Noise Pollution in Baghdad City (*A study of urban sound in districts of Baghdad city*)

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Abstract: -

The city of Baghdad has experienced a major physical, economic and social transformation during the past decade, especially after the war in 2003. The effect of this has been the restructuring of the city, thus causing an impact on the urban aspect. Not many attempts have been made to ease pressure on the city, something which is severely affecting the quality of life by causing noise pollution in different parts of Baghdad. This paper evaluates the case of Baghdad city and assesses the different ways there are of managing noise. Furthermore, it identifies the types of noise pollution and its main causes as an attempt to raise the quality of the environment in the city.

Keywords: Noise pollution, urban sound, built environment, acoustics, Baghdad city

1. Introduction:

Noise pollution is a significant problem affecting cities around the whole world [8]. Because of the importance of this matter, more and more studies are becoming available and encouraged in different countries. In 2002, the Environmental Noise Directive 2002/49/EC [8] was adopted by the European Community. This document was a step forward in terms of managing noise pollution in the environment, and it set up strategies to deal with noise such as using plans to make information on environmental noise available to the public. Since 1980, designers, planners and policy makers have been studying ways to bring cities towards better design forms [19]. There is also an increasing emphasis on making urban communities both healthy and liveable, especially considering the increase in noise pollution [22]. In the Middle East region, there have been several pieces of research looking at pollution after the area experienced economic, social and physical changes. The cities which have been most frequently evaluated are Cairo, Amman and Dubai, [3], on the other hand Baghdad city has been experiencing the same pressure during the last decade – especially after the war on Iraq in 2003 which

made noise pollution an issue of concern and highlighted the question: How can we improve the quality of life in Baghdad city? This research has been adopted because of the importance of this issue as only few attempts have been made to ease noise pollution in Baghdad, which is preventing good living in the urban city and in turn affects the quality of the environment. The paper examines and evaluates the urban neighbourhoods of Baghdad city in focus of the existing issue of noise pollution over the last decade, and it assesses the different approaches towards managing noise to balance and promote good quality of living in the city. The paper defines and examines the causes of noise pollution that affect the quality of life in the city. Noise levels in Baghdad city are studied by reviewing former research. Finally, the paper develops a conclusion which considers the issues of noise to address the aim of the research, which is to develop the knowledge and understanding of noise pollution, oriented towards improving the quality of life in Baghdad city.

2. Methodology of Research:

The research adopts a descriptive method based on former studies to address the main aim of the research. The first part of the methodology is a description of the urban aspects and their relationship to urban noise. The second part highlights former studies involved in examining noise in different districts of Baghdad city in order to examine and identify the noise level, its type and its causes in Baghdad to assess the best approaches to managing noise pollution in view of improving the urban sound environment in the city of Baghdad.

3. Urban noise pollution:

Urban noise is unwanted sound that residents hear in the city without having the ability to turn it off; it interferes with residents' everyday living in different cities all around the world [6], it is the main noticeable and effective factor on the quality of life in residential areas, [7] it's a factor that challenges urban design and planning and finally, it is not well defined as an environmental problem in developed countries. Urban noise pollution is a growing issue and a harmful threat that prevents the development of good urban design [15]. The causes of noise pollution in general are poor urban design, traffic , construction activities , household chores and industrial activity [5]. Community noise levels identified by U.S. environment protection [20] stated that noise exposure at the ear should not exceed 70dB[Leq]. Also there are communities that should not exceed 55dB[Leq] [10] such as school areas and hospitals. The World Health Organisation published guidelines for community noise in cities as shown in **Table 1** [4].

Table 1: guidelines for community noise in cities [5]

Where	Why	Leq
Factories, traffic, shopping places (outdoors and indoors)	To avoid hearing impairment	70
School playground (outdoors)	Avoid annoyance	55
Classrooms	To ensure speakers can understand one another	35
Hospital rooms	To avoid disturbing sleep	30

The efforts made to investigate noise pollution contribute positively towards improving sound quality in urban neighbourhoods. It is therefore important for different professionals such as architects, town planners, and environmental engineers to consider noise as a key issue of managing policies or designing urban areas. [11] They should consider the problems posed by noise pollution when designing new roads, shopping centres, schools, hospitals and both commercial and residential houses in order to attain healthy urban communities [15], [16]. Cities should offer high quality standards in order to create a balanced life which can be achieved by establishing sound management strategies. There is a need to establish environmental noise impact criteria levels for various land use purposes - these criteria levels would enable impacts to be determined. The authorities should pass laws to check excesses of the sources of high noise levels. Baghdad is a large city that is encountering a rapid increase in population growth and is expanding economically, physically and socially , thus making noise pollution a major issue in its urban areas and causes changes in urbanisation, industrialisation and road work which is linked to increase of traffic [16]. A report presented by The Ministry of Environment in Iraq [14] showed that the causes of high noise pollution are due to the densely populated neighbourhoods of Baghdad, the spread of industrial workshops and the failure of the owners to abide by laws relating to environmental determinants and controls. In addition, there has been a significant increase in the number of vehicles and the use of high frequency vehicle horns ranging from 107-109dB(A), thus causing noise pollution in the city. Noise levels in Baghdad city are rated higher than the World Health Organisation's (WHO) standards: the report indicated that noise sources were industrial workshops within residential neighbourhoods, and the ratios of measurements ranged from 37 to 76dB(A), which is higher than specific residential areas approved by the World Health Organisation (WHO) (45-55) dB(A). The Iraqi Environment Ministry also pointed out that the spread of electrical generators which do not feature sound insulation has contributed significantly to the high noise pollution in Baghdad [14]. There is a need to use acoustic and

thermal insulation generators and replace old generators, and to prevent the importation of low quality electrical generators that cause high noise pollution rates [14]. It is very significant that Baghdad city is facing a noise pollution problem that is affecting the quality of life and very little research is available concerning this issue.

4. Noise levels in districts of Baghdad city:

A few pieces of research have investigated the noise levels in different districts of Baghdad city, and these will be reviewed in this paper. The result of one study identifies levels of noise hazards measured in different parts of Baghdad city in the following districts; Al-Alawi, Hayfa St. and Al-Zafarania 2008[13], showing that noise levels range between 64dB(A) –98.6dB(A) and the highest level exceeds the 70dB(A) allowable by the international standard guidelines. The noise was generated by two main noise hazards: electrical generators and traffic noise, and the higher level of the two was from the generators. Another study in 2013 gives measurements of traffic noise predictions on Mahammad Al-Qassim freeway which is located near a residential area in Baghdad city [18]. The values showed a continuous increase in noise levels reached an average of 88dB(A), and the study links the cause to the increased number of vehicles in Baghdad roads which matched results from Abd Hassan research in 2012 [1] that showed results of high noise levels in the district of Al-Khadhimiya were mainly from electrical generators and traffic reaching a level of 80 dB(A) while for levels of other noise sources including industrial, natural and human activity noise, the sound pressure level was less than 50dB(A). A paper presented in 2016 [17] on noise levels at the external areas of the University of Technology campus in Baghdad showed that the source of high noise levels inside the campus were from the electrical generators which reached a value between 58.23dB(A)- 79dB(A). **Table 2** gives an idea of the Average levels of noise pollution in Baghdad.

Table 2: Average of Noise pollution levels in Baghdad

District	Average of Noise Level SPL dB(A)	Year of Measurement
Alkaragh (Al-Alawi,Hayfa St. and Al-Zafarania)	81.94	2008
Al-Kadhimiya	65.5	2012
Mohammed Al-Qassim freeway	88	2013
University of Technology	68.6	2016

5. Identifying and managing noise in Baghdad city:

A study in 2014 [2] evaluated the spatial distribution of electrical

generators and their environmental effect in Baghdad city Because of the shortage of sufficient electricity there is more need for power for everyday life; and this issue created high levels of demand for domestic generators. The study showed the operating time was 8 hours for a percentage of 78.2% in residential areas, these electrical generators added to and increased noise in the urban areas of the city. The report presented by the UN human settlement programme [21] indicated that violent conflict and political instability have led to additional security points in Baghdad which causes traffic. Before 2003 cars and buses moved freely across the city linking different neighbourhoods in Baghdad, whereas after 2003 the establishment of military controlled zones, checkpoints and road blocks interrupted movement on roads linked to different areas of Baghdad, as long lengths of T-walls and concrete road blocks prevent cars accessing from secondary roads on to main roads, and all these diversions and barriers create widespread congestion and traffic noise. Also, road signs and posts need to be clear to prevent confusion that leads to accidents and congestion [9]. Traffic lights, speed limits and traffic guiding are also very poor in Baghdad roads, which adds to the urban environmental noise issue [21]. Study investigation of noise attenuation of tree belts on highways provided a reduction of traffic noise [23], [12]. This could be applied in different areas of Baghdad city. As a result of examining past research, **Table 3** identifies the types of noise pollution in Baghdad and their main causes.

Table 3: Identifies the type of noise pollution and its main causes in Baghdad city

Type	Cause
Traffic	-Increase in private cars -Blockage of secondary roads -Diversions and long length barriers between neighbourhoods -Military control and checkpoints -Use of high frequency vehicle horns -Poor road signing and no speed limits or road guiding
Electrical generators	-Shortage of sufficient electricity -Importation of low quality generators -No use of acoustic or thermal insulation
Industrial	- Spread of industrial workshops -Failure to implement environmental laws -Poor urban design and planning

6. Conclusion:

The information presented confirms that Baghdad city is facing a serious noise pollution problem, a matter which is severely affecting the quality of life in the urban city. The investigation shows that the highest levels in some areas reach up to 98.6dB(A), thus exceeding the recommended limits 70dB(A) according to international standard guidelines. Traffic, electrical generators and industrial noise are the three main types of noise

pollution that are affecting sustainability in Baghdad. Action needs to be taken by authorities, such as implementing sound management policies and strict regulations on the exceedingly high levels of noise, especially in residential areas. Furthermore, educating the public and raising their awareness of the effects of noise pollution on lowering quality of life would have a positive impact on managing noise. Another important factor is good urban design and planning for future developments, such as moving industrial workshops outside Baghdad's urban areas and providing greening and urban green areas, activating public transportation, promoting cycling and walking in residential areas with high population density will contribute positively towards creating a good quality of life. Other factors that can make a difference are that the traffic system needs to be activated and there is a need for technical actions to be considered on the roads such as adding traffic lights and signing, implementing laws on speed limits, avoiding continuous use of vehicle horns especially in residential areas, and using road acoustic barriers especially along busy roads close to residential areas also considering using tree belts on highways could help in reduction of traffic noise. Furthermore, there is a need to use silencers and thermal insulation for electric generators, replacing old generators and preventing the importation of bad quality generators. This will have a considerable impact on decreasing noise pollution. In conclusion, bringing the efforts of different professionals together will make it possible to address the threats of noise pollution and provide a balanced life in Baghdad.

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التلوث الضوضائي في مدينة بغداد (*دراسة للصوت الحضري في مناطق مدينة بغداد*)

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الخلاصه:

شهدت مدينة بغداد تحولاً رئيسياً في الجانب العمراني والاقتصادي والاجتماعي خلال العقد الماضي، لا سيما بعد الحرب في عام ٢٠٠٣. وقد ترتب على ذلك إعادة هيكلة المدينة، مما سبب لها تأثير على الجوانب المتعلقة بالمناطق الحضرية. لم تبذل محاولات كثيرة لتخفيف الضغط على المدينة، الأمر الذي أثر بشدة على نوعية الحياة مسبباً التلوث الضوضائي في أنحاء مختلفة من بغداد. هذا البحث يقييم حالة مدينة بغداد ويدرس الطرق المختلفة للتعامل مع الضوضاء. بالاضافة الى ذلك يتناول أنواع التلوث الضوضائي وأسبابه الرئيسية كمحاولة لرفع جودة البيئة في المدينة.

الكلمات المفتاحية: التلوث الضوضائي، الصوت الحضري، البيئة المبنية، الصوت، مدينة بغداد