toward the quality of the environment rather than the park facilities. In this study, we investigated the perception of *Embung* visitors on ambient air quality. Several previous studies have tried to determine the importance of visitor’s perception of a public open space. However, there is still little that discusses about public open spaces in the form water bodies such as *embung* and even less the relationship with ambient air quality. So, this study aims to better understand the perception of *Embung* visitors about its ambient air quality.

2. METHODOLOGY

A. Data and Location

Our research was conducted in *Embung A* ITERA in north side of campus. The *Embung* located near the north gate of campus at the side of a busy highway of Terusan Ryacudu street, Jati Agung, South Lampung Regency Lampung Province (see Figure 1).



Figure 1. Location of *Embung A* ITERA

Here, all the data taken from respondents who visit *Embung A*. The number of respondents in this study were 100 respondents who were randomly selected. Furthermore, the questionnaires are asked to respondents included: personal data of respondents, behavior in visits, perceptions of air quality, and perceived health quality.

B. Data collecting and Data Analysis

Data was collected by means of direct interviews with each respondent. questionnaire in the form of questions in the form of google form. Each question will be read out then the answer from the respondent will be filled in by the interviewer. Data collection was carried out for 7 days in the afternoon on weekdays and in the morning on weekends. Here, the data analysis from questionnaire results was carried out descriptively and correlation analysis between variables.

3. RESULT AND DISCUSSION

A. Sampel characteristics

The survey was conducted to 100 respondents with range of age vary from 16 to 25 years old (see Figure 2). The profession of participant was dominated by college students (33%), followed by lecturer and students with both 23%. The latest education of the participants was dominated by higher education (41%).

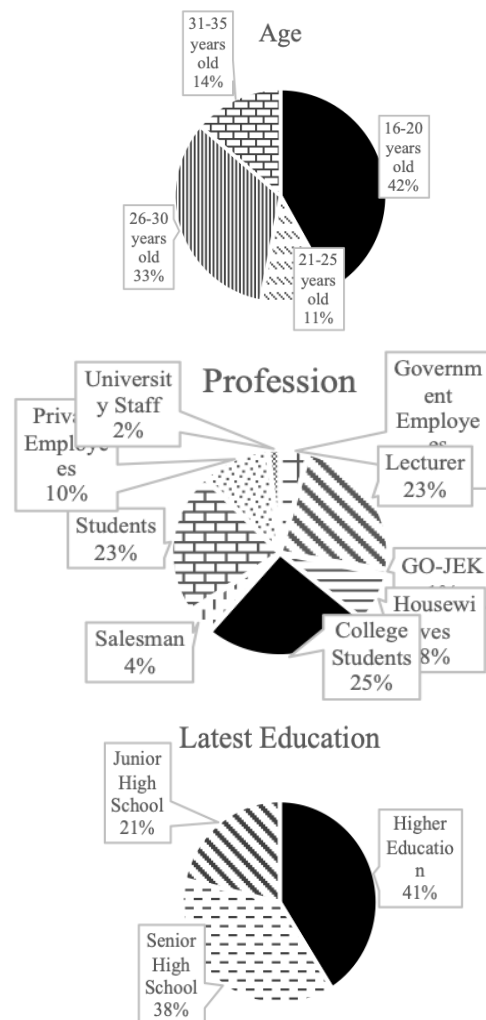


Figure 2. Profile of Respondents

The most of the respondent come from Sukarame district (32%) which has a distance around 4.9 km from *Embung* ITERA (see Figure 3). The transportation that the respondents use was mainly their own private motorbike (49%). But it was followed by walking (23%), because the other respondents were coming from Way Huwi (20%), Korpri (5%), ITERA (2%) and some other location that quite closer to *Embung* ITERA.

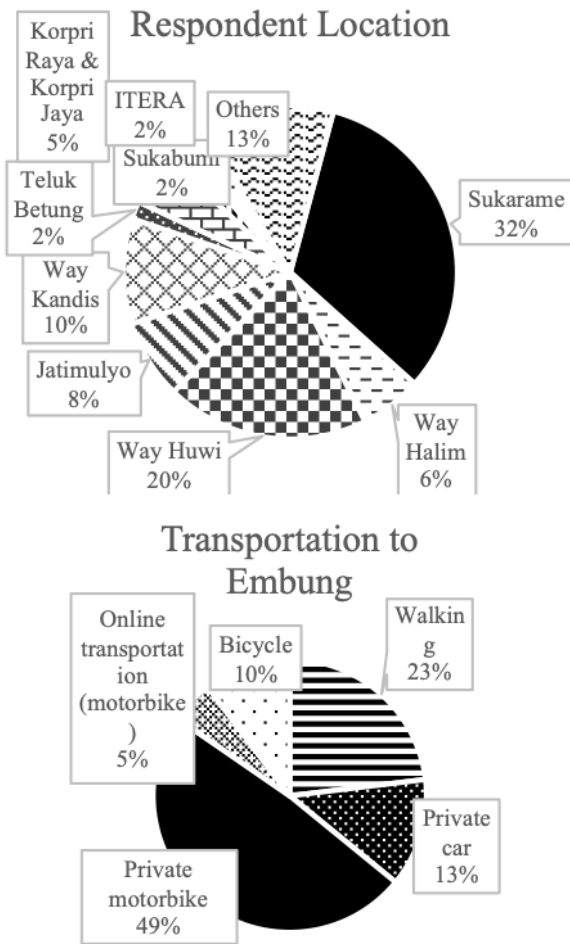


Figure 3. Respondent location and their transportation to *Embung* ITERA

From the interview to the respondent, their main activities were sports such as running and exercise, because *Embung* has a jogging track in its surrounding (see Figure 4). Generally, the respondent frequencies to *Embung* were once in two weeks (37%) with the duration 30 minutes – 1 hour (41%) (see Figure 5).

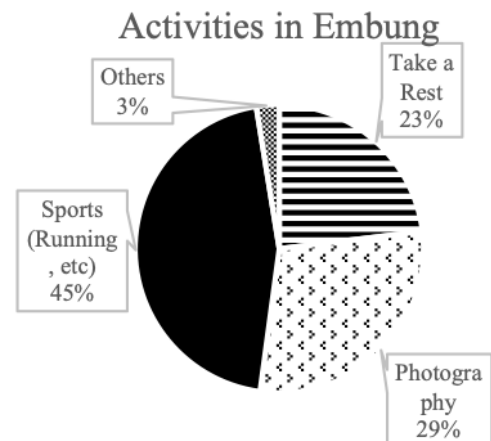
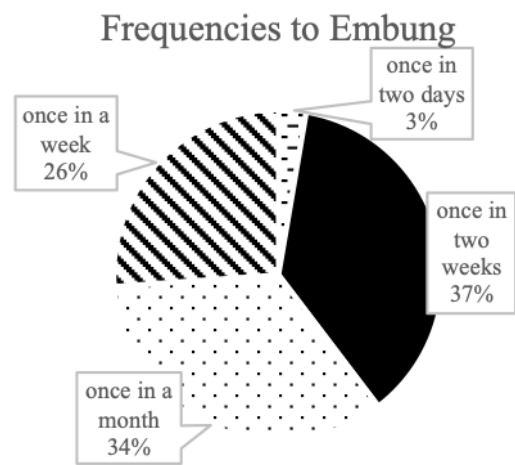


Figure 4. Respondent activities in *Embung*



Duration in Embung

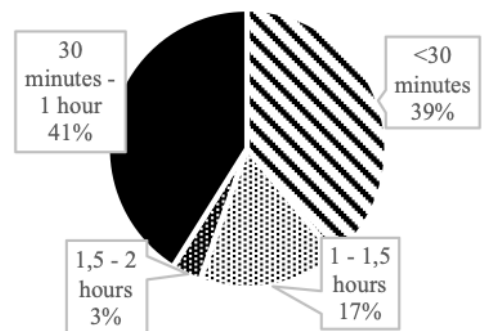


Figure 5. Respondent frequencies and duration in *Embung*

B. Analysis of Perception

The respondents were asked about their perception about *Embung* Air Quality and the importance of it. The results showed that 72% of the respondents said that the air quality was good, and 59% of the respondent said that the *Embung* air quality were important (see Figure 6).

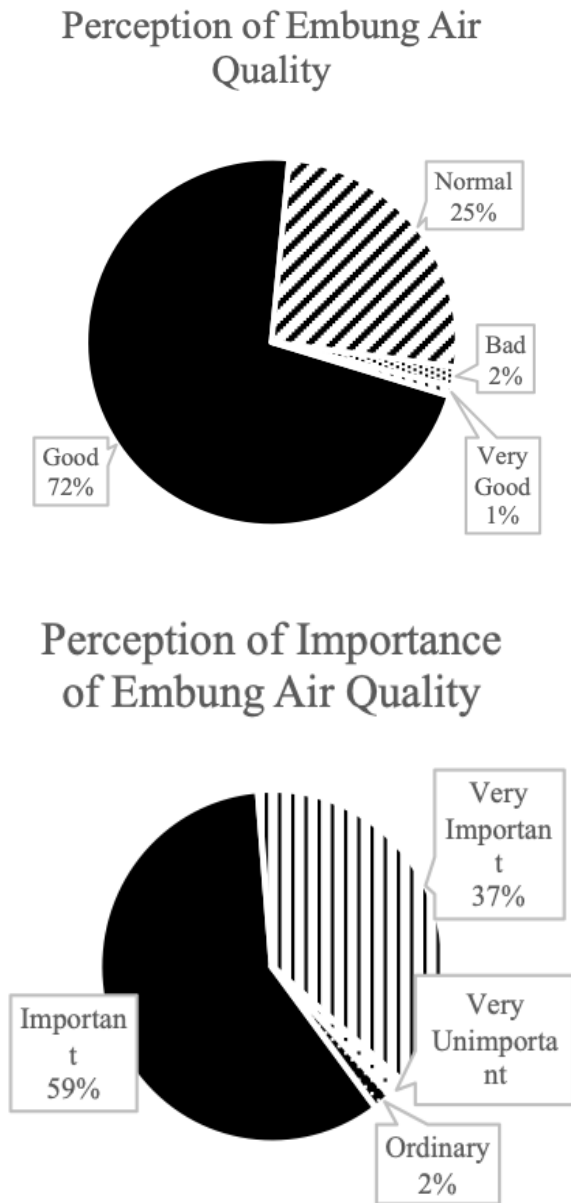


Figure 6. Respondent perception of *Embung* air quality

However, some of the respondents has experienced respiratory problem and noise problem in *Embung*. About 40% of the respondents has cough when in *Embung* and even 70% of the respondents experiencing noise problem (see Figure 7). The respondents said that the pollution from transportation sometimes made them cough. But almost all of the respondent that experiencing noise problem said that it comes from transportation noise in highway. Some of the respondent also mentioned the noise that coming from the illegal street racing which were happened after the dawn.

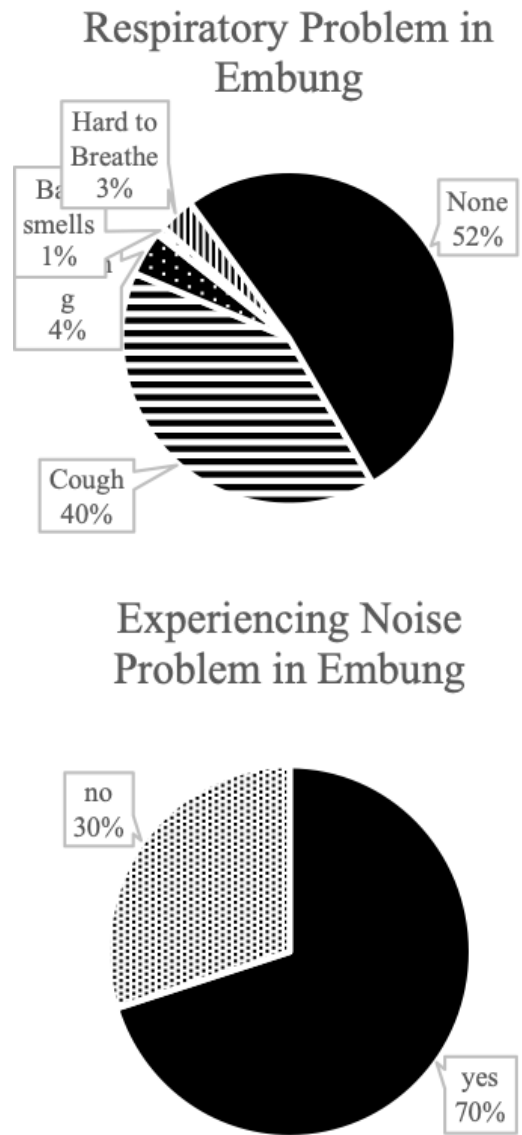


Figure 7. Respondent experience in *Embung* related to air quality and noise

C. Correlation Analysis

In this study, a Spearman rank correlation (Rho) was performed on several variable.

A. Correlation between Perception of Air Quality and Frequency to Embung

The results showed that there are only 1.8% correlation ($p\text{-value}=0.84 > 0.05$) between frequency to *Embung* and perception of air quality. This score indicated that the correlation is very weak and insignificant. This means that perception of the Air Quality is not changed even when the respondent more often going to *Embung*. The more individuals visited nature for recreation and the more they appreciated the natural world, the more pro-environmental behavior reported [6]. Another study [7] showed that People who perceived good air quality in the urban green space

were more likely to visit more than once a week. However, the frequency of visit also associated by the proximity of the location. Visitor will visit regularly if they satisfied with the distance. In our study, the nearest respondent's origin is from Way Huwi (20%), Korpri (5%), and ITERA (2%). The rest are quite far from *Embung* and also offer other alternatives of public open spaces. So, it is reasonable that most of the respondent visit once more than a week.

B. Correlation between Perception of Air Quality and Duration in Embung

According to 29.9% correlation (p -value=0.001 < 0.05) between duration in *Embung* and perception of air quality, this score indicated that the correlation is significant. This means that the duration of community visits in *Embung* does significantly affect their perception of the air quality in *Embung*. The visitor's environmental satisfaction of certain place tends to decrease as the longer duration they spent in that place [8]. Most of respondents of this study stayed in *Embung* less than an hour because generally the time of visit is in the morning before the sun is high and in the afternoon. The most plausible reason is to avoid the heat of the sun.

C. Correlation between Importance of Air Quality and Last Education

The results showed that there are 33.9% correlation (p -value=0.0001 < 0.05) between importance of air quality and last education. This score indicated that the correlation is weak. It means that the last education of people does not strongly make they think that the air quality of *Embung* is important things. Air quality is something that anyone can feel, so if their air is polluted, they will be disturbed regardless of their last education. However, education is an important factor that affect people toward the pro environmental attitudes [9]. Time spent on formal education also contribute to perceiving and understanding more environmental services provided by environment compared to people spent less time [10]. To improve environmental behavior, environmental education offers an effective approach especially in young people [11].

D. Correlation between Importance of Air Quality and Respondent Transportation

The results showed that there are 32.8% correlation (p -value=0.0002 < 0.05) between importance of air quality and respondent transportation. It means that the correlation are weak. The perception of importance does not necessarily made the respondent leave their motor vehicle at home. 62% of respondent used private vehicle to go to *Embung*. Several studies showed the lack of relationship between environmental knowledge and environmental behaviour [12, 13]. The visitor of *Embung* already knew the importance of air quality but it isn't fully reflected in the choice of mode of transportation. More than half respondents are using their motor vehicle. A study by Liu [12] concluded that environ-

mental knowledge has no significant direct effects on environmental behaviour but if combined with environmental attitudes and environmental behavioural intentions it will become more significant. Programs and policies related to environmental conservation have a significant impact on environmental knowledge [14]. So, to encourage the visitor to choose environmentally friendly mode of transportation it needs a supporting policy and programs.

4. CONCLUSIONS

Based on the results of the questionnaire to the visitors of the *Embung*, it can be seen that the majority of respondents (72%) consider the air quality to be in good condition and more than half of the respondents (59%) think that the air quality in the reservoir is important. However, based on statistical analysis there is no statistically strong correlation between air quality importance and environmentally friendly behaviour (respondent transportation) as seen in the number of respondents who use private motor vehicles. Further research is needed to better understand the motives behind the visit to *Embung* or other public open space and their relation to other environmental parameters.

Acknowledgments: The authors wish acknowledge the financial support by Institut Teknologi Sumatera's grant "ITERA Smart" for ones who successfully received the selection (Document Contract number: B/363/IT9.C1/PT.01.03 /2019)

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Received: 30 March 2022, Accepted: 09 May 2022