Advanced International Journal of Business, Entrepreneurship and SME's
EISSN: 2682-8545
Volume: 8 Issue: 27 (March 2026) PP. 258-273

ADVANCED INTERNATIONAL JOURNAL OF BUSINESS, ENTREPRENEURSHIP AND SMES (AIJBES)
www.gaexcellence.com/aijbes

CONCEPTUALISING SOUNDSCAPE PREFERENCE IN HIGH-TRAFFIC COMMERCIAL STREETS

Muhammad Afif Abidi Mat Ghazi[1], Nor Hamizah Abdul Hamid[2]*

[1]Faculty of Architecture and Ekistics, Universiti Malaysia Kelantan, Malaysia
g24d0465f@siswa.umk.edu.my https://orcid.org/0009-0007-7355-8223
[2]Sustainability, Urban Design and Wellbeing, Faculty of Architecture and Ekistics, Universiti Malaysia Kelantan, Malaysia
norhamizah@umk.edu.my https://orcid.org/0000-0003-2920-1685
*Corresponding Author

Article Info:

Article history:
Received date: 25.01.2026
Revised date: 11.02.2026
Accepted date: 09.03.2026
Published date: 30.03.2026

To cite this document:

Mat Ghazi, M. A. A., & Abdul Hamid, N. H. (2026). Conceptualising Soundscape Preference in High-Traffic Commercial Streets. *Advanced International Journal of Business Entrepreneurship and SMEs, 8* (27), 258-273.

Abstract:

Conventional noise management approach in urban contexts primarily prioritised decibel reduction. This approach neglects human perception and experience of sound, particularly in complex settings like high-traffic commercial streets. While prior soundscape studies have comprehensively covered public open areas such as urban squares and urban parks, there remains a gap in understanding acoustic experiences on high-traffic commercial streets. This study addresses this gap by developing a soundscape conceptual framework for high-traffic commercial streets. The study synthesises key findings from a narrative of literature published between 2016 and 2026 to identify the factors of soundscape preference. The proposed framework posits context (environmental and personal factors) and sound sources as independent variables that influence auditory sensation and shape soundscape preference. Soundscape preference is conceptualised as a multi-faceted variable that includes soundscape descriptors and the preferred sounds. This approach shifts from typical decibel reduction to utilisation of various sounds, where sounds are treated as resources to improve the acoustic comfort for psychological well-being. The conceptual framework offers guidelines for urban designers to integrate the soundscape approach into urban design. Urban designers can incorporate elements that promote preferred sounds and minimise unwanted ones, based on the contextual and acoustic factors, to create an acoustically pleasant space.

Advanced International Journal of Business, Entrepreneurship and SME's
AIJBES
EISSN: 2682-8545
Volume: 8 Issue: 27 (March 2026) PP. 258-273

DOI: 10.35631/AIJBES.827017 **Keyword:**

Commercial Streets, Conceptual Framework, Soundscape Preference, High-traffic, Soundscape Descriptors

Introduction

The rapid urbanisation rate in Malaysia has been steadily rising, reaching 76.6% in 2020 and is estimated to reach 88% by 2050 (Department of Statistics Malaysia, 2025). This rapid urbanisation has led to the expansion of high-traffic commercial hubs, which are important public spaces that offer services and promote social interactions and cultural identity. However, this has caused severe environmental pollution, including noise pollution, which is often overlooked by urban designers (Elfaig et al., 2014). Thus, high-traffic commercial streets became well-known due to their loud noise production that exceeds the recommended sound level for commercial areas, which is 65-70dBA (Department of Environment, 2019; Hong & Jeon, 2020; Hosseini & Kowkabi, 2023; Mohd Nasir et al., 2024).

A soundscape preferences framework is necessary to overcome the limited outcome from conventional noise management approaches, which prioritise technical metrics such as decibel reduction but overlook the human experience of sound. Many previous studies demonstrate that soundscapes significantly influence well-being, social interaction, and sense of place (Aletta et al., 2018; Jo & Jeon, 2021). By identifying key factors, a soundscape framework shifts the focus from mere noise suppression to the design of meaningful auditory experiences. This human-centred perspective acknowledges that certain sounds, such as human and natural sounds, can enhance vibrancy and comfort when intentionally curated, fostering environments where economic vitality aligns with psychological well-being. For instance, studies highlight how sound preferences vary across individual characteristics and behaviours (Yang & Kang, 2005), while urban design principles emphasise the role of spatial layout in mediating auditory experiences (J. Liu et al., 2021). The framework, which synthesises these findings, offers planners practical criteria for balancing conflicting demands, such as preserving a street's lively character while reducing fatigue from constant traffic noise.

This integration is important, particularly in urban commercial areas, as the complexity of sound sources makes it difficult to estimate sound levels (Brown et al., 2016). High-traffic commercial streets receive a tremendous amount of vehicular and pedestrian volume, making them more prone to noise pollution and a poor auditory environment. This issue has been affecting the public's well-being as these commercial streets have become a socialising centre in urban areas. Typical urban design only focuses on decibel reduction but has less focus on the user experience, perception, and preference, which makes the commercial streets visually aesthetic but acoustically unpleasant (Abdul Hamid, 2022; Brown, 2012; Cao, 2022; Kang,

Advanced International Journal of Business, Entrepreneurship and SME's
AIJBES
EISSN: 2682-8545
Volume: 8 Issue: 27 (March 2026) PP. 258-273

2019; Wu, 2024). Neglecting the user aspects in acoustic design in this specific context leads to stress, anxiety, and impaired cognitive function caused by the extreme urban noise (Brown, 2012; Leus, 2011). Most existing conceptual frameworks focus on parks, squares, or open spaces, with limited attention to high-traffic commercial streets. Therefore, there is a need for a context-specific soundscape framework.

Methodology

One of the most common research methods in interdisciplinary studies is the literature review (Aletta et al., 2016; Che Din et al., 2020; Indrani et al., 2021), which is used to address research issues related to a topic (Torraco, 2016). This study deploys a semi-systematic or narrative review approach to lay a foundation for the research findings. Several inclusion and exclusion criteria were outlined to select the literature reviews of journal articles, as shown in Table 1. A narrative review is intended for subjects that have been approached in different ways and investigated by different teams of researchers across a range of fields (Snyder, 2019). This approach seeks to study and comprehend all potentially particular research traditions that impact the focused issue, and to synthesise the issues (Snyder, 2019).

Table 1 Inclusion and Exclusion Criteria for Three Review Rounds

Review round		Inclusion	Exclusion
1.	**Based on titles only**	Contains the word "soundscape" or "acoustic"	All papers whose topics are unrelated to the soundscape or acoustic environment.
	Based on title, abstract, and keywords	Contain the words "conceptual framework", "conceptual", or "framework"	
2.	**Filter search in the Scopus database**	-Papers must be published between 2016-2026 -Subject area limit to: physics; engineering; arts & humanities; social science; psychology; environmental science; medicine; health profession. -Keywords limit to: acoustic fields; human; architectural acoustic; conceptual framework; soundscapes; theoretical framework; urban planning; sound environment. -Studies were the final stage in publication.	-All papers, aside from articles and reviews -Studies that were not published in a journal -Non-English papers
3.	**Based on full papers**	-Developed/adapted soundscape conceptual framework in the study related to soundscape preference, perception, or design. -The variable used in the conceptual framework must address the human as subject, and consider the acoustic, non-acoustic, or both, as the causal factors. -The soundscape study must relate to built-environment studies.	-Studies outside of the built-environment context, such as underwater or aerospace. -Does not mention the use or development of any conceptual framework in the study

Source: Adapted from Reinten et al. (2017)

Advanced International Journal of Business, Entrepreneurship and SME's
AIJBES
EISSN: 2682-8545
Volume: 8 Issue: 27 (March 2026) PP. 258-273

Soundscape Definition

Soundscape is the acoustic environment of a place, including both natural and human-made sounds, and how it is perceived, experienced, and understood by the people who live, work, or visit the place (International Organization for Standardization, 2014). Any auditory field of research is referred to as the soundscape, such as a radio show, an acoustic setting, or a musical piece, which can all be referred to as a soundscape (Schafer, 1994). Soundscape is the temporal experience shaped by how individuals hear and respond to their surroundings (Schafer, 1994). Thus, urban soundscape can be defined as the acoustic environment, composed of both natural and anthrophonic sounds (Brown et al., 2016), perceived, experienced, and understood by humans in a specific context, encompassing any auditory environment, including constructed auditory experiences.

Key Factors Influencing Soundscape Preferences

Soundscape is an approach for extracting descriptions of a listener's sound perception in an environmental context (Llorca-Bofí et al., 2022). Figure 1 illustrates the conceptual framework of the soundscape developed by International Organization of Standardization (2014). The framework localised human perception over purely physical measurements. It demonstrates that soundscape evaluation is not just about noise levels but also involves a dynamic interplay among contextual influences, acoustic factors such as sound sources and the acoustic environment, and psychological processes. Based on the existing framework, context and sound sources are the major elements shaping the acoustic environment, influencing user experience and response.

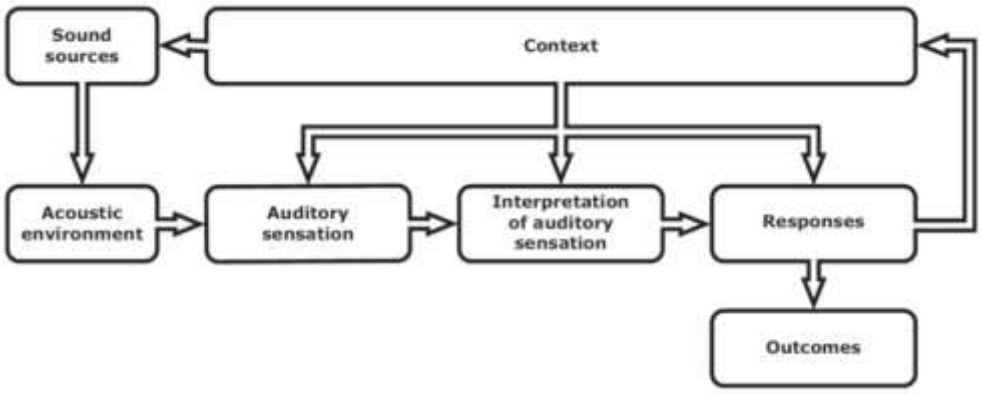

Figure 1 Soundscape Conceptual Framework Developed by ISO 2913-1:2014
Source: ISO 12913-1, International Organization of Standardization (2014)

Soundscape can be highly context-dependent, found in various places (Abdul Hamid, 2022) and created by multiple elements, including social, cultural, and physical aspects (Hu et al., 2024). A study related to 'soundscape indices' (SSID) (Kang, 2019) highlighted that one of the concerned factors is contextual factors, which will reflect levels of human comfort within the acoustic environment (Kang, 2023), due to the site's environment having a strong correlation with users' sound judgments (Cao & Kang, 2023). This includes environmental components (weather, time of day, and temperature), place or location, and sound level. A person may be concerned with the appropriateness of the soundscape for a location or the significance of sound within a specific place (Aletta et al., 2016). The context will affect holistic soundscape

Advanced International Journal of Business, Entrepreneurship and SME's
AIJBES
EISSN: 2682-8545
Volume: 8 Issue: 27 (March 2026) PP. 258-273

descriptors, as the associations among soundscape characteristics may be determined by the location's primary purposes and functions (Aletta et al., 2016; Hong & Jeon, 2020). For instance, active sounds are considered appropriate for establishing a comfortable and contextually suitable soundscape experience in urban contexts (Abdul Hamid et al., 2023). These elements significantly influence how people perceive sound and their preferences.

Similarly, personal attributes play a crucial role in shaping the soundscape preference (Abdul Hamid, 2022; Indrani et al., 2021; Jo & Jeon, 2021; J. Liu et al., 2021; Wang et al., 2025). Understanding the impact of soundscapes on users as part of soundscapes research is important (Kang, 2023), as people's needs determine the ideal qualities of a healthy acoustic environment (Chen & Ma, 2020). Various aspects have been studied, including social and demographic factors, space usage, behaviours, user experience, and noise sensitivity (Abdul Hamid, 2022; Herranz-Pascual et al., 2010; Indrani et al., 2021; Kang, 2023; Lavia et al., 2023; Mackrill et al., 2016; Mohamed Aburawis & Dokmeci Yorukoglu, 2018; West et al., 2024; Yang & Kang, 2005). These factors influence everyone's perception of the soundscape (Fang et al., 2021). For example, older people who were accustomed to their surroundings tended to enjoy natural, musical, and manufactured sounds more when they were heard, but they also tended to perceive them less frequently (Fang et al., 2021). Individual differences greatly influence sound preferences, as people perceive and interpret sound differently (Wu, 2024).

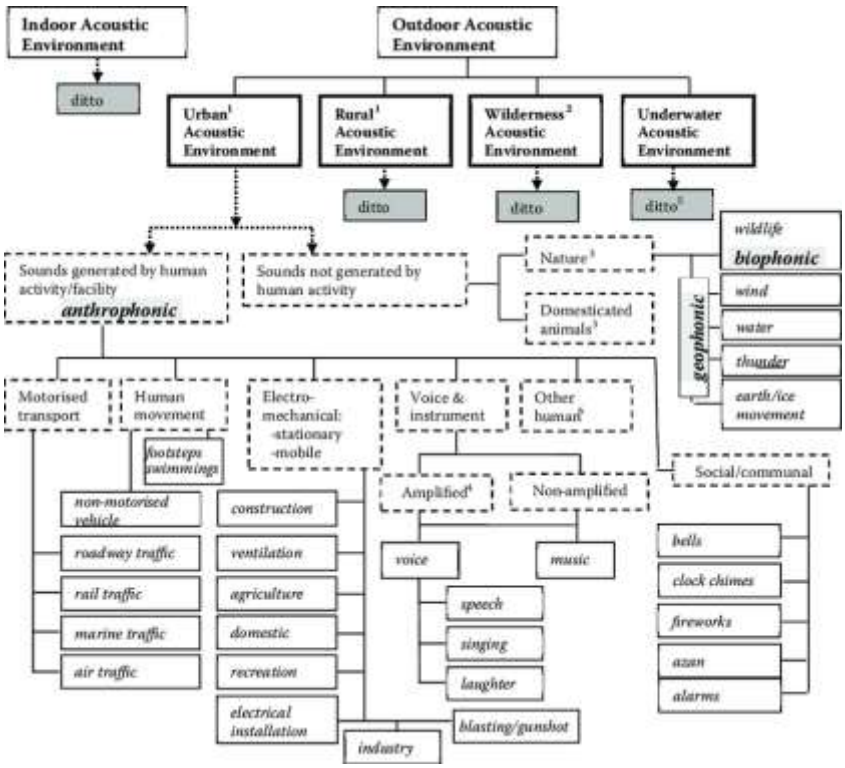

Figure 2 Taxonomy of Urban Soundscape

Source: Brown et al. (2016)

Sound sources are hugely influenced by the context and shape the soundscape preference (International Organization for Standardization, 2014; Ling Lee et al., 2023; Ozturk et al., 2025). The function of space, location, and the environment generates different types of sounds. It is crucial to identify the auditory characteristics of the location's overall sound environment

Advanced International Journal of Business, Entrepreneurship and SME's
AIJBES
EISSN: 2682-8545
Volume: 8 Issue: 27 (March 2026) PP. 258-273

and each sound source (Herranz-Pascual et al., 2010), in developing a soundscape preference framework. This is because the uniqueness of every acoustic environment is largely determined by the presence or absence of specific sound sources (Abdul Hamid, 2022; Brown et al., 2016). For example, certain metropolitan neighbourhoods were dominated by music and instrumental sounds, such as square dancing and singing, which drew older people who were accustomed to the surroundings (Fang et al., 2021), while commercial streets were typically dominated by human activities and by road traffic, depending on the location (Hong & Jeon, 2020). Figure 2 is the taxonomy of urban soundscape, highlighting the main sound sources in the urban acoustic environment, which are anthrophonic, geophonic, and biophonic (Brown et al., 2016).

Search Strategy

Gathering information from multiple earlier studies is the initial stage (Indrani et al., 2021). The articles were searched using the first review round, which screened the search results based on the titles, abstracts, and keywords of papers. The period covered by the studies under consideration was 2016 to 2026. After gathering the search results, two review rounds (the second and third rounds) were conducted to choose papers that fulfil the required criteria. The search results were then sorted according to relevance. Studies were filtered according to the inclusion criteria in the second review round, while the third review round involved reviewing the full paper and selecting the available papers that met the inclusion criteria.

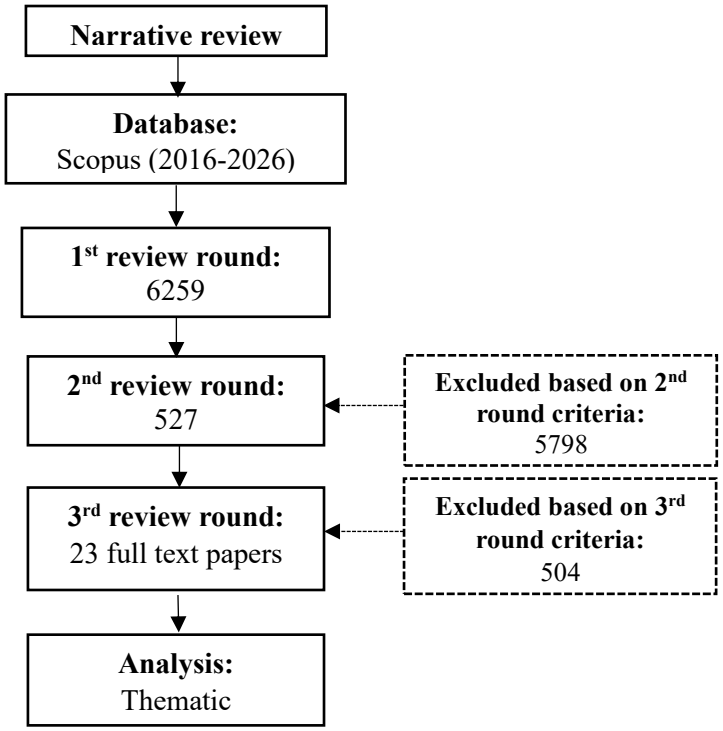

Figure 3 Review Procedure of Paper Selections

Method Of Analysis

The most common method for analysing narrative reviews is thematic analysis (Snyder, 2019). Thematic analysis is the process of identifying, examining, and interpreting meaningful patterns, also known as 'themes', in qualitative data (Clarke & Braun, 2017). Thematic analysis is a distinctive approach that is unbound by theoretical commitment rather than a fixed

Advanced International Journal of Business, Entrepreneurship and SME's
AIJBES
EISSN: 2682-8545
Volume: 8 Issue: 27 (March 2026) PP. 258-273

methodology, which is a theoretically oriented yet confined framework for research (Clarke & Braun, 2017). The analysis will identify patterns in operational variables within the conceptual framework used in previous soundscape studies.

Table 2 summarises the thematic extraction of previous studies on soundscape conceptual frameworks. The data and patterns were identified and analysed to be integrated with the proposed conceptual framework. The main item is to identify the key variables to develop a soundscape preference framework for high-traffic commercial streets. The independent variables were the factors that influence the soundscape, while soundscape preference, perception, or design are the common dependent variables in past research.

Result And Discussion

Figure 3 illustrates the contextual soundscape preference model for high-traffic commercial streets. By adapting the existing framework developed by the International Organization of Standardization, this conceptual framework implemented the appropriate variables identified from previous studies. The proposed conceptual framework illustrates the interactions among the independent variables (context and sound source) and the dependent variable (soundscape preference). The context influences the sound source, auditory sensation, experience, and response (International Organization for Standardization, 2014; Ling Lee et al., 2023). Context and sound source of a high-traffic commercial street shaped the acoustic environment. The sounds produced in the environment are then perceived through one's auditory sensation and translate into a soundscape preference driven by the soundscape descriptors and the user's preferred sounds.

The context includes non-acoustic factors, such as personal and environmental attributes (Abdul Hamid, 2022; Fenech et al., 2021; Kang & Zhang, 2010). These aspects heavily influence the activities, active sound marks, type of sound sources, overall acoustic environment, auditory sensation, and soundscape interpretation (Abdul Hamid, 2022; International Organization for Standardization, 2014; Kang, 2019). This framework highlighted sound sources specifically found in high-traffic commercial streets come from nature, human, road traffic, mechanical, commercials, and social and cultural activities (Alías & Socoró, 2017; Jo & Jeon, 2021; Yang & Kang, 2005). These sound sources are shaped by the nature of a high-traffic commercial street and significantly influence the soundscape's preferences.

Table 2 Operational Variables in The Soundscape Framework Based On Previous Studies

Author	Operational variable					
	Dependent variable			Independent variable		
					Contextual	
	Sound	Sound	Sound	Sound source	Environmental factors	Personal factors

Advanced International Journal of Business, Entrepreneurship and SME's
AIJBES
EISSN: 2682-8545
Volume: 8 Issue: 27 (March 2026) PP. 258-273

				Perceived sounds	Sound level	Time of the day	Temperature	Place/ location	Demographic	Space usage	User activities	Noise sensitivity	Socio-cultural
Mackrill et al. (2016)	x			x	x			x	x		X		
Dokmeci Yorukoglu & Kang (2016)			x	x	x	x	x	x	x	x		x	x
Aletta et al. (2016)	x			x	x								
Reinten et al. (2017)				x				x	x	x	x		
Mohamed Aburawis & Dokmeci Yorukoglu (2018)	x			x	x			x	x	x	x	x	x
Acun & Yilmazer (2018)	x	x		x	x		x	x		x	x		
Xiao et al. (2018)	x		x	x	x			x					
Acun & Yilmazer (2019)	x			x				x					
Devos et al. (2019)	x			x		x		x	x	x			x
Fiebig et al. (2020)				x		x		x	x		x	x	x
Chen & Ma (2020)	x			x				x			x	x	
Mistar et al. (2020)		x		x				x	x		x		
Orhan & Yilmazer (2021)			x	x	x			x					
X. Liu et al. (2021)	x			x	x			x	x		x		
Çankaya Topak & Yılmazer (2022)			x	x	x			x					
West et al. (2024)	x			x	x			x	x				x
Razali et al. (2024)			x	x				x	x	x			
Torresin et al. (2024)			x		x		x	x	x	x	x		x
Zhang et al. (2025)				x				x	x				x
Kurukose Cal et al. (2025)			x	x		x	x	x					
Lu et al. (2025)			x	x		x		x				x	
Erçakmak Osma & Dökmeci Yörükoğlu (2025)			x	x	x	x	x	x	x	x	x	x	x
Rachman et al. (2025)				x					x	x	x	x	

Source: Adapted from Indrani et al. (2021)

The auditory sensation refers to the sounds heard by the users in high-traffic commercial streets. Human sounds, road traffic sounds, and music from commercials are among the most frequently heard sounds in high-traffic areas and urban commercial streets (Hosseini & Kowkabi, 2023; Hu et al., 2024; Jo & Jeon, 2021; Puyana Romero et al., 2016; Yang & Kang, 2005). Meanwhile, wind, leaves rustling, water, and biophonic sounds such as birds are the typical nature sounds found in commercial street areas (Puyana Romero et al., 2016; Rehan, 2016; Yang & Kang, 2005).

This study conceptualised soundscape preference as a multifaceted variable comprising soundscape descriptors and preferred sounds. Soundscape descriptors refer to the soundscape experience and the emotional impact of users on the sound environment (Aletta et al., 2016; Cao, 2022). Soundscape descriptors serve as the integral dimension of soundscape preference, providing the evaluative judgement of the environment. Examples of soundscape descriptors found in soundscape studies are excitement, calmness, eventfulness, and appropriateness (Aletta et al., 2016; Harvie-Clark et al., 2023; Rachman et al., 2025; Zhang et al., 2025). These evaluative judgements reflect people's preference for or annoyance with their environment (Cao & Kang, 2023). Descriptive words such as "pleasant", "eventful", "calm", or "appropriate" are associated with high preference, whereas "uneventful", "chaotic", or

"inappropriate" reflect the annoyance of the users (Cao & Kang, 2023). Soundscape descriptor that connects the physical sound environment of high-traffic commercial streets to preferred sounds.

The proposed conceptual framework also offers practical benefits for urban planners, landscape architects, and designers by providing information on users' preferences, needs, and expectations. For example, Rehan (2016) highlighted elements for acoustic insulation, water features, pavement materials with good sound absorption, and an appropriate noise barrier to promote positive sounds, like natural and cultural sounds, and mitigate unwanted sounds, such as traffic and mechanical sounds. Urban designers can integrate elements and encourage activities that generate sounds, reflecting the natural, social, or cultural environment (Rehan, 2016). Natural sounds are highly associated with positive well-being, while cultural and traditional components are essential as they contribute to place identity and foster a unique soundscape design (Hosseini & Kowkabi, 2023; Ozturk et al., 2025; Rehan, 2016). These practical implications will help improve the overall auditory quality of high-traffic commercial streets without compromising the visual aesthetic.

Conclusion

The findings of this study underscore a fundamental shift from decibel-oriented noise mitigation to a multidimensional soundscape paradigm specifically calibrated for the high traffic of commercial streets. By localising literature from 2015 to 2026, the research concludes that the soundscape of these high-traffic commercial streets is not merely a byproduct of traffic volume, but a perceived experience moderated by contextual factors and individual characteristics. The developed conceptual framework identifies perceived affective quality as the critical determinant of soundscape preference. These findings suggest that when the physical environment is designed to harmonise with diverse sound sources, the acoustic environment can function as an urban resource that simultaneously enhances psychological well-being and supports commercial vibrancy.

While this framework provides a robust theoretical basis for soundscape design, its current derivation from an integrative review necessitates further empirical validation. The inherent complexity of high-traffic commercial streets, characterised by diverse sound sources, means that the subjective evaluation of these spaces remains highly localised. Consequently, future research should employ on-site surveys, laboratory-controlled listening tests and consider the interplay between auditory and visual stimuli to quantify the relative weight of different contextual variables. Integrating this framework into urban planning policy will facilitate the move toward restorative cities, where soundscape design is utilised not just to mitigate annoyance, but to actively promote a sense of place and social sustainability.

Advanced International Journal of Business, Entrepreneurship and SME's
AIJBES
EISSN: 2682-8545
Volume: 8 Issue: 27 (March 2026) PP. 258-273

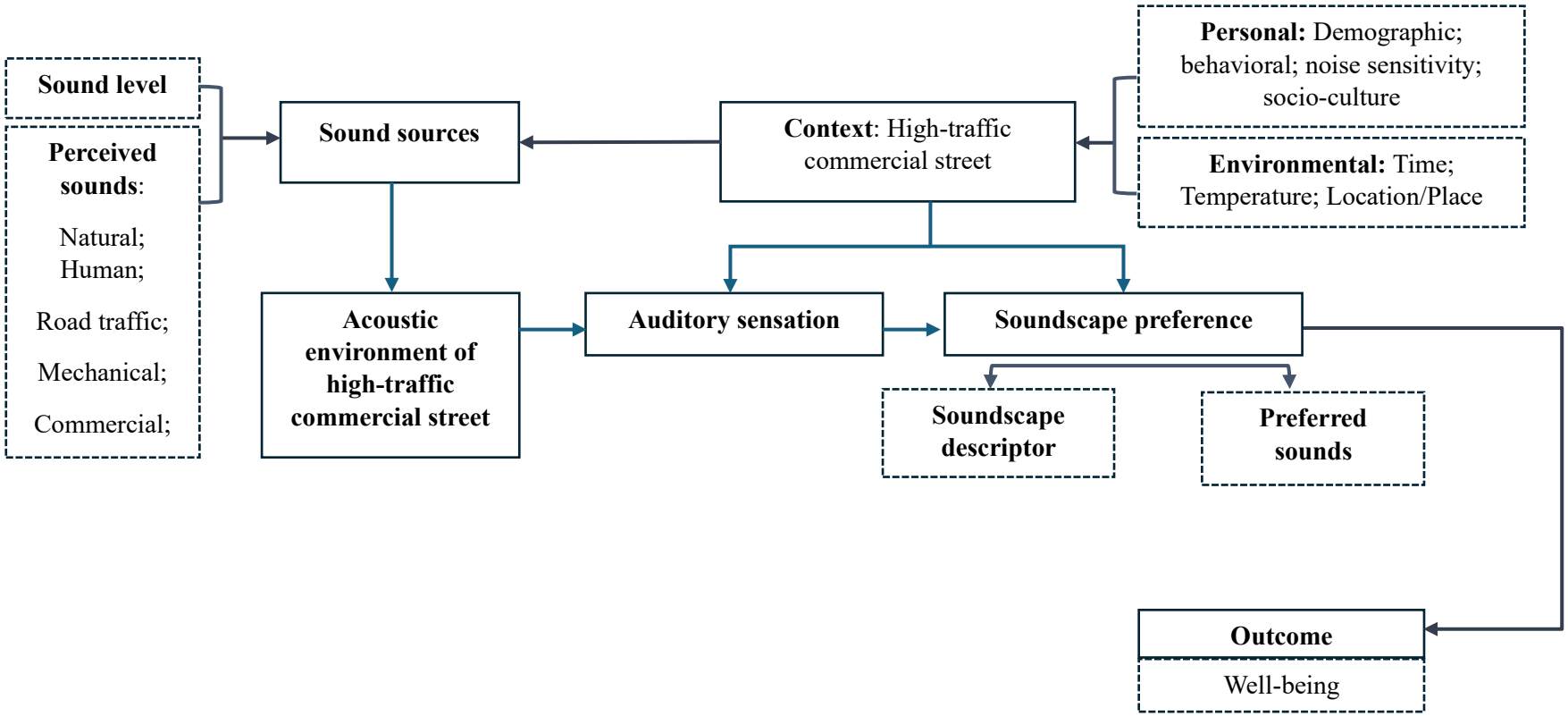

Figure 4 Proposed Contextual Soundscape Preference Model

Source: Adapted from International Organization for Standardization (2014)

Acknowledgements: The authors would like to express their sincere gratitude to the Faculty of Architecture and Ekistics, Universiti Malaysia Kelantan, for providing the necessary resources and support throughout the course of this research. Special appreciation is extended to colleagues and peers who contributed valuable insights and constructive feedback, which greatly enhanced the quality of this paper.

Funding Statement: This research was funded by the Ministry of Higher Education Malaysia under the Fundamental Research Grant Scheme [FRGS/1/2024/2212/UMK/03/1]. The authors gratefully acknowledge the financial support provided.

Conflict of Interest Statement: The authors declare that there is no conflict of interest regarding the publication of this paper. All authors have contributed to this work and approved the final version of the manuscript for submission to the Advanced International Journal of Business, Entrepreneurship and SMEs (AIJBES).

Author Contribution Statement: All authors contributed significantly to the development of this manuscript. Nor Hamizah was responsible for the conceptualisation, methodology, critical revision of the manuscript, and overall supervision of the study. Muhammad Afif Abidi handled data collection, analysis, and interpretation of results, as well as contributed to the literature review and drafting. All authors read and approved the final version of the manuscript prior to submission.

Advanced International Journal of Business, Entrepreneurship and SME's
AIJBES
EISSN: 2682-8545
Volume: 8 Issue: 27 (March 2026) PP. 258-273

References

Abdul Hamid, N. H. (2022). *Establishing Soundscape Preference Criteria for Urban Shopping Streets in Kuala Lumpur Malaysia*. Universiti Putra Malaysia

Abdul Hamid, N. H., Zainal Abdullah, M. E., Mohamed, S. A., Othmani, N. I., Yeo, L. B., Wan Mohamad, W. S. N., Ramlee, N., & Sukri, S. N. D. (2023). Exploring the impact of environmental factors on soundscape perception for sustainable and resilient urban environments. *BIO Web of Conferences*, *73*, 05011. https://doi.org/10.1051/bioconf/20237305011A

Acun, V., & Yilmazer, S. (2019). Combining Grounded Theory (GT) and Structural Equation Modelling (SEM) to analyze indoor soundscape in historical spaces. *Applied Acoustics*, *155*, 515–524. https://doi.org/10.1016/j.apacoust.2019.06.017

Aletta, F., Kang, J., & Axelsson, Ö. (2016). Soundscape descriptors and a conceptual framework for developing predictive soundscape models. *Landscape and Urban Planning*, *149*, 65–74. https://doi.org/10.1016/j.landurbplan.2016.02.001

Aletta, F., Oberman, T., & Kang, J. (2018). Associations between positive health-related effects and soundscapes perceptual constructs: A systematic review. In *International Journal of Environmental Research and Public Health* (Vol. 15, Number 11). MDPI. https://doi.org/10.3390/ijerph15112392

Alías, F., & Socoró, J. C. (2017). Description of anomalous noise events for reliable dynamic traffic noise mapping in real-life urban and suburban soundscapes. *Applied Sciences (Switzerland)*, *7*(2), 146. https://doi.org/10.3390/app7020146

Brown, A. L. (2012). A Review of Progress in Soundscapes and an Approach to Soundscape Planning. *International Journal of Acoustics and Vibrations*, *17*(2), 73–81. https://doi.org/10.20855/ijav.2012.17.2302

Brown, A. L., Gjestland, T., & Dubois, D. (2016). Acoustic environments and soundscapes. In *Soundscape and the Built Environment* (pp. 1–16). CRC Press. https://doi.org/10.1201/b19145-2

Çankaya Topak, S., & Yılmazer, S. (2022). A comparative study on indoor soundscape assessment via a mixed method: A case of the high school environment. *Applied Acoustics*, *189*. https://doi.org/10.1016/j.apacoust.2021.108554

Cao, J. (2022). *Soundscape and social relationships in urban public spaces*. University of Sheffield.

Cao, J., & Kang, J. (2023). A Perceptual Structure of Soundscapes in Urban Public Spaces Using Semantic Coding Based on the Grounded Theory. *International Journal of Environmental Research and Public Health*, *20*(4), 2932. https://doi.org/10.3390/ijerph20042932

Chen, J., & Ma, H. (2020). A Conceptual Model of the Healthy Acoustic Environment: Elements, Framework, and Definition. *Frontiers in Psychology*, *11*, 554285. https://doi.org/10.3389/fpsyg.2020.554285

Clarke, V., & Braun, V. (2017). Thematic analysis. *Journal of Positive Psychology*, *12*(3), 297–298. https://doi.org/10.1080/17439760.2016.1262613;WGROUP:STRING:PUBLICATION

cun, V., & Yilmazer, S. (2018). A grounded theory approach to investigate the perceived soundscape of open-plan offices. *Applied Acoustics*, *131*, 28–37. https://doi.org/10.1016/j.apacoust.2017.09.018

Department of Environment. (2019). *Guidelines for environmental noise limits and control (3rd ed.)*. Ministry of Energy, Science, Technology, Environment & Climate Change.

Department of Statistics Malaysia. (2025). *Current Population Estimates*. https://open.dosm.gov.my.

Devos, P., Aletta, F., Thomas, P., Petrovic, M., Mynsbrugge, T. Vander, Van De Velde, D., De Vriendt, P., & Botteldooren, D. (2019). Designing supportive soundscapes for nursing home residents with dementia. *International Journal of Environmental Research and Public Health*, *16*(24). https://doi.org/10.3390/ijerph16244904

Dokmeci Yorukoglu, P. N., & Kang, J. (2016). Analysing sound environment and architectural characteristics of libraries through indoor soundscape framework. *Archives of Acoustics*, *41*(2), 203–212. https://doi.org/10.1515/aoa-2016-0020

Elfaig, A. H., Duad, M., Adam, N. M., Bardaie, M. Z., & Abdullah, R. (2014). Monitored Community Noise Pollution in Selected Sensitive Areas of Kuala Lumpur. *INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH*, *3*(2). www.ijstr.org

Erçakmak Osma, U. B., & Dökmeci Yörükoğlu, P. N. (2025). Indoor Soundscape Intervention (ISI) Criteria for Architectural Practice: A Systematic Review with Grounded Theory Analysis. *Acoustics*, *7*(3). https://doi.org/10.3390/acoustics7030046

Fang, X., Gao, T., Hedblom, M., Xu, N., Xiang, Y., Hu, M., Chen, Y., & Qiu, L. (2021). Soundscape perceptions and preferences for different groups of users in urban recreational forest parks. *Forests*, *12*(468). https://doi.org/10.3390/f12040468

Fenech, B., Lavia, L., Rodgers, G., & Notley, H. (2021). Development of a new ISO Technical Specification on non-acoustic factors to improve the interpretation of socio-acoustic surveys. *Acoustics Bulletin*. https://www.scopus.com/pages/publications/85170842206?origin=resultslist

Fiebig, A., Jordan, P., & Moshona, C. C. (2020). Assessments of Acoustic Environments by Emotions – The Application of Emotion Theory in Soundscape. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.573041

Harvie-Clark, J., Dobinson, N., Hinton, R., King, R., & Forster, E. (2023). DESIGNING FOR ACOUSTIC SATISFACTION IN OPEN PLAN OFFICES. *Proceedings of the Institute of Acoustics*. https://www.scopus.com/pages/publications/85183594686?origin=resultslist

Herranz-Pascual, K., Aspuru, I., & García, I. (2010). Proposed conceptual model of environmental experience as framework to study the soundscape. *39th International Congress on Noise Control Engineering 2010, INTER-NOISE 2010*, *3*, 2245–2253.

Hong, J. Y., & Jeon, J. Y. (2020). Comparing associations among sound sources, human behaviors, and soundscapes on central business and commercial streets in Seoul, Korea. *Building and Environment*, *186*. https://doi.org/10.1016/j.buildenv.2020.107327

Hosseini, A., & Kowkabi, L. (2023). Measuring the Soundscape Quality in Urban Spaces: A Case Study of Historic Urban Area. *Sustainability (Switzerland)*, *15*(5). https://doi.org/10.3390/su15054255

Hu, Y., Meng, Q., Li, M., & Yang, D. (2024). Enhancing authenticity in historic districts via soundscape design. *Heritage Science*, *12*(1), 396. https://doi.org/10.1186/s40494-024-01515-8

Indrani, H. C., Ekasiwi, S. N. N., & Arifianto, D. (2021). Conceptual model of soundscape perception based on working behaviour in open-plan offices. *Journal of Physics: Conference Series*, *1896*(1), 012014. https://doi.org/10.1088/1742-6596/1896/1/012014

International Organization for Standardization. (2014). *ISO 12913-1:2014(en) Acoustics — Soundscape — Part 1: Definition and conceptual framework*.

International Organization of Standardization. (2014). *ISO 12913-1:2014(en), Acoustics — Soundscape — Part 1: Definition and conceptual framework*. https://www.iso.org/obp/ui/en/#iso:std:iso:12913:-1:ed-1:v1:en

Jo, H. I., & Jeon, J. Y. (2021). Urban soundscape categorization based on individual recognition, perception, and assessment of sound environments. *Landscape and Urban Planning*, *216*. https://doi.org/10.1016/j.landurbplan.2021.104241

Kang, J. (2019). Urban sound planning - A soundscape approach. *Acoustics 2019, Sound Decisions: Moving Forward with Acoustics - Proceedings of the Annual Conference of the Australian Acoustical Society*, Schanck.

Kang, J. (2023). Soundscape in city and built environment: current developments and design potentials. *City and Built Environment*, *1*(1). https://doi.org/10.1007/s44213-022-00005-6

Kang, J., & Zhang, M. (2010). Semantic differential analysis on the soundscape of urban open public spaces. *The Journal of the Acoustical Society of America*, *112*(5_Supplement), 2435–2435. https://doi.org/10.1121/1.4779999

Kurukose Cal, H., Aletta, F., & Kang, J. (2025). Exploring the factors influencing school soundscapes: Insights from teachers and acoustic experts. *Indoor and Built Environment*. https://doi.org/10.1177/1420326X251383003

Lavia, L. R., Torija Martinez, A. J., & Clark, C. (2023). DEVELOPING A NOISE AND SOUNDSCAPE CONCEPTUAL FRAMEWORK FOR FAIR AND EQUITABLE DISTRIBUTION OF AIRCRAFT. *Proceedings of the Institute of Acoustics*, *45*, 2023. https://doi.org/10.25144/16601

Leus, M. (2011). The soundscape of cities: A new layer in city renewal. *WIT Transactions on Ecology and the Environment*, *150*, 355–370. https://doi.org/10.2495/SDP110301

Ling Lee, J. S., Hosni, N., Rusli, N., & Ghani, N. A. (2023). Soundscape Perception and Preference in the context of Malaysian Urban Parks. *IOP Conference Series: Earth and Environmental Science*, *1274*(1), 012022. https://doi.org/10.1088/1755-1315/1274/1/012022

Liu, J., Xu, J., Wu, Z., Cheng, Y., Gou, Y., & Ridolfo, J. (2021). Soundscape Preference of Urban Residents in China in the Post-pandemic Era. *Frontiers in Psychology*, *12*, 750421. https://doi.org/10.3389/fpsyg.2021.750421

Liu, X., Kang, J., Ma, H., & Wang, C. (2021). Comparison between architects and non-architects on perceptions of architectural acoustic environments. *Applied Acoustics*, *184*. https://doi.org/10.1016/j.apacoust.2021.108313

Llorca-Bofí, J., Dreier, C., Heck, J., & Vorländer, M. (2022). Urban Sound Auralization and Visualization Framework—Case Study at IHTApark. *Sustainability (Switzerland)*, *14*(4), 2026. https://doi.org/10.3390/su14042026

Lu, X., Li, G., Song, X., Zhou, L., & Lv, G. (2025). Concept, Framework, and Data Model for Geographical Soundscapes. *ISPRS International Journal of Geo-Information*, *14*(1). https://doi.org/10.3390/ijgi14010036

Mackrill, J., Cain, R., & Jennings, P. (2016). Proposing a Conceptual Framework to Develop the Hospital Soundscape Through Visual Communication. *Design Journal*, *19*(3), 491–509. https://doi.org/10.1080/14606925.2016.1149330

Mistar, N. A., Sulaiman, R., & Che Din, N. Bin. (2020). A Conceptual Framework for Acoustic Comfort Classification in Eatery Places: Critical Reviews of the Determining Factors. *Acoustics Australia*, *48*(3), 337–348. https://doi.org/10.1007/S40857-020-00204-3/METRICS

Mohamed Aburawis, A. A., & Dokmeci Yorukoglu, P. N. (2018). An integrated framework on soundscape perception and spatial experience by adapting post-occupancy evaluation methodology. *Building Acoustics*, *25*(1), 3–16. https://doi.org/10.1177/1351010X18758478

Mohd Nasir, Y. H., Wan Ismail, W. Z., Misni, A., & Aksah, H. (2024). Assessing Environmental Noise Pollution Around Public Hospitals in Selangor, Malaysia: Implications for Urban Planning. *Planning Malaysia*, *22*(6), 129–143. https://doi.org/10.21837/pm.v22i34.1618

Orhan, C., & Yilmazer, S. (2021). Harmony of context and the built environment: Soundscapes in museum environments via GT. *Applied Acoustics*, *173*. https://doi.org/10.1016/j.apacoust.2020.107709

Ozturk, Z. S., Kang, J., & Aletta, F. (2025). Soundscape Research in Streets: A Scoping Review. *Sustainability 2025, Vol. 17, Page 3329*, *17*(8), 3329. https://doi.org/10.3390/SU17083329

Puyana Romero, V., Maffei, L., Brambilla, G., & Ciaburro, G. (2016). Acoustic, visual and spatial indicators for the description of the soundscape of water front areas with and without road traffic flow. *International Journal of Environmental Research and Public Health*, *13*(9). https://doi.org/10.3390/ijerph13090934

Rachman, Z., Aletta, F., & Kang, J. (2025). Advancing soundscape assessment in open-plan offices: Insights from expert focus groups. *Building Acoustics*, *32*(3), 417–461. https://doi.org/10.1177/1351010X251340905

Razali, A. W., Che Din, N. Bin, Yahya, M. N., & Sulaiman, R. (2024). Conceptual framework of acoustic comfort design enablers for a classroom: A systematic review. *Journal of Building Engineering*, *95*. https://doi.org/10.1016/j.jobe.2024.110160

Rehan, R. M. (2016). The phonic identity of the city urban soundscape for sustainable spaces. *HBRC Journal*, *12*(3), 337–349. https://doi.org/10.1016/j.hbrcj.2014.12.005

Reinten, J., Braat-Eggen, P. E., Hornikx, M., Kort, H. S. M., & Kohlrausch, A. (2017). The indoor sound environment and human task performance: A literature review on the role of room acoustics. *Building and Environment*, *123*, 315–332. https://doi.org/10.1016/j.buildenv.2017.07.005

Schafer, R. M. (1994). *The Soundscape: Our Sonic Environment and the Tuning of the World*. Simon and Schuster.

Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, *104*, 333–339. https://doi.org/10.1016/J.JBUSRES.2019.07.039

Torraco, R. J. (2016). Writing Integrative Reviews of the Literature: Methods and Purposes. *Https://Services.Igi-Global.Com/Resolvedoi/Resolve.Aspx?Doi=10.4018/IJAVET.2016070106*, *7*(7), 62–70. https://doi.org/10.4018/IJAVET.2016070106

Torresin, S., Aletta, F., Dicle, S., Albatici, R., de Dear, R., Hasegawa, Y., Kang, J., Parkinson, T., & Cabrera, D. (2024). Towards developing a model of adaptive acoustic comfort in the built environment: A thematic analysis from an expert focus group. *Building and Environment*, *266*. https://doi.org/10.1016/j.buildenv.2024.112074

Wang, W., Ma, H., & Wang, C. (2025). The Impact of Non-Acoustic Factors on Chinese Community Response to Noise: A Systematic Review. *International Journal of Environmental Research and Public Health 2025, Vol. 22, Page 651*, *22*(4), 651. https://doi.org/10.3390/IJERPH22040651

West, B., Deuchars, A., & Ali-MacLachlan, I. (2024). Office soundscape assessment: A model of acoustic environment perception in open-plan offices. *Journal of the Acoustical Society of America*, *156*(5), 2949–2959. https://doi.org/10.1121/10.0034230

Wu, S. (2024). *Exploring Soundscape Satisfaction and Preference in Residential Areas (Dissertation)*.

Xiao, J., Lavia, L., & Kang, J. (2018). Towards an agile participatory urban soundscape planning framework. *Journal of Environmental Planning and Management*, *61*(4), 677–698. https://doi.org/10.1080/09640568.2017.1331843

Yang, W., & Kang, J. (2005). Soundscape and sound preferences in urban squares: A case study in Sheffield. *Journal of Urban Design*, *10*(1), 61–80. https://doi.org/10.1080/13574800500062395

Zhang, R., Ma, H., Wang, C., Zhang, Y., & Kang, J. (2025). Soundscape and its context: A framework based on a systematic review. *Journal of the Acoustical Society of America*, *157*(6), 4417–4436. https://doi.org/10.1121/10.0036882