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Conceptual framework on noise ranking classification in eatery places for human psycho-acoustics preferences towards acoustic comfort

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Abstract. One of the important dining interests for focusing on smelling and tasting during dining in eatery places is having concentration or attention perceived of what we eat or drink. The dining satisfaction influenced positive behavior of return intent and recommending the eatery places to others. Higher noise level may distract the concentration for having a fine dining experience and could interrupt the ability of smelling and tasting senses. Settings in the noisy atmosphere of eatery places such as located near to a busy road, open kitchen, table layout and inappropriate decoration as well as the patrons' conversation behavior may affect speech intelligibility. Ultimately, the long period exposure towards high decibel sound and noise affecting not only the health and wellbeing but also the social interactions and communications. It is also having a direct significant impact to human preferences on acoustic comfort during their dining. However, there is no specific classification or rating system established in Malaysia to assist the information on acoustic environment obtained in the eatery place. The aim of this paper is to identify the framework of eatery places classification in Malaysia within the context of the acoustic comfort and its performance. The main concern is to elucidate clearly different categorization of eatery places which might have significant on human psychoacoustics. Based on ongoing research, this paper will discuss on the critical literature reviews to develop a conceptual framework in classifying eatery places typologies and diners' acoustical preferences.

1. Introduction

The eatery places are where the business of exchanging prepared food and drinks with money. It varies from a very high end fine dining to family style dining, and also to inexpensive cafeterias and fast food range. A restaurant basically provides tables and chairs for customers to eat meals prepared by attached kitchen equipped with crockery, cutlery, linen, and décor which varying in quality and



basically according to concept and objectives of the establishment [1]. The ambience of the restaurant is often what the customers come back for despite a good food and a quality of service [2]. Restaurant space design should not only consider the representation of creativity and aesthetics but also explore the design factor of eco-friendliness to improve overall performance [3].

Restaurant typology are divided into five expanded typology based on the five set of attributes which modulate the typologies such as quick service, midscale, moderate upscale, upscale, and business dining [4]. In design aspects, eatery places are usually vary based on four common design strategies such as the usage of materials or finishes, volumes of spaces (geometry), types and concept of eatery place. In other aspects, a casual dining is defined by the industry as “informal dining with style.” Cafe’s, trattorias, sushi bars, and, in some cases, bistros, are examples of restaurant varieties that facilitate and reflect this dining style [5].

Classification of eatery place can vary depending on who is going and what they are doing [6]. Ambient conditions such as temperature, lighting, noise, music, and scent will stimulate the five senses namely sight, sound, smell, touch and taste [7]. Ultimately, [8] have demonstrated that, the senses can influenced the food perception by one or a combination of these five senses. The atmosphere also varies depending on the type of space, which the acoustical character will differ depending on the type of restaurant or eating place [9]. Customers are willing to pay more for not only good food and the ability to socialize, but also for nice interior and quality service [10].

There are a lot of studies in developing countries such as UK and Australia on contemporary acoustics issues of eatery places such as restaurant and café including optimization of the acceptable background noise level and speech intelligibility [11-14]. Investigation on the sound level in bars, cafes, and restaurant in Wellington CBD, New Zealand revealed that the distribution of measured sound level are extensive from 34 dBA to 81 dBA [15]. The author also pointed out the highest point of 81dBA is exceeding the recommended design sound level by Australian/New Zealand Standards (AS/NZS 2107 (2000) of 50 dBA. A long period of exposure to high decibel sound can cause negative impact towards human health and wellbeing. The exposure causing negative symptoms toward hearing and ears, psychological effects, headache, cardiovascular disturbances and few more [16]. Eventually, the noise also builds the social barriers since people will have to speak louder in order to have conversation with others.

Conversely, in Malaysia, a very limited study on noise and acoustical comfort but rather focusing on customers’ satisfaction towards the ambience of the restaurant. For instance, youth customers indicated that their satisfaction were determined by human service and price rather than the physical environment [17]. In contrary, [18] provides an analytical framework for understanding the effects of service quality on constructs such as customer satisfaction, perceived value, restaurant image and behavioral intentions in several moderate upscale restaurants in the Klang Valley area, Malaysia. On the other hand, in the same study genre, restaurant atmospheric elements create different customers’ behavior and satisfaction [19, 20]. For that reason, it is crucial to classify factors affecting the perception on noise towards acoustic comfort in eatery places categories.

2. Perception on noise

Studies towards perception on noise have been carried out for some time and these studies shows how the users perceived noise comfort and factors affecting them. These factors can be divided into five factors; 1. architectural characteristics of the restaurant, 2. noise source, 3. dining style, 4. density, 5, demography and others (Table 1). Each factor is discussed below.

2.1. Architectural characteristics of the restaurant

[22] with structural equation modeling analysis found that facility aesthetics, such as furniture, color, lighting and décor, ambience and employees influenced on the level of customer pleasure, also gave impact significantly to arousal. The environmental features of a restaurant, either physical or visual, both gave significant effects to the dining satisfaction and behavioral intentions and also the

psychological emotions of the customers [23, 24]. [24] also found that dining satisfaction have a significant influence on behavioral intentions, predominantly the intentions to return and recommending the restaurant through word-of-mouth. On the other hand, the acoustical character of the spaces (reverberation and ceiling height) are related to an increased range of sound levels during periods of lower occupancy [9]. In order to elude the poor acoustic comfort in restaurants or similar places, a bigger volume and more noise absorbing materials must be taken into design consideration [25].

Table 1. Studies towards perception on noise in the literature, by factors affecting the perception

Studies	Architectural characteristics	Noise source	Dining styles	Density/ Occupancy	Demographic character
Samagwa et al., 2010 [19]	/	/			
Ryu & Jang, 2007 [20]	/				
Liu & Jang, 2009 [21]	/				
Heung & Gu, 2012 [24]	/				
Lorimer & Tinianov, 2015 [9]	/			/	
Rindel, 2017 [25]	/	/		/	
Spence, 2014 [26]	/	/		/	
Rindel, 2015 [27]	/	/		/	
Lauren H Christie, 2004 [15]		/			
L. H. Christie & Bell-Booth, 2006 [28]		/			
Pinho et al., 2018 [29]		/			
Astolfi et al., 2003 [30]		/		/	
Chen & Kang, 2017 [31]		/			/
Raab et al., 2013 [32]	/	/			
Biswas et al., 2018 [33]		/			
Milliman, 1986 [34]		/			
Hodgson et al., 2007 [35]	/			/	
North & Hargreaves, 1996 [36]		/			
Novak et al., 2010 [37]		/			/
Wilson, 2003 [38]		/			
Zemke et al., 2011 [14]		/			/
Caldwell & Hibbert, 2002 [39]		/			
Musinguzi, 2010 [40]		/			
North et al., 2003 [41]		/			
Gueguen, Nicholas; Jacob, 2004 [42]		/			
Pellegrino et al., 2015 [8]		/			/
Rindel, 2015 [43]		/		/	
Spence, 2012 [44]		/			
Zampini & Spence, 2010 [45]		/			
Farber & Wang, 2017 [46]			/		/
Meng et al., 2017 [47]		/	/	/	
W. To & Chung, 2014 [48]			/	/	

W. M. To & Chung, 2015 [49]	/	/	
Zhang et al., 2016 [50]		/	
Yildirim & Akalin-Baskaya, 2007 [51]	/	/	/
Migneron & Migneron, 2015 [52]	/		
Lindborg, 2015 [53]	/	/	
Battaglia, 2015 [54]			/

2.2. *Noise source*

The perceived noise level in a public space such as a restaurant depends not only on the amount of sound generated by occupants of the space and the source of noise but also the properties of the surfaces and furnishes [26]. Eatery places were too loud and ‘undesirable’, due to excessive background-noise levels [15, 28]. Multiple sources of noise, indoor and outdoor are noted to be the factors contribute to the sound level in dining area [29]. However, major cause of noise in dining space is due to the customers rather than the external sources [30]. This was proven that the conversation between customers could be the main causes for higher indoor noise levels [21, 31]. Ambient noise affect customers’ satisfaction towards restaurant ambient [32]. Additionally, music volume, tempo, styles and genre could also affect customers’ behaviour, satisfaction and perception towards acoustic comfort in the restaurant [14, 31, 33, 34, 36, 37, 38]. Moreover, music affects customers’ willingness to spend more money and time in restaurant [38, 39, 41]. In other aspect of study, perceptions and consumption of food and drinks are also affected by music and background noise, which loud music can impair the taste and consumption of food and drinks [8, 40, 42, 43, 44, 45, 52].

2.3. *Dining styles*

The sound levels tend to be correlated with types of ethnic cuisines, possibly reflecting certain cultural preferences for the type of dining experience [46]. The author also indicated through their study in New York city that, the sound levels of eating venues in New York City tend to be correlated with certain neighbourhoods, possibly as a reflection of the venues in that neighbourhood that attract a certain demographic. According to [47], the dining styles in China will affect the conversation behaviour among the diners, the sound pressure level in the dining area and also the acoustic comfort perceived by the diners. However, according to [48], the noise level is primarily depending on the density of the occupancy in the dining area and not the types of restaurant.

2.4. *Density*

A study conducted by [27, 43] showed that the acoustical problems were depend on the number of people in the dining area. This author suggested that the noise in a fine restaurant should be in a lower level to maintain the taste qualities in the food as the perception on food and drinks are influenced by the perceived noise level. Crowded restaurant will have higher sound from the occupants than the sound from surrounding nature [53]. Previous research finding showed that, perception of the restaurant atmospheric environment is affected based on the density [35, 51] Furthermore, background noise levels are varied between 41dBA to 83dBA which are based on seating density [49]. Ultimately, the variations of noise levels decreases when the occupancy density increases [47, 49, 50].

2.5. *Demographic character*

Some researchers demonstrate that demographic characters can influence the different perceptions towards noise. Acoustic comfort is perceived in different way by age group [54]. For instance, [14] found that age affected the noise sensitivity. Age does induce the preferential toward the background sound but gender differences have no significance effect in their perceived toward background sound [8]. However, in contrary, females are found to be more sensitive than males in perceptions toward [37]. Supported by Chen & Kang, female have higher comfort level in the sound environment

compare to male. However, the authors [31] found that age, education background and companion does not influence the comfort level. In relation between seating densities and gender with the customers’ perceptions of cafe’ atmospheric attributes, male customers had a more positive perception of densities of seating elements than female customers [51].

3. Summary

As an initial remark, it is believed that this article has obviously demonstrated the role of users’ character (dining style, demography, density) and the character of the restaurant (noise source, architectural character, ambience) towards noise and acoustical comfort perception. In particular, the sound conversations of the customer and the density of the occupancy control our perception of the noise in the restaurant and how we react to them. The background noise, (such as the music, machine, kitchen) can (and do) differentiate our reactions of perceptions on noise. [21] indicated size and density of the restaurant; the source of noise from the diners; and background music and machinery affected the increased of indoor noise level in the restaurant. Ultimately, the long period exposure towards high decibel sound and noise affecting not only the health and wellbeing but also the social interactions and communications [16]. Finally, this review summarizes the determination factors of diners’ acoustic comfort preferences in the eatery places as shown in Figure 1. The six classifications of the acoustic comfort are adopted based on the Café and Restaurant Acoustical Index (CRAI) by The Acoustical Society of New Zealand [55]. The contribution to knowledge from this study is the extension of the independent variables’ parameter derived from reviewed articles

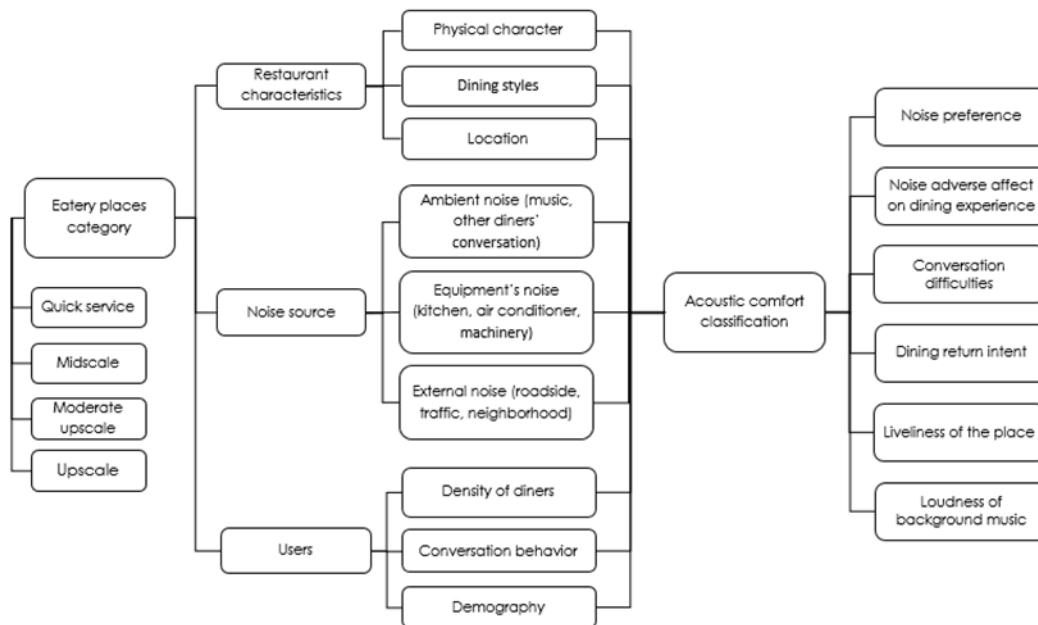


Figure 1. Framework of acoustic comfort classification in eatery places.

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