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INVESTIGATING THE ISSUE OF POLLUTION IN THE MICRO-SCALE DESIGN OF MEGA-CITIES:A CASE STUDY OF ENGHELAB STREET, TEHRAN

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Abstract
Today there is a growing concern about urbanization and its impact on environmental pollution, which threatens human health and quality of life especially in mega cities. The mega city of Tehran, the capital of Iran, deals with various types of pollution. Although a large body of research has highlighted the significance of study on urban pollution in mega cities, only a few studies have addressed the issue at the micro scale. However, most of the research is restricted to air and noise pollution, whereas visual pollution as an important type of pollution that can be interpreted more deeply on a micro-scale, has been neglected. This study aims to evaluate some of the major issues of environmental pollution in Tehran by focusing on the micro-scale of the street. Therefore, as the central part of Tehran is one of the most affected divisions in the city, Enghelab Street has been selected as the case study for this research. This paper argues that identification and implementation of pollution mitigating strategies in Tehran's master plan is not responsive enough to the whole city. This study of Enghelab Street reveals that policy making strategies for decreasing pollution should be initiated from micro-scale with further emphasis on psychological health. In the future, the lessons learned from the case study of Enghelab will help other major cities in developing countries to combat pollution through initiating from most affected districts in small scale.
Keywords: Micro_scale, Environmental Pollution, Air pollution, Noise pollution, Visual Pollution.

1. INTRODUCTION

Pollution has been present sincethe pre-historic era when the first fires were started. However, it became a public concern after the industrial revolution as a result of population growth, and mass migration from villages to cities. The concentrations of services, resources, social welfare and career opportunities in mega cities is another factor that has intensified thepollution and the significance of the prevention strategies.Although numerous studies have been conducted on pollution mitigating strategies, most of them are exclusive to macro-scale policies that consider the whole city without investigating micro-scale environments, such as streets or neighbourhoods.

This study does not suggest that top down approaches of research are not beneficial to the problematic scheme of pollution in mega-cities; rather it proposes that a bottom-up examination of different

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environments may add another dimension to research on various kinds of pollution. Accordingly, this paper aims to investigate different types of pollutionat the scale of a single street in the central district of Tehran, which is the most polluted part of the city and to evaluate the potential for pollution mitigating strategies at this micro-scale.

Containing several significant uses and important architectural elements, Enghelab Street which is one the most populous streets in Tehran hosting several commuters due to its high accessibility, educational and commercial components has been chosen as a representative of the city central district . Due to the importance of this street as a major trunk of the city and suffering from various types of pollutions, the environmental sustainability of this street is a rising concern, both for the people and policy makers. Early evaluations of Enghelab Street alongside field studies and literature review revealed that air-pollution, noise-pollution and visual-pollution are the most significant problems for residents and commuters, which has affected the national figure of Enghelab Street to a noisy and polluted transport corridor.

A background to Tehran Pollution

Tehran is the capital of Iran, it is also its largest city with a population surpassing 14 million in the wider metropolitan area. Due to its population, geographical setting, meteorological conditions, industrial zoning plan, urban sprawl and wind direction(al, 2004; Atash, 2007), Tehran has also been rated one of the most polluted cities on earth, experiencing growing environmental problems including water, air, land and noise pollution(Madanipour.A, 1999).Among these various types of pollution, air-pollution can be considered as the most severe, threateningresident's wellbeing and quality of life(Atash, 2007; Masjedi, 2003).

However, air-pollution is not the only environmental problem that Tehran's inhabitants are dealing with. Due to the high volume of vehicles and road traffic, noise pollution is inevitable. Since most cars and motorcycles, which are still used in Tehran streets are not complying with international standard the quantity of the noise produced by automobiles is in a very high level (Mehravaran et al, 2010). Moreover, another type of pollution that Tehran struggling with is visual pollution, especially in the busy central and southern parts. Accordingly, Tehran is facing severe urban pollution, particularly in its central districts,which is characterized by high levels of human activity and increased traffic congestion. Therefore, Enghelab Street as the major trunk route (west to east) in the centre of Tehran has been chosen to address these issues.

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A Background to Enghelab Street

In the early stages of the Pahlavi Dynasty, Tehran saw muchdevelopment as a result of political, social and economic changes. Fosses around the city were filled and replaced by new streets such as Enghelab Street in the central part of Tehran. The former name of Enghelab Street was Shah Reza Street after the founder of the Pahlavi Dynasty but it changed to Enghelab-e-Islami (Islamic Revolution Street) in 1979.

Enghelab Street has a valuable architectural identity with an emphasis on Vartanian Style1. Different eras of history have affected the meaning and identity of thisstreet(Atashinbar, 1389). In the Ghajar Dynasty, Enghelab was considered the northern boundary of Tehran. In the first generation of the Pahlavi Dynasty (1925-1941), Enghelab was the commercial and office centreof Tehran but by in the second generation of the Pahlavi Dynasty (1941-1978), itchanged to a recreational and intellectual centre. Followingthe Islamic Revolution, Enghelab Street has become a pole of intellectual, cultural, commercial and political uses, which has given a national identity to this street.Enghelab Street is not only a public place, rather it hosts a collective identity.

Enghelab Street hosts several universities including the University of Tehran, Amirkabir University, the University of Art and a branch of Azad University. The University of Tehran, which is one of the oldest universities in Iran, was built around 80 years ago by Hekmat, in collaboration with the French-born architect, Andre Godard (Figure 1). Since most protests for or against governmentshave originatedfrom this university, the University of Tehran is considered as a political as well as an educational institution.

FIGURE 1 - THE ENTRANCE OF UNIVERSITY OFTEHRAN (SOURCE: AUTHOR)

[1]Vartanian style is an Iranian architectural style affected by pre-World War II, modern architecture, Art nouveau, Bauhaus, Adolf Loos and Le Corbusier's point of view that was originally created by Vartan Havanesian.

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All four above-mentioned universities are located in the northern edge of Enghelab Street; however the southern part is mostly dedicated to the commercial uses hosting several publication offices, translation offices, book stores and stationary shops, which supply the requirements of these universities and the whole city. The cultural and artistic character of Enghelab Street is owing to the Tehran City Theatre (opened in 1972), which is the main performing arts complex in Tehran and several cinemas, such as the Sepideh Cinema (built in 1943) and Bahman Cinema (built in 1972) (Figure 2).

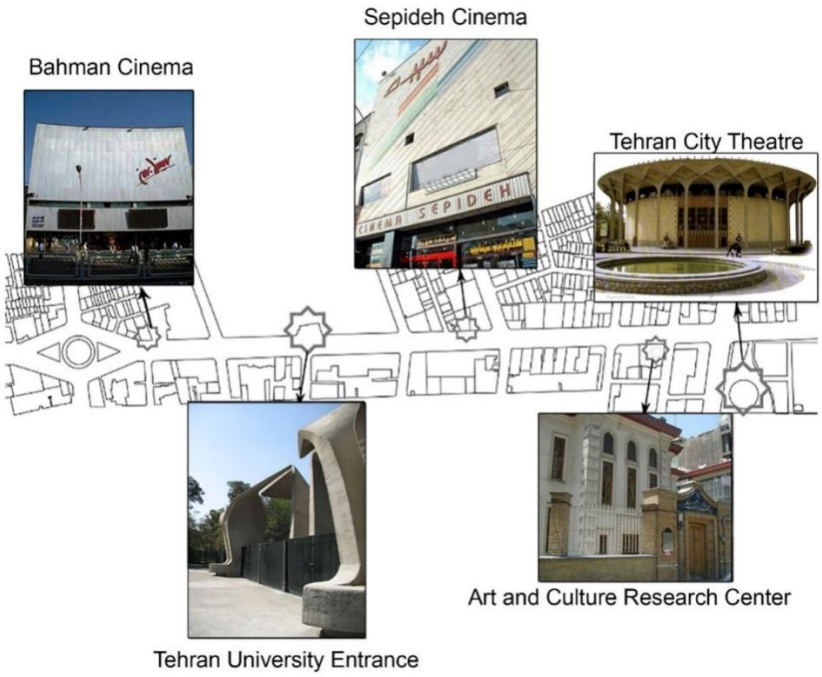

FIGURE 2 - CITY ELEMENTS BESIDE ENGHELAB STREET(SOURCE: AUTHOR)

Moreover, Enghelab Street is considered as a major trunk route (west to east) in the centre of Tehran, which has an intersection with Kargar and ValiasrStreet the two other major routes for city traffic.

Environmental Pollution

Air pollution

Air is one of the five essential elements, which is required for human survival. Every person breathes up to 22,000 times in a day and this requires 15 kg air per day (24 hr). Air pollution is one of the results of industrialization and urbanization, population growth and increased fuel consumption. Polluted air threatens humans not only via direct inhalation, but also through contaminated water, food and skin(Mage et al, 1996). According to Economist (2003), air pollution is the most dangerous environmental pollutions that affect public health (Economist, 2003).

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According to AQCC, in 2011, megacity of Tehran dealt with 218 days with unhealthy and very unhealthy air quality, which reached such dangerous levels that officials had to close schools and impose traffic restrictions (Table 1). The air quality of Tehran metropolitan is mainly affected by the stationary and mobile sources.

TABLE 1 - AIR QUALITY OF TEHRAN IN DIFFERENT DAYS OF A YEAR (SOURCE: AIR QUALITY CONTROL COMPANY SUBSIDIARY OF TEHRAN'S MUNICIPALITY)

Air Quality/ Year	1390	1389	1388	1387	1387
Good	3	14	32	13	23
Moderate	144	247	291	293	327
Unhealthy	215	103	40	59	15
Very Unhealthy	3	1	1	1	0
Hazardous	0	0	1	0	0

Based on a study in 2000, stationary sources such as industries and commercial services, are responsible for only 11% of the air pollution, while over 89% of Tehran's air pollution is contributed to the mobile sources (Hastaie, 2000)(Figure3). In a similar study carried out by Tehran's municipal council in (2004), it was uncovered that many cars are more than 20 years old and new cars are not manufactured upon the international environmental criteria. The results of the study indicate that 216 tonnes of carbon monoxide, 29 tonnes of hydrocarbon, and six tonnes of nitrogen oxides are released into the atmosphere during a typical morning rush hour in Tehran. The study also found that 11.5 million trips are made every day by private cars (29%), bus and metro (24%), taxis (20%), minibuses (11%), motorcycles (9%), coaches (4%) and vans (3%) (Hastaie, 2000)(Figure4).

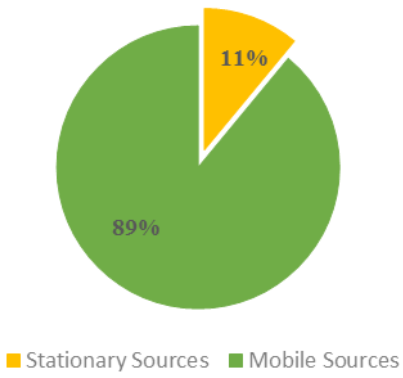

FIGURE 3 - THE PROPORTION OF STATIONARY AND MOBILE SOURCE OF CONTAMINANTS IN TEHRAN. SOURCE: AUTHOR

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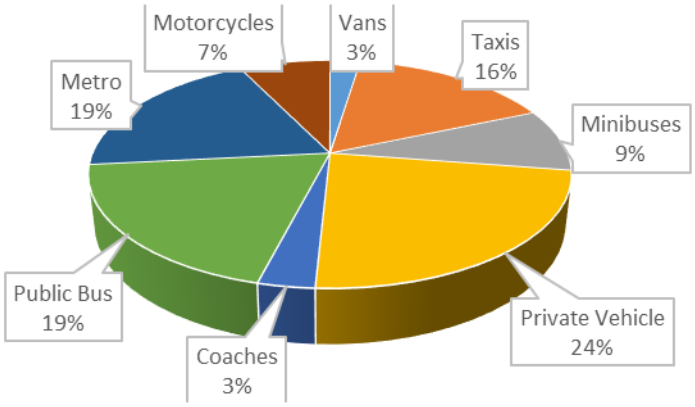

FIGURE 4 - DIFFERENT TRANSPORTATION SYSTEMS CREATE AIR POLLUTION IN TEHRAN IN 2004. SOURCE: AUTHOR

The strategic location and importance of Enghelab Street has brought many people to this area, therefore diverse means of transportations, from public buses to underground metros, have been provided to facilitate people's accessibility to this street. This has greatly affected the air quality of this area. In addition, the topographic features of Enghelab Street can be counted as another parameter that affects the air quality of the street. As the street is situated in a bowl shaped ground, discharging the air pollution via prevailing wind is not possible in this area, which intensifies the level of air pollution in this area. Figure 5 illustrates a cross-section from Tehran and indicates the position of Enghelab Street in relation to the other parts of the city

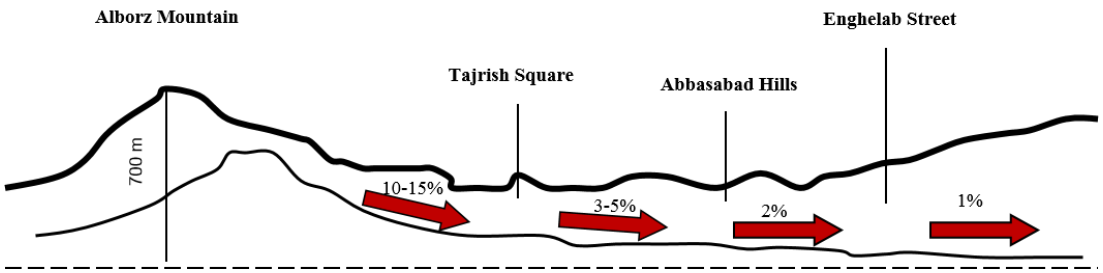

FIGURE 5 - TOPOGRAPHICAL POSITION OF ENGHELAB STREET IN TEHRAN. SOURCE: AUTHOR

Noise Pollution:

Based on the latest studies on noise pollution in the city of Tehran, Enghelab Street is situated in one of the most polluted district of city. Therefore, noise pollution is another fundamental problem of Enghelab Street in terms of environmental quality, which affects physical and mental health of city dwellers. Some of the side effects of noise pollution are sleep disorder, annoyance, hearing loss, lower task performance, increasing the blood pressureand the risk of cardiovascular diseases (Conte, Agretto, Spaccini, & Piccolo, 2005; Ko et al, 2011; Stansfeld et al, 2003).Vehicular traffic is one of the major source of noise pollution in urban areas (Arana & García, 1998; Suksaard et al, 1999; Zannin et al,

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2003) that has been identified more intensive than the noise created by industry, airport and community (Kryter.K D, 1982).Table 2lists the standards for the environmental noise exposure in free field2(Hansen.C. H, 1995), which was established in 2012.

TABLE 2 - ENVIRONMENTAL NOISE EXPOSURE STANDARDS FOR FREE FIELD. SOURCE: (ZHANG ET AL, 2012)

Type of areas	Daytime(dba) 07:00-22:00	Night-time(dba) 22:00-07:00
Residential	50	30
Residential-Commercial	60	50
Commercial	65	55
Residential- Industrial	70	60
Industrial	75	65

According to studies conducted on Tehran by municipality and Tehran Air Quality agency the level of noise pollution in this city especially in special district, which conclude Enghelab Street is 15 to 25 dB above the standard limit (around 65-75 dBA) that can be really dangerous for the city inhabitant(Mage et al, 1996).

It also reported that over 25% of noise pollution in Tehran is originated from the traffic(Mage et al, 1996). Moreover to the effect of traffic on level of noise pollution in Enghelab Street, old and non-standard manufactured vehicles, noisy motorcycles and high level of people activity especially during the day time intensify the issue. Thehighest exposure to the noise occurs in the street, while it gradually decreases by moving towards the pedestrians walkways. Thereview of existence studies shows that level of sound reduces slightly in front of the Tehran University, where there is a significant level of vegetation.

Creating a buffer zone through urban greeningis one of the most effective design guidelines, which is used worldwide to mitigate the noise problem in urban areas.In the context of a dense and compact city such as Tehran, the challenge in improving the existing planted barriers along the Tehran University along the street as noise attenuators is the high cost and availability of landin Enghelab Street. Although certain traffic restrictions have been imposed in Enghelab Street to keep private cars out during working hours and bus rapid transportation(BRT) lines and underground metro have decreased the level of road traffic to some extent, the street is still experiencing heavy traffic, which intensifies the air and noise pollution of Tehran. As transportation known to be the main factor influencing the level of air and noise quality in Enghelab Street, several actions are needed to be taken, such as developing traffic management strategies, maintenance of public transportations, controlling vehicle noise and pollution emissions.

[2] The free field is a region in space where sound may propagate free from any form of obstruction (Hansen,1995)

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Visual Pollution

In addition to air, noise and water pollution,visual pollution is another type of pollution that has an effect on people's quality of life but that is not often considered among the others (Yilmaz & Sagsoz, 2011). Visual pollution is not a new issue but it is greatly expanding, especially in mega cities such as Tehran. Ravages in building facades, inappropriate use of colour, a mass of advertising and other numerous factorscontribute to our daily visual experience of cities. Visual pollution candisrupt the harmony and natural balance between humans and the environment, which has several negative consequences including distraction, eye fatigue, decrease in stimulation and joy of living, adaptation difficulties,behavioural disorders and increase in psychosomatic illnesses (Yilmaz & Sagsoz, 2011).

According to Kevin Lynch(Lynch. K, 1960), a useful urban design should be able to enhance "people's quality of life" through enhancing the quality of the physical environment. Hence, improving the quality of the built environment is one of the main goals of any urban designer. Enhancing the visual quality of built environment that can expand the aesthetic taste, senses and above all the quality of life,especially in an important street like Enghelab,is important. Investigating the origin of visual pollution in this street requires a comprehensive study of street elements, including facade components such as colour, material and adjacent to the facades, skyline, urban furniture and advertising.

2. FACADE

The visual quality of a cityscape is linked to the city image. Therefore, buildings perform a principal role in the organization and layout of a city'sappearance(Utaberta et al, 2012). Indeed, the surrounding walls ina street are a perspective of public places and contain environmental and cultural values of a society as an identity of cultural heritage. Thus, the facade as a connective layer between inner and outer space, plays an essential role in urban and environmental design that should not be considered as just a building's skin(Huxtable. A. L, 2004). Facades can be considered the "faces" of cities; they vary in character and expressiveness in a similar way to human faces and affect the individual's perception of the built-environment quality. Askari (Askari. A, 2009)has stated that people evaluate building facades based on visual elements such as shape, colour and architectural style (Utaberta et al, 2012). Aspects of the surface, such as cleanliness and ornamentation(Akalin. A, 2009), curved lines, decorated figures (Frewald, 1990,), details and context (Akalin. A, 2009) may cause pollution in the cityscape and can have an influence on our quality evaluation (Stamps, 2000,).

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Enghelab Street has a valuable architectural identity, referred to as pre-modern architecture with an emphasis on Vartanian Style (Figure 6). Unfortunately, its valuable facades may be ruined due to three reasons. Firstly, a lack of attention to maintaining and cleaning that has caused deterioration of the historical facades and pollution in the visual appearance. Secondly, the presence of new developments or attachments without respect to the patterns of pre-modern architecture beside them. Thirdly, a lack of rules and guidelines in colour use and failure to provide a prevailing colour and material inthe streetscape.

FIGURE 6 - (A & B): VARTANIAN STYLE ARCHITECTURE IN ENGHELAB STREET. TEHRAN. IRAN (SOURCE: AUTHOR)

2.1. Materials

Despite the functional and structural reasons in the selection of materials, facades materials are used as a tool for communication between buildings and people. The variety of materials rely on numerous factors,including the function of building, the dominant architectural style of the street, climatic and geographical conditions(Zekavat. K, 2003). The presence of valuable buildings in Enghelab Street such as the City Theatre and University of Tehran as well as old fashion buildings and cinemas has created a special character for this street, particularly in terms of facades materials. Therefore, concrete and white cement are the dominant materials of the street. Unfortunately,with the lack of rules in choosing material for new development or renovating buildings in harmony with the street spirit, Enghelab is faced with a serious visual disturbance and disharmony.Figure.7shows a wide range of building facades materials along the street, such as aluminium composite, stone, brick, concrete and glass.

An increasing use of new generation of materials such as aluminium composites facades with blind imitation from modern architecture has created an incompatible streetscape with the image of street. Ultra use of glass in comparison to other materials in facades and also the vertical and horizontal order of windows can be counted as an example that must be used with greater sensitivity to dominant architectural style of the street. Facades cleanliness and maintenance in this air polluted and crowded

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street can be counted as another major issue in terms of visual pollution which have intensified the level of public discontent with the streetscape. Moreover, the level of quality, stability and longevity of materials that have been used in building facades, as an effective factor in intensification of the street visual pollution should not be ignored.

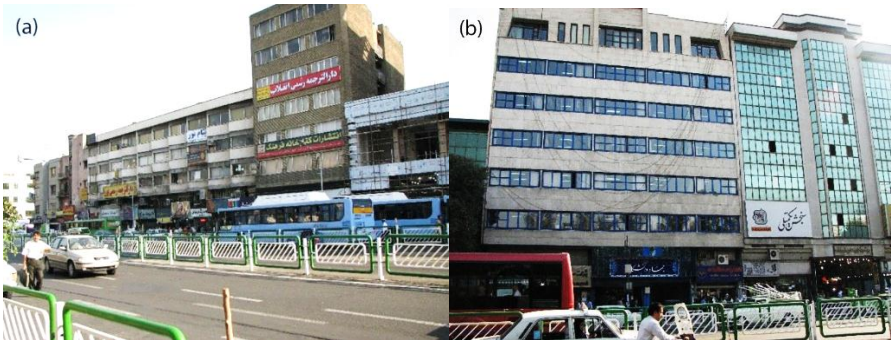

FIGURE 7 - (A &B): USE OF VARIOUS MATERIALS WITH DIFFERENT PATTERN WITHOUT ANY RESPECT TO HISTORICAL AND VALUABLE BUILDINGSHAS CAUSED VISUAL DISORDER IN ENGHELAB STREET

2.2 Extensions to Facades

The facade includes different elements, such as doorways, windows, stairs box, and balcony. While several elements in facades have been positioned according to façade order and are predesigned, there are also other instruments or elements that have not been considered, especially in older designed buildings such as air conditioners, signs or pipes. In recent years the majority of residential buildings in the street edge have changed their use to shops, academic institutes, publication offices and services institutes.

FIGURE.8A - ACCUMULATIONOF SIGNS AND BILLBOARDS ON BUILDING FACADES. FIGURE.8B: SHOWS A BUILDING LOCATED AROUND THE ENGHELAB SQUARE THAT COVERED WITH HUGE BILLBOARD

Changing the use of these buildings and equipping them with modern facilities has created new requirements that had not been considered in the old style buildings such as air conditioners, signs, ads and posters.Consequently, neglecting the pre-designed location for billboards and building signs in new developments, billboards and signs on building facades with disharmonious size, shape, colour, font

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size and level have turned buildings into massive billboards, which has caused visual pollution and disturbance in the streetscape (Figure 8).

2.3 Facade colours

Colours in architecture are utilized for supporting architectural style, denoting heritage values and improving built environment experience. Also they areused as a communication device and a form of innovative expression (O'Connor, 2011). In terms of environmental aesthetics, colour is one of a number of attributes considered to influence cognitive judgments relating to the 'fit' between a building and its context (Groat. L, 1988; Janssens. J, 2001; Urland. A, 1997; Wohlwill. JF, 1980). Thus, the facade colour is recognized as one of the numerous features that can contribute to the aesthetic response to the built environment (Nasar. J. L, 1994; Stamps.A E, 2000). Moreover, itcan reveal the identity of the city, streets or neighbourhoods and the rate of pleasantness or unpleasantness from the built environment from the perception of city dwellers.

The presence of valuable buildings such as the University of Tehran, the City Theatrehave determined the dominant colour of the street through their colour and texture. Other than architectural style, the greenery and natural view of the open space of university of Tehran territory on the north side of the street have enriched the colour palette in this street (Figure 9).

FIGURE 9 - THE GREENERY OF UNIVERSITY OF TEHRAN IN NORTH SIDE OF ENGHELAB STREET, TEHRAN. IRAN

Despite the rich colourscape of the street due to its valuable architectural building and green space, the quality of the Enghelab streetscape hasdeteriorated due to various factors that can be categorized into five groups: 1) Excessive use of colourful material, regardless of the street colour characteristic, has intensified disharmonise and irregular street colourscape 2) Air pollution has intensified the monotony of Enghelab Street 4) Lack of cleanliness and maintenance 5) Lack of urban design rules or design guidelines for colour use in new developments 6) Use of poor quality materials and/or colour coverage.

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2.4. Skylines

Since commuters are often in motion, facades as physical elements consistently merge with the skyline to create visual diversity. A skyline is the top of a building's crown and the intersection of buildings and structures with the sky. Accordingly, street skylines can be counted as an effective factor in streetscapes(Zekavat. K, 2003).

A building's arrangement and height difference affects the appearance of skylines of the street. The heights of buildings in Enghelab Street follows different range from 1 to11 floors, which has decreased around crossroads and increased in between. This extreme range of rise and fall has resulted in a disharmonized and disordered skyline, especially in the south side of the street. The height of the first generations of Enghelab buildings, Vartanian style,is about 1 to 2 floors, which resulted in a simple but orderly skyline. Due to special characteristics of Vartanian style, such as building crowns, slopes and specially emphasising on the staircase and building entrance, the skyline of Enghelab had rhythmic and diverse street skyline.

New development with different architectural styles and increase in building heights up to 11 floors have changed the rhythmic skyline of the street. Since new developments haveoccurred in only some parts of the street, height differencesare highlighted and the skyline of the whole street is affected(Zekavat. K, 2003) (Figure 10).

FIGURE 10 - CHAOS IN ENGHELAB STREET SKYLINE. SOUTHERNEDGE OF STREET. TEHRAN. IRAN

3.URBAN FURNITURE

Urban furniture occupies a large share of urban space and is one of the important components of streets capes. There are different classifications for urban furniture. For example, it can be divided into two categories: 1) functional urban furniture such as power posts and bins 2)decorative urban furniture such as public monuments, sculptures and trees (Zekavat. K, 2003). In the context of Enghelab Street, the iconic structure of the train station in the centre of Enghelab Square can be counted as a public monument and urban furniture. This square has witnessed many protests and celebrations in the history of Iran that should be recalled by its iconic structure. But unfortunately, lack of maintenance, use of

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improper materials with monochrome and dull colours in this structure not only failed to comply street spirits but it also is going to become one of the elements of visual pollution in the heart of Enghelab Street over the time (Figure 11).

FIGURE11 - THECOLOURLESSICONICELEMENTSOFENGHELABSQUARE .TEHRAN .IRAN .

Urban furniture can be separated into fixed and moveable elements. Fixed urban furniture includes mailboxes, power and telephone posts, phone booth, electricity beam and bins. Due to safety rules or functional identification, special colours and materials should apply to some of the fixed furniture, such as power boxes, but the colour selection for others can relate to different factors such as the character, geography and function of the place. In the context of Enghelab Street, using an improper colour for street furniture without any harmony to street colour and also failure to use appropriate, long lasting and qualified material and colour can result in a premature exhaustion of urban furniture. In addition, the use of different colours for one element such as a phone booth not only has caused confusions, but also it caused a disharmony in the streetscape.

FIGURE 11 - PUBLIC TRANSPORT IN ENGHELAB STREET. TEHRAN. IRAN

Moveable furniture consists of citizens, and public and private vehicles. In EnghelabStreet, people as active elements of urban spaces play an important role in the streetscape. Accordingly, the lack of colour use and monotony of people's clothescan have an impact on the total aesthetic feature of street.

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Moreover, the unpredictable behaviour and lack of order in people's movement along the street can be considered as an effective component of visual pollution in Enghelab. In this crowded and heavily travelled street, vehicles are another moveable elements of urban furniture that have resulted in a sense of visual disturbance and irregularities through their physical condition,colour palette, advertising coverage and movement patterns in high traffic volume of the stree (Figure 12).

4. ADVERTISING

Indexing the environment and serving communication in streets can be count as a principal function of signs. In commercial streets like Enghelab, signs3 rapidly change our picture of the street to a street of pictures(Abu-Ghazzeh, 1997). Hence, when signs remain uncontrolled, they have a tendency to createvisual pollution of a cityscape. According to the potential contribution of signs in generating a communication between people and built environment; the way signs are shown on facades or street edges and how they can change the building's image is more considerable(Abu-Ghazzeh, 1997). Enghelab Street, which is characterized by educational and social institutes is struggling with a large volume of advertising such as signs, billboards, tract, and declaration of hiring or training classes and notifications of exhibition or theatre. Consequently, overuse and poor placement of signs and overload of unexpected messages combined with sign's expected messages along the street elevation of Enghelab Streethave caused a clutter and visual pollution.

Moreover, competition between companies and shop owners to be seen in the mass of signs and advertising environment force them to use different tricks through abusing colours, shapes, fonts and mounting in special places. Hence, as figure 13 shows, the buildings and surfaces of street is suffering froman improper sign design and a chaotic display. The visual pollution is not exclusive to disorder in building facades; the other issue is the distribution of advertisement in paper format to people individually or pasting them on any surface such as bus stops and phone booths. Spreading papers on floors and the view of mass colourful papers, which are glued layer by layer on any standing structure is another indicator of pollution in the street.

According to Lynch and Rivkin who are contented that "… the individual must perceive his environment as an ordered pattern, and is constantly trying to inject order into his surroundings"(Lynch.K & Rivkin. M, 1959, page 33). Disorderly and chaos visual environment caused confusion and stress for its users. Therefore, the result of this mass in Enghelab street represents trouble for people whoare trying to finda

[3]The term of 'signs' in this study refers to both signs (used to designate an activity which contains title, address, social reason) and advertising signs.

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particular address in this street. Even though signs should signify as 'way finding' aids to the location of services and goods in the urban setting,their massive use has caused visual confusion in Enghelab Street.

FIGURE 12 - (A&B): THE MASS OF ADVERTISEMENT THAT HAVE BEEN STICK EVERYWHERE CAUSED VISUAL POLLUTION IN ENGHELAB STREET. TEHRAN. IRAN. SOURCE: AUTHOR

5. CONCLUSIONS

In recent years,numerous research has been done on the city of Tehran that has been restricted to air pollution on a macro scale. Neglecting other types of pollution and searching for the origin of pollution in the micro scale of streets leads to inappropriate strategies for pollution mitigation in Tehran. Based on this study, transportation system, urban mismanagement and lack of appropriate urban legislations are the most effective reasons for pollution in the small scale of street that can be extended to the entire city of Tehran. The result of this kind of research will help inform more appropriate decisions about the implementation of pollution mitigating strategies for the mage city of Tehran. It is hoped that the lessons learned from the case study of Enghelab Street will help other major cities in developing countries to tackle the problem of air pollution more effectively through small scale strategies in the future.

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