


JUNE 12 2024

The puzzling soundmark of a cultural and tourist city; the case of Yogyakarta **FREE**

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Proc. Mtgs. Acoust. 52, 040012 (2023)

<https://doi.org/10.1121/2.0001896>



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*Acoustics 2023 Sydney***185th Meeting of the Acoustical Society of America**Sydney, Australia
4-8 December 2023**Noise and Architectural Acoustics: Paper 3pNSa5****The puzzling soundmark of a cultural and tourist city; the case of Yogyakarta****Christina E. Mediastika and Yusuf Ariyanto***Department of Architecture, Universitas Ciputra Surabaya, Jawa Timur, 60219, INDONESIA; eviutami@ciputra.ac.id; yusuf.ariyanto@ciputra.ac.id***Anugrah S. Sudarsono***Kelompok Keahlian Fisika Bangunan, Institut Teknologi Bandung, Jawa Barat, INDONESIA; anugrahsabdono@gmail.com***Sentagi S. Utami, Ressay J. Yanti, and Zulfi A. Rachman***Department of Engineering Physics, Universitas Gadjah Mada, Yogyakarta, INDONESIA; sentagi@ugm.ac.id; ressay.jaya.y@mail.ugm.ac.id; Zulfi.rachman.22@ucl.ac.uk***Teguh Setiawan***Yogyakarta Tourism Office, Yogyakarta, INDONESIA; tspinang@gmail.com*

Yogyakarta is a city rich in culture and heritage, making it the second most popular tourist destination in Indonesia after Bali. However, unlike Bali, Yogyakarta loses its intangible uniqueness quickly. This paper explores people's perceptions of Yogyakarta's soundscape, particularly the vanishing soundmark. Qualitative and quantitative approaches were employed to collect data through focus group discussion (FGD) and questionnaires. The qualitative data were processed using the Colaizzi protocol, and the quantitative were processed using a modest statistical method to show trends. Through the FGD, the discussants conveyed that determining the iconic sound is intricate. It needs consent to know what 'icon' means because different areas have unique sounds. However, they agreed upon Maliboro as the most iconic place, which has lost its soundmark due to noise. While quantitatively, respondents stated that the sounds of 'gamelan' (a set of traditional musical instruments) and 'andong' (horse-drawn carriages) are two soundmarks of Yogyakarta. They also recognize a third soundmark, namely the mystical sound of a marching band heard at certain times, whose origins are still debated, truly representing the term 'intangible'. The challenging part in developing soundscapes and soundmarks is the varying perceptions between residents, visitors, and generations about the pleasant and memorable sound.

1. INTRODUCTION

Yogyakarta, the capital of Daerah Istimewa Yogyakarta Province, Indonesia, is rich in culture and heritage, making it one of Indonesia's most popular tourist destinations. It has been constantly positioned as the second most popular tourist spot after Bali for decades. People find that Bali has a vast array of tourist attractions consisting of beaches, mountains, paddy fields, and the famous Hinduism merged with locally-rooted culture and tradition, which spans preserved tangible and intangible elements. Meanwhile, Yogyakarta's attractions are less varied than Bali's; even so, it is now struggling to protect its intangible aspects. One of which is the sound uniquely associated with the city. The gradually fading unique sounds are due to the changing of locals' lifestyles and livelihoods (Sullivan, 1986; Birsyada & Syahrurah, 2018). An earlier study shows that people strongly associated Yogyakarta with the sound of 'gamelan', a set of traditional musical instruments played by a group of musicians (Mediastika et al., 2023a). A gamelan is an ensemble of gongs, metallophones, drums, bowed lute, xylophone, zither, bamboo flute, and (sometimes) singers (Walton, 2007). Its most important function is to accompany dance, theatre, and ceremonial occasions, such as weddings, in both ritual and commercial settings (Walton, 2007). It was customary to hear gamelan music in high-ranking offices and royal family residences (Vetter, 2001). In 2021, UNESCO inscribed the philosophical value of gamelan as one of the UNESCO Representative Lists of the Intangible Cultural Heritage of Humanity.

Although 'gamelan' music does not uniquely belong to Yogyakarta, it is an intangible aspect that people strongly associate with Yogyakarta more than other areas or cities in Indonesia. It refers to the livelier and greater tradition of 'grebeg', an event to commemorate Prophet Muhammad's birthday in Yogyakarta, where 'gamelan' is part of the event than it is in other cities (Mulyana, 2017; Sapphira, 2019; Priyatningsih & Rahayu, 2021). Among Indonesians, the culture embedded in Yogyakarta is better known as Javanese culture. The term Javanese is actually used for those who have blood descendants from people who have lived on the island of Java for many years, especially Central Java, Yogyakarta and East Java. However, most people recall that the Javanese strongly refer to the Yogyakartaese and Surakartanese ethnic groups rather than other Central and East Java areas (Purwani, 2014; Nardiati et al., 2023), as the two were formerly parts of the Mataram Kingdom before split into two smaller kingdoms. However, in many cases, it is also strongly addressed to the people of Yogyakarta (Kurniasih, 2006; Herliana, 2015; Nurani, 2015; Mulyana, 2017). It might be because, in the past, the Javanese culture strongly related to the people of Yogyakarta (and Surakarta) more than people from other Central and East Java areas. Javanese, which in this case is Yogyakartaese, tend to be introverted, polite, have delicate personalities, and speak in idioms that have symbolic meanings instead of direct meanings (Abimanyu, 2013:28, in Herliana, 2015), in which the very structure of the 'gamelan' music reflects this belief (Walton, 2007), and the practice of meditation in daily live (Walton 2012 quoted about the Sumarah practice). These characteristics have been maintained by Javanese people in order to attain a harmonious life and to avoid people feeling offended. These characteristics are also reflected by the Javanese 'gamelan' rhythm, which is calm and slow if compared to, for example, the dynamic and lively Balinese 'gamelan'. The Javanese 'gamelan' reflects thought, experience, and belief in Javanese culture: mysticism (Walton, 2007). The creation of melodies has remarkably close parallels in the Javanese mystical world (Walton, 2007). The styles of Yogyakarta and Surakarta gamelan are also different; Yogyakarta gamelan still maintains the Mataram culture, while Surakarta gamelan has been innovated somehow (Purnama, 2021).

Apart from the strong bond between Yogyakarta and 'gamelan'. It is also crucial to learn how Yogyakarta is known for its culture, tradition, and tourist city at the same time. It began long before Yogyakarta was appointed as a special province. Previously, Indonesia had two special provinces, Aceh and Yogyakarta, but the status of Aceh has been upgraded to have more autonomy than only as a special province. Currently, Yogyakarta is the only special province in Indonesia. How did it get a special predicate? In short, Yogyakarta was a kingdom that existed before Indonesia. When colonialism ended in 1945 and Indonesia was born, Yogyakarta's Sultan, as the kingdom leader, voluntarily agreed that his territory was a part of Indonesia. There were two kingdoms in Yogyakarta: Kasultanan and Pakualaman, and both agreed to be parts of Indonesia. Under the Indonesian government, Yogyakarta has special autonomy by its sultan, who is automatically a governor. Unifying two kingdoms into one provincial government with both sultans as the governor and deputy governor has kept the sultanate traditions alive. It also has a special budget allocation from the central government to maintain the sultanate tradition. With the existence of Yogyakarta's Sultan as the governor and the budget allocation that part of it is to maintain the culture and tradition, including the existence of the two kingdoms, people seem to expect that playing 'gamelan' as part of the kingdom tradition is kept alive just as they recall it. It is still but with a thinner occurrence. This is understandable since the younger generation is currently attached to modern culture instead of their locally rooted culture. Some younger generations have a passion for playing 'gamelan'. Even so,

many have said that the feel and atmosphere are different. Spiller & Clendinning (2022: ix) expressed the public's opinion that gamelan today no longer has a multidimensional meaning, which somehow degrades the quality. Two opinions support this statement by saying that "Nowadays, nobody works hard at playing the 'gamelan'," and "The masters of the past were more skilled than those of today" (Spiller & Clendinning, 2022: ix).

The sounds of 'gamelan' that people remember and the 'gamelan' performances that now only exist in a few have maintained Yogyakarta's predicate of culture and heritage city. Tourists visit Yogyakarta mostly to explore the city's remaining cultural heritage, including the Yogyakarta Palace. They believe that this is an integral part of Yogyakarta's cultural richness and makes Yogyakarta a culture-based tourism city (Wijayanti & Damanik, 2019). Although most people associate a place with a visual identity, for Yogyakarta, because people perceived the city to have a strong connection with 'gamelan', the aural aspect should also be a part of its identity. Combining visual and aural identities is also ideal for visually impaired people, who are 1.5% of the Indonesian population (Mediastika et al., 2020b; 2022a; 2022b). Additionally, it will also provide a more immersive experience for visitors. Unfortunately, as mentioned above, Yogyakarta's aural signature has gradually been lost. The study aims to uncover the Yogyakarta sound signatures as perceived and expected by loyal and new residents for the possible preservation of the intangible elements of the city. People's perception of 'gamelan' is a piece of preliminary information. The iconic sound of Yogyakarta could be more than just it since the city was rich in culture and traditions.

2. METHODOLOGY

The study to collect data about people's perception of iconic sounds or soundmarks for improving the city soundscape and, later, reconstructing them for preservation was conducted using qualitative and quantitative approaches through a focus group discussion (FGD) and face-to-face surveys collected at the participants' houses.

A. THE FOCUS GROUP DISCUSSION (FGD)

The FGD was conducted prior to the field survey as the discussion was intended to seek opinions from the Yogyakarta stakeholders to develop the questionnaire for the face-to-face survey. It invited ten stakeholders through purposive sampling to gain comprehensive inputs with no age limitations. Participants voluntarily agreed to participate in the study. They comprise government officers (Regional Development Planning Board, Office of Spatial Planning, Office of Culture, and Office of Tourism), academics, urban planners, and musicians. It was coincidental that all participants were male. One female, the head of the Office of Culture, was expected to come as she agreed upon the invitation, but at the time of the FGD, she felt unwell and sent her staff to replace her. At the beginning of the session, we explained the FGD procedure to all participants and raised questions to trigger participants' opinions. Apart from the questions, participants were allowed to include other opinions when they thought additional information was needed to support their opinions. The questions were as follows:

1. Which locations are considered to have iconic sounds in Yogyakarta?
2. What is your opinion about the past sound environment in Yogyakarta?
3. What is the ideal sound environment for Yogyakarta?

We maintained ethical principles throughout the FGD, including volunteerism, anonymity, confidentiality and participants' autonomy. The ethical approval to conduct the FGD was granted by the Ethic Commission of Universitas Aisyiyah Yogyakarta, numbered 1413/KEP-UNISA/V/2021. It was conducted in Bahasa Indonesia for 1 hour.

B. THE SURVEY PARTICIPANTS

Yogyakarta's population is roughly 449,890 (BPS Yogyakarta, 2022). The sample size is an important issue in research; if it is too small, it fails to find what it set out to detect. On the other hand, if it is too large, it will waste resources that could have been spent on something else. The ideal sample size collects sufficient data to have a good chance of measuring what you set out to measure (Conroy, 2016). Thus, around 3% of the city population was surveyed. Yogyakarta consists of 14 sub-districts with a total of 45 urban villages. Figure 1 shows the 45 urban villages, leading to a decision to use a stratified sampling method, where 30 participants were surveyed in each urban village. This decision was taken based on broad dimensions that are relatively the same in all surban villages. Within each urban village, the 30 participants were randomly selected, with a direction given to enumerators to cover the whole area of each urban village as much as possible. The enumerators were also directed to cover various house positions, such as residential areas along small streets and houses in busy business areas along large or even major streets. This was intended to collect various

sound sources that exist in Yogyakarta. Thirty participants for each urban village were considered sufficient to represent its population as well as to save time and resources. With 45 urban villages and a confidence level of 95%, the total number of participants was 1,350, with a margin of error of 2.66 only. The ethical approval to conduct face-to-face surveys for this large sample was granted by the Ethic Commission of Universitas Aisyiyah Yogyakarta numbered 1804/KEP-UNISA/IX/2023 and by Dinas Penanaman Modal dan Pelayanan Terpadu Satu Pintu Kota Yogyakarta 0022/09/XX/VIII/2023.

Thirty enumerators conducted the survey. They were undergraduate students in Yogyakarta and Surabaya universities who voluntarily registered for the work and attended two briefings before the survey. The survey was set to be done with two enumerators in pairs considering the complicated task of the enumerator: interviewing and filling up an online questionnaire, observing the surroundings related to the current sound heard in the vicinity (a brief soundscaping) to be listed in the questionnaire, taking surrounding photos for records, and filling up the survey location (by using coordinate) into the online questionnaire. Finally, the enumerator also handed over tokens of appreciation to the participants. The sounds listed by the enumerator will be compared and validated with the participant's perception of the sounds they currently hear. The survey of 1,350 data was conducted for 6 to 8 days for each pair, depending on their capability and available time slots between enumerators' campus activities. On average, per day, each pair of enumerators managed to collect around 13 questionnaires starting from 8 am to 8 pm.

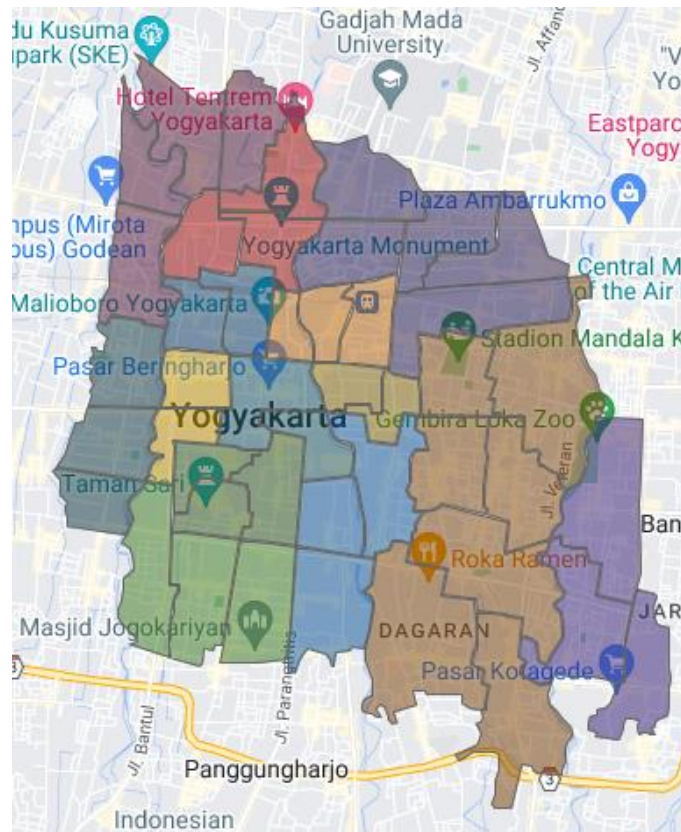


Figure 1. Yogyakarta city with its 14 sub-districts and 45 urban villages. Urban village areas with the same color belong to the same sub-district (Available https://www.google.com/maps/d/u/0/viewer?mid=1Lrs16sMu4t94iyHYD66xcnUh0Ek&hl=en_US&ll=7.80282511367695%2C110.37484649999999&z=13)

C. THE SURVEY QUESTIONNAIRES, ENUMERATORS, AND DATA PROCESSING

The questions were developed to provide as much data as possible on-site. Thus, besides being interviewed to gain participants' responses, it was also designed to be filled with observational data by enumerators. It consists of open and closed questions with a detailed structure, as shown in Table 1. Since the initial stage of this study raised an issue about the existence of a mystical sound, namely 'drum band,' this study decided to include it in the questionnaire to investigate and possibly locate its source. It is attributed to a mystical sound since many

have heard people playing these musical instruments in the middle of the night and at dawn, which is considered a strange time. Also, no one could describe and locate what it is and where it is, and no paper has delved into it. Hence, this study attempted to investigate it.

The enumerator read the questionnaire and then filled the answer in the online form. While the first enumerator interviewed and filled out the form, the second enumerator checked the coordinates of the survey location and listened to the surrounding sounds to put it on a note. By the end of the interview, the second enumerator sent the note to their partner to be inserted in the form. Both data from participants and enumerators were filled in the same form to result in one form only per participant. Therefore, 1350 responses were collected. Since the response is modest, a simple statistical Excel run was employed to process the data. Then, the Orange app was used to plot the collected coordinates on the map for location mapping.

Table 1. The questionnaire structures.

Group	Question	Source		Type of question		Answer options	
		Participant	Enumerator	Open	Closed		
1	Demographic	Location (coordinates)		√	-	-	-
		Location photos		√	-	-	-
		Gender		√*		√	Male/female
		Age	√			√	≤ 20/21-30/31-40/41-50/51-60/≥61
		Period of stay in Yogyakarta	√			√	since birth/≤10/11-20/21-30/≥31 years
		Period of stay in the interview location	√			√	since birth/≤10/11-20/21-30/≥31 years
2	Sound	Sounds they heard from childhood to adolescence	√		√	-	-
		The most unique sound in Yogyakarta	√		√	-	-
		Is the unique sound still audible?	√			√	entirely audible/partially audible/entirely inaudible
		Past sounds were pleasant	√			√	strongly disagree/disagree/neutral/agree/strongly agree
		Current surrounding sounds	√		√		-
		Current sounds are pleasant	√			√	strongly disagree/disagree/neutral/agree/strongly agree
		Current surrounding sounds (during the interview)		√	√		-
		Experience with the 'drum band' sound	√			√	never/yes once in a while/yes frequently

* Due to the norm in Indonesia, gender is filled in by the enumerator based on physical appearance because it is considered impolite to ask for confirmation from the participant

3. RESULTS AND DISCUSSION

A. THE QUALITATIVE DATA

The discussion of the FGD was brought verbatim; then, the Collaizi protocol was used to identify the fundamental structure of the phenomenon. The protocol consists of seven steps: verbatim, extracting significant statements, creating formulated meanings, building themes, developing exhaustive descriptions, identifying the fundamental structure of the phenomenon, and returning to participants for validation (Morrow & King, 2015; Praveena & Sasikumar, 2021). However, the protocol flow was modified since three questions were developed to guide participants' opinions, meaning themes had already been built before the verbatim. As the verbatim was in Bahasa Indonesia, translations were done upon extracting significant statements. In order to suit the limitations of the study, other modifications were also made. Instead of returning the findings to the original participants of the FGD, the study opted to validate the qualitative findings through field measurement for agreement or disagreement. It correlates with the intention of the FGD to seek insight into developing a questionnaire for the field survey.

As mentioned, the discussion had three themes following the questions at the beginning of the FGD: the iconic sound and specific place, the current sound environment and the ideal sound environment. Later, it extended into five themes, as the first participant shared his opinion and questioned what the 'iconic' term means and another participant also mentioned the possibility of developing new iconic places. While Merriam-Webster describes that iconic means widely recognized, well-established, widely known, and acknowledged especially for distinctive excellence, the meaning of the word iconic when associated with sound still does not have a clear meaning. Thus, the first theme built from the verbatim is the iconic term. Several significant statements on the first theme emerged as follows:

"Actually, we cannot say this is the most iconic and the least iconic (place or sound). Malioboro might be the icon, but maybe it is not today. Different generations may have different opinions about what is iconic."

"Sound is always related to time, right? Due to the time of occurrence, we may feel whether the sound matches a certain time of day, day of a week, week of a month, etcetera. The same sound may become the context of different times."

"I want to add (an opinion) about age; there will also be a difference (of age) or generations. For example, in Participant X's generation, my generation, and others, what is expected to be audible differs."

"There are also moments related, right? During the pandemic (COVID-19), the two sounds that dominated over other sounds were the sound of ambulances and the announcements of who died from the mosque speakers."

"We need to realize that sound could emerge by design or as a result of activities."

"If sounds emerge from activities, they might also become the character of a space."

"Here, it is more about the distribution or pattern of identities, so it is not uniform or refers to a single idea. We shall be open to all insights to decide what iconic sound is. One definition cannot represent all, as it will trigger criticism."

The discussion shows that the concept of iconic is vast and can be applied to various things. Participants also added that defining iconic sounds is complex and that many stages of studies must be taken before defining the iconic sounds in Yogyakarta. They believe time, space, age/generation, situation, and condition are the most important factors. Iconic sounds can also be designed or happen inadvertently. Therefore, no exhaustive description could be made of 'iconic sound' since the definition of iconic sound remains unclear. However, we may temporarily draw that iconic sounds can be segregated by time, space, design, generation, situation, and condition. This agrees with the opinion that the iconic sounds of a city are a distribution of identity patterns that are not uniform or do not refer to a single idea. Although there was no single agreement about the iconic sound, participants agreed to move to the second theme about specific sounds and places in Yogyakarta. It begins with a place, namely Malioboro, the most favorite public place in Yogyakarta (Mediatika et al., 2020a, 2021, 2023b) and a must-visit tourist object. Malioboro is a street corridor with a shopping arcade and culinary and cultural events.

"I agree that Malioboro is, by far, the most iconic place in Yogyakarta, with its various sounds. However, different areas with different activities should have different sounds."

"Talking about icons is about the majority. So far, Malioboro is a place that, statistically, the majority believe represents Yogyakarta."

"Every space has a sound, including Malioboro, which is contributed mainly by tourists, although there are also contributions from local people."

"Malioboro was made for visitors rather than residents. It has been like that from the start and to this day. It is the visitor who makes Malioboro alive and boisterous."

"Malioboro's sounds are not for residents; they are instead for tourists."

"The exciting part in Malioboro was when street vendors usually listened to Malioboro radio for gamelan sounds or announcements from Malioboro's technical supervisors, which is no longer now."

"There are currently new sounds in the Malioboro area. They are angklung, a set of traditional instruments made from bamboo originally from West Java instead of Yogyakarta, and a blind singer uses considerably noisy loudspeakers busking along Malioboro Street. These are not identical to Yogyakarta."

The discussants believed Malioboro was designed for tourists. Hence, domestic and international tourists are the sound component that fills Malioboro. As a result, the atmosphere in Malioboro is always lively and boisterous. The voices of shoppers, 'gamelan' music, and announcements from the city's technical supervisor color the Malioboro's sound environment. The discussion to answer the question of "Which locations are considered to have iconic sounds in Yogyakarta?" was mainly pointed to Malioboro, but another sub-theme emerged when participants mentioned the possibility of new iconic places and sounds.

"Almost all areas in Yogyakarta were named after specific activities conducted by the inhabitants, which, of course, have consequences for their sound since those activities produce sounds."

"I think Kotabaru could be the new iconic place in Yogyakarta. It is a strategic area located relatively close to the center. The Office of Culture once held a regular orchestra performance, which worked for the area. I think orchestra performance suits the area of Kotabaru as the new sound icon of Yogyakarta instead of 'gamelan'."

"Yeah, now Kotabaru is bustling, but it primarily represents the new iconic place in the northern area of Yogyakarta. It is also essential to develop the southern part to have new iconic locations, such as the revitalization of XT Square and Kotagede, so the intensity between the North and South parts could be balanced. The XT Square has been developed to boost cultural activities in the southern part, but it could be more successful."

Participants agreed that there is a possibility for a new sound icon and location in Yogyakarta, namely Kotabaru. However, since Kotabaru is a bit in the North part of Yogyakarta, they also think of balancing over the South area. For the past sound environment theme, the significant statements conveyed by participants were as follows:

"Maybe the iconic past sound is 'gamelan', but given the lifestyle changes, for example, in the Kotabaru area, I think orchestra suits more than 'gamelan'."

"Gamelan is strongly connected to Alun-alun Lor (the North Square in front of the Sultan Palace) because of the 'sekaten' procession to commemorate the birthday of Prophet Muhammad, which includes the 'gamelan' parade. However, instead of 'gamelan' only, the Alun - alun was once used for bullfighting or tiger fighting and war training; then people screamed as bullets of a training soldier accidentally hit them, which was truly boisterous. While at the Mosque's courtyard (still in the Alun-alun area), there was the sound of the palace's 'gamelan' preparing for the parade. It was deafening, more like blacksmithing than music. However, in the Mosque foyer, there were human voices singing laudations or recitations. So it was the past sound we encountered in the Alun-alun, but for the late version, the bustle was replaced by night markets, and now, it is even quieter since no event is permitted in the Alun-alun to maintain its sacredness."

"People may say that 'andong' is also identic to Yogyakarta and associate it with Malioboro. This may be correct now, as tourists are interested in riding 'andong' in Malioboro for recreational purposes. However, in the past, it was identical to the Kotagede area, where 'andong' was used to transport goods, sellers and buyers of the Kotagede Market."

"I think the only place in Yogyakarta where sound is still quite genuine is Kotagede."

"My idealist friends felt that Yogyakarta's sound is more into 'gamelan', but for me, Yogyakarta is an adaptive city; we work collaboratively, so I think Yogyakarta's sound is not only 'gamelan'."

"The 'drum band' sound, which has remained mystical until now, is also a unique sound of Yogyakarta. I experienced it myself, just like Mr X said. Nevertheless, I would name it a psychological sound rather than a mystical one. So, it is more into our psychological than physical space."

The discussants agreed that 'gamelan' is a past sound recalled mainly by people associated with Yogyakarta, followed by 'andong' and 'drum band' sounds, even though the location or the source of those three sounds were not defined. For the last theme of the ideal sound environment of Yogyakarta, the discussants conveyed their significant statements as follows:

"Visitors make the most significant contribution to many aspects of Yogyakarta, including sound."

"The ideal sound for Yogyakarta is those that can strengthen function and space orientation. A sound that functions as a soundmark to a particular area is also essential."

"Each area in Yogyakarta has its unique sound that can be developed as its soundmark."

"I think Yogyakarta is a composition between the good or the expected and disturbing sounds. It might be that Malioboro is the iconic place, but we have to be careful; its sound might not be the sound that is expected to represent Yogyakarta's sound. It could be Yogyakarta's kampong sound that represents the sound of Yogyakarta. It is true that the sound of modernity now dominates Yogyakarta's sound and other

cities in Indonesia. That is why it may also be crucial if we could study sound that is not based on locality but more to represent Yogyakarta in general, and maybe Indonesia in general, which also accommodates modern sound."

By the qualitative approach using an FGD, the phenomenon of iconic or signature sounds of Yogyakarta are drawn as follows:

"Iconic sound and iconic place of a city are not a single definition. They depend on many factors, such as time, space context, and generation. It also needs to be clear whether the iconic sound will be designed or emerge related to the community's activities. For the Yogyakarta case, it seems that 'gamelan', 'andong', and 'drum band' sounds were parts of the past sounds, and Malioboro was and still is the most mentioned place in Yogyakarta. The city may need new iconic places to balance the North and South areas since every part of Yogyakarta is unique. Therefore, their unique sound may also be developed as the soundmark of each location, and modern sound should also be considered as part of the soundmark."

B. THE QUANTITATIVE DATA

The data collected through face-to-face surveys from 1,350 randomized participants in 45 urban villages, each of 30 participants, shows that the randomized study covered 57% female and 43% male participants (Figure 2). Participants over 41 years old dominated the age span (81%), which is in line with the aim of the study to collect past sound signatures of Yogyakarta. Regarding the period of stay, most participants have been Yogyakarta residents for a long time, with those since birth and those who have lived for more than 21 years being 67% and 22%, respectively. The rest, 11%, stay less than 21 years. Of the 89% of the loyal residents, 68% never moved from the place since birth, and the moved ones stayed at the interview location for more than 31 years. It indicates that Yogyakarta rarely move. There might be no opportunity to move or live comfortably in Yogyakarta for various reasons. The indication that Yogyakarta is a city with a population aging in Indonesia was conveyed by Alfana et al. (2020), where the percentage has always been more significant than the national percentage since 1990. The loyalty of residency in Yogyakarta is also possibly due to the feeling of solid linkage between Yogyakarta and the Sultanate, where Yogyakarta accept their sultan as government leader as well as the spiritual leader (Assilmi, 2024), so they may come and go but do not leave for good. This phenomenon does not apply exclusively to the people of Yogyakarta but even to foreigners who stay in Yogyakarta; they never leave for good but maintain ties to Yogyakarta when they are away and return to stay there (Fechter, 2000). Another reason is the lower cost of living than in other cities in Indonesia. The fact that loyal residents are more dominant than those who stay less than 20 years should place the sound perception of the first group as the focus of reconstructing the past sound. This disagrees with the FGD participants' opinions, which said that Malioboro (and its sounds) was designed for visitors instead of locals. On the other hand, this agrees with the FGD opinion that Yogyakarta needs new iconic places (and sounds) to balance the city icons, which could be developed for locals since Malioboro was and still is for tourists. For the later plotting of participants' location related to their past sound perception, the figure shows the location of loyal locals (Figures 5 and 7).

The survey selected Yogyakarta's top five sound signatures: 'gamelan', 'drum band', 'andong' (horse-drawn carriages), train, and bird. Interestingly, these sounds were experienced mainly by participants who have lived in Yogyakarta since birth (Figure 2a). The shorter they stayed in Yogyakarta, the lesser the signature sounds were heard. After all, 'gamelan' is the unique sound of Yogyakarta perceived by those who stay since birth and between 11 to 30 years (2b). These data answer a minor doubt during FGD, in which participants accept 'gamelan' as the iconic sound of Yogyakarta but are also open to other possible sound icons. From the top five sound signatures, two transportation modes were perceived as identical to Yogyakarta: 'andong' and train. These two transportation modes were not uniquely linked to Yogyakarta because horse-drawn carriage modes are also found in other Indonesian cities. Even so, the name 'andong' is unique to Yogyakarta and nearby areas. In Indonesia, similar carriages are named 'delman', 'dokar', 'bendi', and 'sado'. The strong relationship between 'andong' and Yogyakarta is also found in numerous publications (Hutami & Effendi, 2015; Purnamasari, 2018; Prasetyo & Marzuki, 2019; Hijriyanto, 2020; Huda, 2022; Hanifah, 2021, Tontowi et al., 2021; Ciptosari et al., 2021) rather than it is with other areas in Indonesia. Even in Yogyakarta, there is a provincial regulation about 'becak' (three-wheeled traditional vehicles) and 'andong' numbered 5/201, which is not stipulated in other cities and provinces in Indonesia.

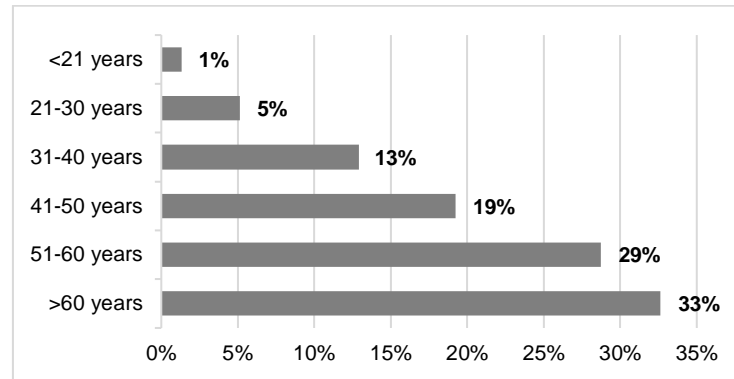


Figure 2. Age composition of participants.

Nonetheless, the details of horse-drawn carriages in Indonesian cities also differ, such as the horse attire that creates different sound combinations in each city. Trains are also not unique to Yogyakarta. Train types that pass through and stop in all cities in Indonesia have a similar sound to those produced by a state company and use the same railway quality. A possible argument to support the perception that the sound signatures include train sounds is that the central train station is located in the heart of the city adjacent to the most iconic place and tourist object: Malioboro. The city is also relatively small, which made train sounds audible from a distance since non-highspeed trains could produce sound pressure levels of up to 90 dBA (Pronello, 2003; Istantara, 2017), which only decreased about 3 dBA with a 25 m distance from the train (Pronello, 2003). In the past, when traffic noise and high-rise buildings that block sound dispersion were less, the train sound was audible much farther.

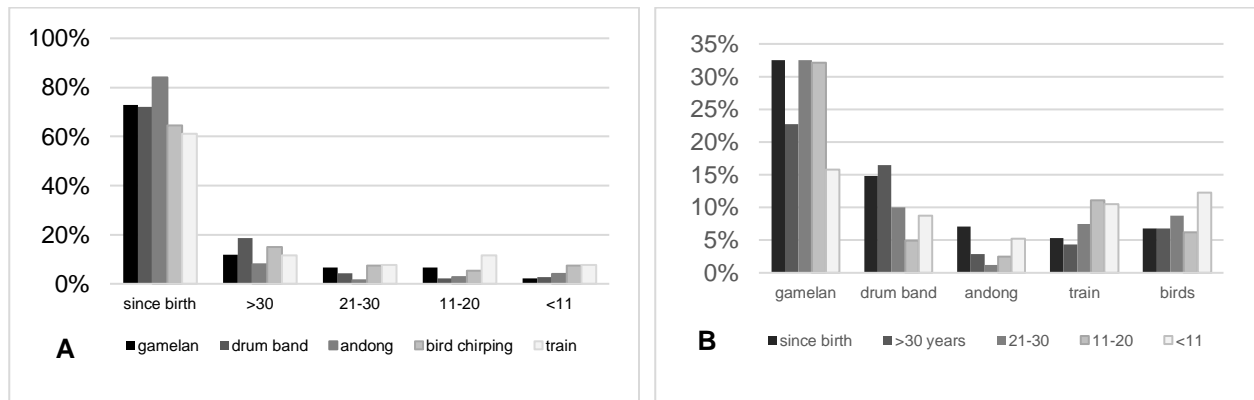


Figure 2a and 2b. The five most iconic sounds vary with the stay period and vice versa.

The perception of iconic sounds concerning participants' age showed that, in general, participants over 60 considered the sounds of 'gamelan', 'drum band' and birds to be the three most iconic sounds (Figure 3). At the same time, train and 'andong' sounds were voted mainly by those aged 51 to 60 (Figure 3). The audibility level of 'gamelan', 'andong', train, and birds' sounds is found to be naturally maintained in the city, and around 50% of participants perceived it as still partially audible, with 15% perceived entirely inaudible (Figure 4). The 'gamelan' sound as the first vote is plotted over the city map, which shows that its current audibility is scattered all over the area (Figure 5), which is an asset for maintaining a sound strongly associated with Yogyakarta. Apart from the other four sounds, it is interesting that the participants included the 'drum band' sound as one of the iconic sounds. It became more interesting as 72% of participants stated they knew and heard the 'drum band' sound and 47% of those who experienced the 'drum band' sound heard it frequently instead of once in a while. Among the 72% who said they knew and heard it, 15% perceived it is still entirely audible now, 52% perceived it as partially audible, and 32% perceived it as entirely inaudible (Figure 6).

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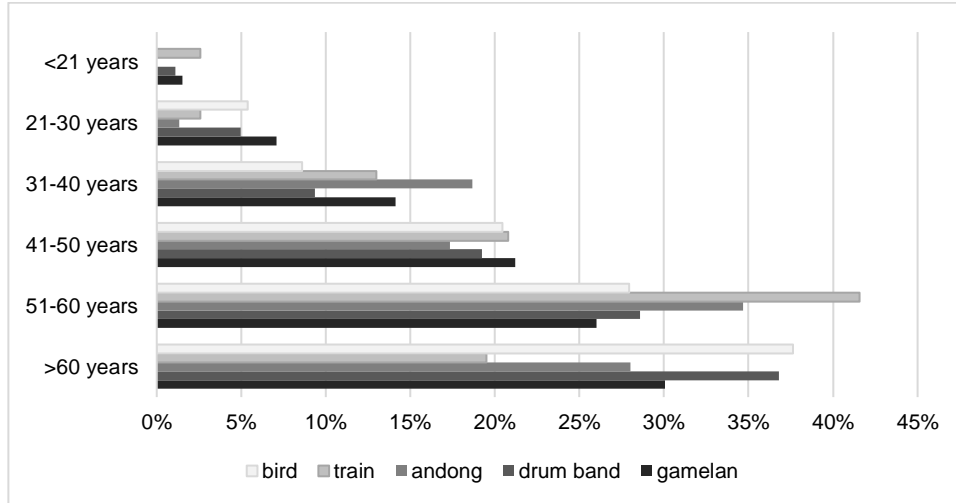


Figure 3. The perception of 'gamelan', 'drum band', 'andong', train, and bird sounds varies with age.

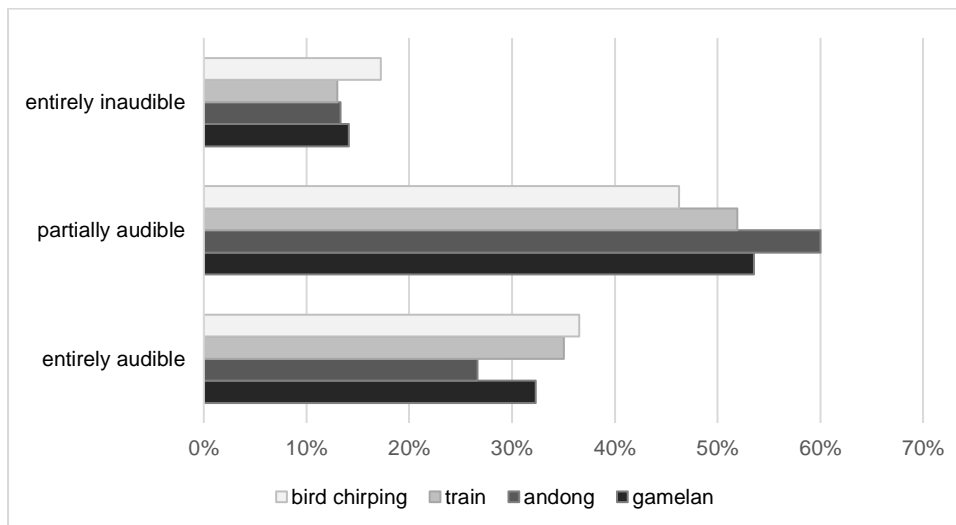


Figure 4. The audibility level of the four iconic sounds of Yogyakarta.

The sound of 'drum band' is, in fact, the most iconic sound of Yogyakarta. To date, no paper has ever discussed it. However, after a quick check on the general search engine by simply inserting two keywords, drum band and mystery, numerous articles will pop up, and they will never be related to other cities or areas instead of Yogyakarta. However, since it has not been scientifically proven, nor does it aurally exist for everyone living or visiting Yogyakarta, it was not the first participant vote on the iconic sound. The 'drum band' sound spread within the current situation is plotted over a map (Figure 7). The scattered red, light blue, and light green dots show that the source location of the 'drum band' sound remains unsolved. In this case, instead of a mystical or psychological sound, as said by an FGD participant, the 'drum band' might, scientifically, be the sound of nature, such as the sound of soil (Rillig et al., 2019), sound of earth or moving ground (Kahn, 2013), or sound of cloud and cloud droplets (Colgate & McKee, 1969; Qiu et al., 2021), which would be audible in a quiet environment during the dusk and dawn. Perceptions that the five iconic sounds are now less audible and even entirely inaudible (15% for the four and 32% for the 'drum band' sounds, respectively) could be between two conditions. First, the sound sources do not exist at the participant's location, or they are covered by noise, such as traffic noise. Second, there may be a decrease in participants' hearing ability as 62% of participants were regarded as seniors where presbycusis occurs (Gates & Mills, 2005).

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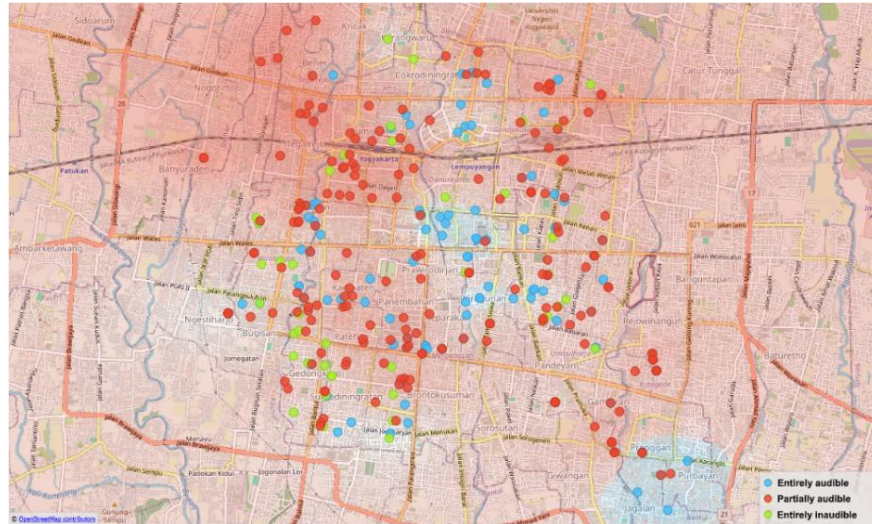


Figure 5. The current spread of the 'gamelan' sound.

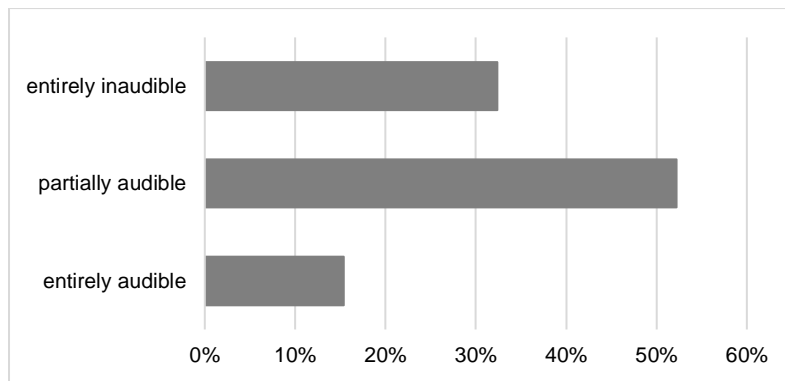


Figure 6. The audibility level of the 'drum band' sound.

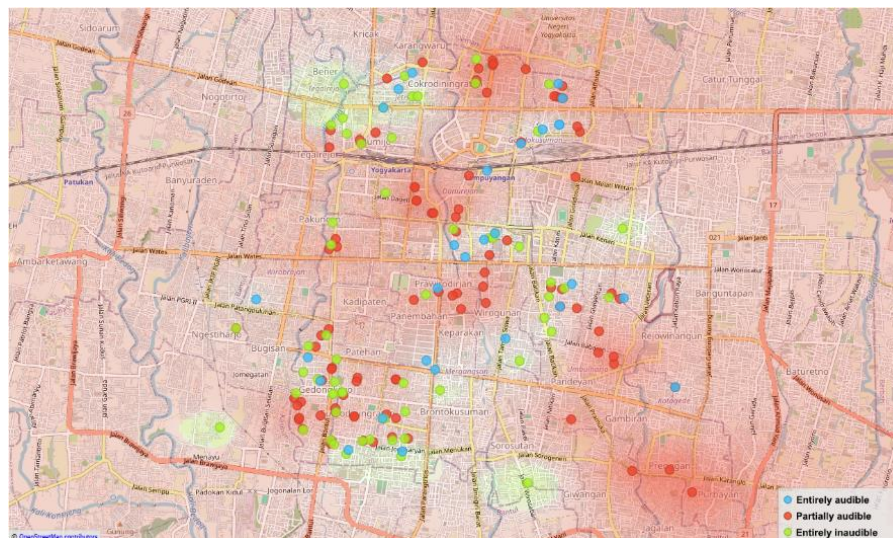


Figure 7. The current spread of the 'drum band' sound.

Besides age variation to sound preference as shown in Figure 3, sex variation also affects people's perception of unique sounds (Figure 8), where 'andong' and train are significantly unique for females, and that bird is more significant for males. There are no valid arguments to support females' significant vote for transportation sounds. However, it is common for Indonesian males to be bird enthusiasts (Situmeang, 2017; Salsabila et al., 2023;

Wulandari, 2023). Yogyakarta also has a market dedicated to selling and buying birds (Iskandar et al., 2020). Apart from the various perceptions about the unique sound of Yogyakarta, participants generally agree that when the past sounds of Yogyakarta were entirely audible, the sound environment was pleasant, and that the current sound, when some of them are partially audible and entirely inaudible, is not pleasant nor unpleasant. Figure 9 shows that 56% declared neutrality, with only 13% and 5% declaring agreement and strong agreement that the current sound is pleasant. This is understandable since the current sound is dominated by traffic and human activity noise, with little natural sound (Figure 10).

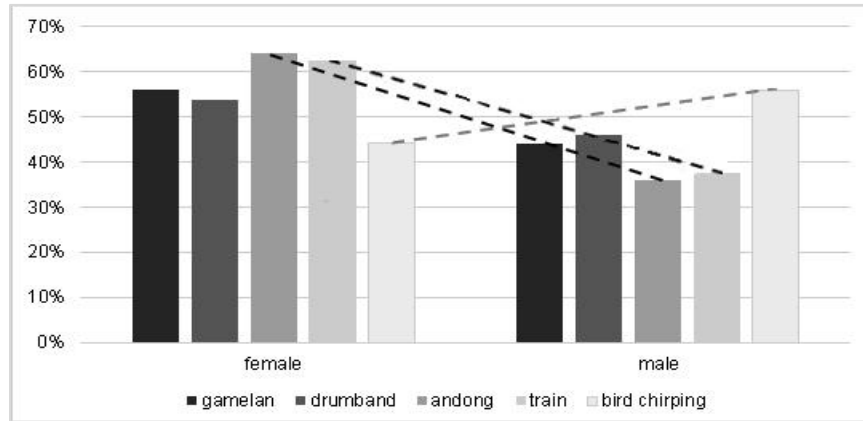


Figure 8. The perception of Yogyakarta's iconic sound varies with sex.

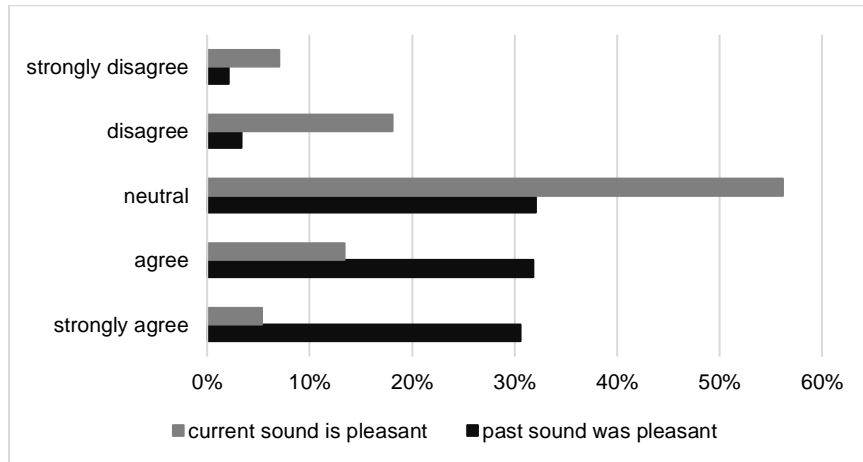


Figure 9. The perception of the pleasantness of current and past sounds.

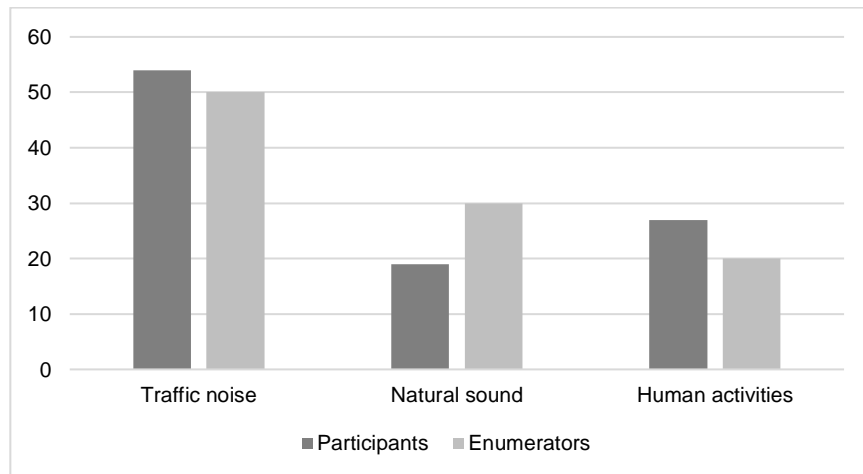


Figure 10. The current sound heard by participants and enumerators.

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4. CONCLUSION

The study that aims to uncover the Yogyakarta sound signatures for the possible preservation of the city's intangible elements initially faced an intricate stage when the term iconic, unique, or signature sound remained unclear during the qualitative data collection. It was due to several factors affecting the term, such as time, space, age/generation, situation, and condition. However, the complexity was reduced by the result of the quantitative data. Indeed, the sound perceptions vary according to the period of stay, age, and sex of the 1,350 participants, whom seniors and loyal residents of Yogyakarta dominate. Nonetheless, the participants generally voted 'gamelan', 'drum band', 'andong', train, and bird as the five most iconic sounds. The 'drum band' sound remains a mystery. It was and still is regarded as a mystical sound because of the strange audible time, and people know little about what and where the source is. It is, therefore, truly representing the term intangible. Scientifically, it could be the sound of nature.

Even though the quantitative data revealed that 'gamelan' is the most iconic sound in Yogyakarta, followed by the other four sounds, developing the five sound icons as soundmarks for the entire city's soundscapes is still challenging. The qualitative data by stakeholders conveyed the need for careful consideration of many aspects, including the possibility of developing new iconic places and sounds to balance city sound as well as accommodating different generations' preferences.

ACKNOWLEDGMENTS

The authors would like to express their deepest gratitude to the funding agencies and Ciputra University Surabaya for their unlimited support during data collection for the first author to manage teaching and research responsibilities on and off campus.

DISCLOSURE STATEMENT

No potential conflict of interest was reported by the author(s).

FUNDING

This work was fully funded by the Ministry of Education, Culture, Research and Technology of the Republic of Indonesia under the scheme of Penelitian Fundamental Reguler with contract number 044/SP2H/PT/LL7/2023 dated 19 June 2023 (made through LLDIKTI 7).

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