ENVIRONMENTAL EFFECTS OF COLOR IN URBAN OPEN SPACE AS A CASE STUDY: TEHRAN-IRAN

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Abstract - The city as a living and dynamic organ could play an important role in psychological and mental human needs. As an important of the city, open space is an arena that allows for different types of activities enclosed necessary, optional and social activities. Humans do not respond to the monotonically environment. There are many ways to make divers area and color can be one of them. Color is a visual and important statement of contemporary urban life that has been neglected due to lack of attention to its interactive capabilities in the environment. Nowadays, colors and building materials are smart, coatings can eliminate contamination and are antibacterial and, more importantly, pollute the air. The purpose of this study is point out effects of color in the environment. How can color be used in ecological and visual aspects? In order to answer this question I would like to explain some related projects and incredible color effect in air purifying. One of those is related to Tehran,the city has the most polluted air. According to this study, it can be achieved that how color can purify the environment. Eventually, it can be concluded that color can be important factor in urban design that can't be neglected.

Keywords - Environmental color effects, Ecological aspects, Air purifying Color

INTRODUCTION

Color is a visual and important statement of contemporary urban life that has been neglected due to lack of attention to its interactive capabilities in the environment and the lack of understanding of urban areas and identity. Therefore, the purpose of this study is based on research on the color of urban spaces and tried to investigate the interactive qualities of color in urban open spaces from a functional, identity, aesthetic and symbolic point of view, to the role of color as an effective factor in health care environment. According to some researches about color in the urban spaces, some new information has been obtained. That is related to air purifying color that can be effective item in ecological design.This technology has been used frequently in various urban projects in other countries. For example, the first air purifier hospital in Mexico City, or the first church with air purification capability.This time in Iran and one of the most polluted areas of the capital, a historic and valuable mosque was equipped with this new weapon of intelligent air purifier.The purpose of this study is point out the effective role of color in polluted cities such as Tehran-Iran.

II. IMPORTANCE OF COLOR IN CITYSCAPE

Color is an essential part of the city, creating and shaping urban form.[1] Nobody can forget the whites of modernist Brasilia, the greens of historic Cairo, the rosy reds of Petra, the terracottas of South America's shantytowns, the color discordances of Times Square and Shinjuku. Colors have an attendance over and beyond the objects, buildings, spaces, billboards, artifacts, and people that make up the city. Not only does color give meaning to cities but also cities give meaning to color. "Whether carefully coordinated, clashing, or an expression of materials, color is a powerful cultural, economic, and political force in cities".[1] Yet discussions on the city do not usually focus much on color, perhaps because urban colors are too often understood as being beyond any one authority or taste, or are simply dismissed as cosmetic, naive, or intangible. Color is substantial to life and art yet so diverse that it has seldom been studied in a general way.

II. THE ROLE OF COLOR IN URBAN OPEN SPACE

Open space has been described from a user's point of view as being an arena that allows for different types of activities encompassing necessary, optional and social activities (Gehl 1987). Necessary activities have to take place and therefore their existence is not dependent upon the physical environment; though how much improved people's daily quality of life might be if the spaces that these activities take place in are well conceived designed and managed cannot be fully estimated.

The city as a living and dynamic organ could play an important role in psychological and mental human needs. The effects of urban areas on the citizens have two basic aspects of human physical and spiritual senses of human can be investigated. The city set of visual cues that establish visual communication with cities. Urban design is a regulation tool which brings standards formulating the development. It is important that all urban spaces should be evaluated in collaborative and comprehensive approach. Open Space offers a rare insight into people’s engagement with the outdoor environment and looks at the ways in which design of spaces and places meets people’s needs and desires in the twenty-first century. Embracing issues of social inclusion, recreation and environmental quality, it explores innovative ways to

develop an understanding of how the landscape, urban or rural, can contribute to health and quality of life. [2]

What we should be demanding from urban open space in the 21st century: what are the social and spatial implications of new lifestyles, chromatic systems, tendencies to nature and what models for future city life will accommodate these? In looking for ways forward in recent years, governments and politicians have focused on a number of common themes. Variations on the ideas ofchromatic designs for urban open spaces and also façade improvement may can be the part of governments, urban designers and architectures focused issues.Urban open spaces are defined as publicly accessible open places designed and built for human activity and enjoyment. Urban public spaces vary widely in type, form and size and include Plazas, Squares, Streetscapes and Parks and Playgrounds. The creation of urban public space is not just as a part of urban planning but is also influenced by the surrounding architecture, the sculptural façades of which characterize the open space around them.

IV. ECOLOGICAL ASPECT OF COLOR IN CITYSCAPE

The role of the air purifying color is self-cleaning and the long lifespan of the building facade, and this technology has come in many developed countries in recent years through urban and urban management.According to the World Health Organization, three million people die every year due to air pollution.In recent years and in the 1990s, nanotechnology has produced new products that have unique properties.Today, colors and building materials are intelligent, coatings can eliminate contamination and become antibacterial and, more importantly, pollute the air.These types of colors are activated with ultraviolet energy and convert the particles of nitrogen oxides in the air and volatile organic matter into harmless materials.

This type of color contains CristalACTiV™ photo catalytic technology, which is ultrafine titanium dioxide, (TiO2) that absorbs energy from light and transforms ordinary water vapor into hydroxyl and proxy free-radicals at the surface of the TiO2. These free-radicals, created in billionths of a second, become the reactive species that break down noxious air pollutants such as nitrogen oxides (NOx) that come into contact with the surface. Harmful NOx gas is converted to nitric acid that is rapidly neutralized by alkaline calcium carbonate particle in the paint, producing harmless quantities of calcium nitrate and negligible amounts of carbon dioxide and water. Calcium nitrate is water soluble and easily removed from the film, leaving a fresh surfaceready to engage the next pollutant to come into contact with the film. A great advantage of this photocatalytic reaction is that the ultrafine TiO2 is not consumed in the reaction, but is merely a catalyst that continuously generates free radicals as long as there is sufficient light, air and moisture. Additionally, this reaction gives the paint self-cleaning and anti-bacterial properties. This technology reacts with harmful nitrogen oxides (NOx) coming from emissions of motor vehicles, solvents from factories and power plants, and neutralizes it through a chemical process. The NOx are broken down and converted into harmless substances that can simply be washed away by the next rainfall. (Fig.1)

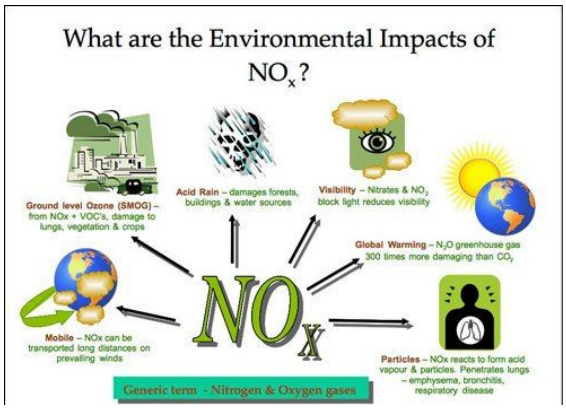


Fig.1. The environmental impacts of NOx

V. CASE STUDY

This technology has been used frequently in various urban projects in other countries. For example, the first air purifier hospital in Mexico City, or the first church with air purification capability and its own view of Italy, is among these projects. This time in Iran and one of the most polluted areas of the capital, a historic and valuable mosque was equipped with this new weapon of intelligent air purifier.Tehran is located in north central Iran and is its largest city. A dynamic, loud, chaotic and cutting edge city, the Iranian capital is home to 15 million people, bold fashion, art galleries, restaurants and cafes. It is also home to museums overflowing with ancient treasures, magnificent palaces, inspiring yet imposing mosques and dramatic government buildings. Endlessly enchanting, Tehran is one of the brightest gems in the Middle East.

The unique Mosque of Al-Jawad Tehran was painted with air purifier color.This valuable building is located in one of the main centers of Tehran's air pollution, Haft Tir Square, which is now known as the world's first mosque in air purification. This mosque was founded in 1341 and due to various reasons, including being in the center of Tehran, the specific type of architecture and adjoining mosque attracts the attention of the citizens of Tehran.The color of the air purifier, in addition to the mentioned property, also has self-healing properties and a long life span of the building's facade, and this technology has been introduced in many developed countries in

recent years through urban planning and management.The project, which was completed with the assistance of top managers and advisers of the mosque in 14 days, was painted with a high silicone-high elastic mosaic with a high silicone-based mosaic, and as of the day it was completed, the mosque was "the first mosque to be refined Air "has been renamed and exploited.(Fig.2)



Fig.2. Aljawad Mosque

As mentioned in previous section, Titanium Dioxide Titanium (TiO2) particles in the CrystalActiv ™ crystalline form receive energy from sunlight and ultraviolet rays and release hydroxyl and proxyl radicals in the presence of moisture and vapor in the air. These free radicals create in a billionth of a second, it will react to break nitrogen oxides (NOx) in the air. These broken particles are neutralized with alkali calcium carbonate particles present in the color, and innocuous amounts of calcium nitrate and small amounts of carbon dioxide and water are produced. Calcium nitrate is soluble in water and easily removed from the surface of the paint, which will prepare the surface for the next reaction. (Fig.3)

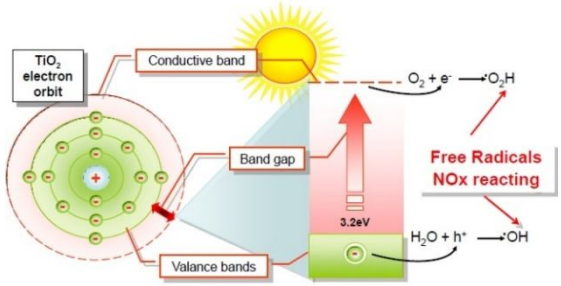


Fig.3. The function of this technology

A major benefit of this photocatalyst reaction is that titanium dioxide nanoparticles (TiO2) are not used in the reaction and are merely acting as a biocatalyst that continuously produces free radicals and, if there is light and the humidity of the air will continue, as well as the use of active crystalline actinide, which is responsible for its anti-bacterial properties.According to various experiments approved by the domestic civic organizations and institutions, every square meter of this color is treated daily as a mature tree.Also there are another projects that experimented such as, Metro Station Test, Manila, Philippines, Vincy Parking Experiment, Paris, France, Camden Experiment, London, UK and also The Congestion Tunnel, The Hague City, Netherlands. Also in Tehran, there are some wall-painting projects too that used this technology. The wall is more than 60 meters long and is painted with air purifier designs that are suitable for color performance. So this time we can see the chromatic design and this aesthetic factor can also clean the air.

CONCLUSIONS

Color is a visual and important statement of contemporary urban life that has been neglected due to lack of attention to its interactive capabilities in the environment and the lack of understanding of urban areas and identity. According to the most of color studies, it can be achieved that the color is really one of the important factors in design of urban spaces. But to point out the recently technology it can be mentioned as ecological item that can help air purification. In order to some projects in Iran or other countries , the successful effects of using color in urban spaces without mention to aesthetic or other points , can be the ecological view of the color. Also beside this, another aspects are important too, such as pay attention to identity and historic areas in design of urban spaces and use of color[7]. Yet discussions on the city do not usually focus much on color, perhaps because urban colors are too often understood as being beyond any one authority or taste, or are simply dismissed as cosmetic, naive, or intangible. Color is substantial to life and art yet so diverse that it has seldom been studied in a general way. So, it is better to think about all aspects of color when we use it in designs of urban spaces and do not to mention it just as an aesthetic point of the projects. It should be equally important as other factors in projects. All in all, the world is changing, and new technologies are helping human life. These new technologies will promote the environment.

REFERENCES

[1] D. GARETH editorial, “New Geographies 3 Urbanisms of Colors”, Cambridge : Harvard University, Graduate School of Design , 2010
[2] Uffelen, Chris van,“plazas, squares and streetscapes / Chris van Uffelen” , Braun,2013 Copyright 2013
[3] Meerwein , G. &Mahnke , F,“Color-Communication in Architectural Space”, Berlin:Birkhouser, 2007
[4] Porter, T. “Color Outside. London”. The Architectural Press , 1982
[5] http://www.knoxoutpaints.ir/knoxout/knoxout.htm
[6] Dzulkifli. M. &Mustafar. M. The Influence of Colour on Memory Performance: A Review. The Malaysian Journal of Medical Sciences. 20(2),3 .2013
[7] S. GhasempourKazemi. "THE ROLE OF COLOR IN THE PAST AND FUTURE OF THE CITY, TABRIZ-IRAN" Istanbul DAKAM conference, 2016.
[8] News.akhbarrasmi.com

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