

The Complementary Relationship Between Colors and Urban Spaces (A Study of Urban Spaces Adjacent to Residential Communities)

Nashwa Youssif Abdelhafiz

Department of Architecture, October High Institute for Engineering and Technology, Giza, Egypt
email: dr.naswayoussef@gmail.com

DOI: 10.21608/PSERJ.2024.300519.1345

Received 1-7-2024

Revised 20-8-2024

Accepted 16-9-2024

© 2024 by Author(s) and PSERJ.

This is an open access article licensed under the terms of the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



ABSTRACT

This study addresses the various aspects of the reciprocal relationship between colors and society, whether in cultural, social, or other aspects. It also explores different forms of expression through colors and reviews key studies and methodologies previously followed to improve the color design of urban and architectural spaces alike.

It aims to clarify and understand the importance of color design, and to highlight the significance of colors in enhancing design efficiency and consequently the functional efficiency of these spaces, while documenting and analyzing the psychological and physiological effects of colors on the user, and in turn, on improving the urban environment.

The topic is approached from a different perspective: studying the color design of urban space. The study focuses on the research axes represented in urban space and colors, then the reciprocal relationship between them and its impact on design efficiency and space functionality, and consequently on the user. Furthermore, selected projects are examined for their applicability in the contemporary Egyptian context, through observation, analysis, and evaluation based on the proposed methodology for case study assessment.

Finally, a set of recommendations is reached, highlighting the importance of colors in various urban spaces.

By adopting color theory in the design of urban spaces to ensure the harmony of colors with each other, and a set of executive recommendations for new projects is put forward.

These ideas can be integrated into the research to provide a comprehensive guide or practical methodology for designing urban spaces with colors, thereby contributing to their improvement

Keywords: Urban Color Evaluation, Functional Assessment, Color Psychology.

1. Introduction:

This research explores the role of colors in urban design, highlighting their impact on cultural identity and the efficiency of public spaces. It examines the reciprocal relationship between colors and society, emphasizing the importance of color in enhancing both design and functionality. The study also offers recommendations for using color strategically in urban planning to improve user satisfaction and create cohesive environments. [1]

Through studies and scientific research, it is evident that certain components must be available in various urban spaces, including social communication, availability of activities, ease of access, comfort, and general appearance, among others. In order to achieve these components, which in turn enhance the functional efficiency of the space, the importance of urban design in its comprehensive concept becomes clear. Consequently, the importance of color design or the use of colors as one of the impactful design tools on the user is highlighted.

This research explores the aspects of the reciprocal color relationship from and to the community, whether in cultural or social life or other areas. Additionally, it examines the different types of expression through colors, going through the most important studies and methodologies previously followed to improve color design in both urban and architectural spaces. The research aims to propose a methodology for analyzing and evaluating the overall design of different spaces, and subsequently, their color design.

1.1. Research Problem:

The research problem lies in the absence and inadequacy of most studies and scientific research in the field of urban development concerning the study of color design for urban space components and its impact on the design on one hand and the user on the other. There is also a lack of a clear and sound guidance and evaluation method for this color relationship between urban space components and the overall fabric and its impact on the community, resulting in deficiencies in space designs and their effectiveness in urbanization. Additionally, there is no clear methodology for color design through standard regulations in urban space to keep pace with urban development axes, especially design.

1.2. Research Objectives:

- To understand the importance of color design and the use of colors in urban spaces, and to clarify the importance of colors in enhancing the design efficiency and consequently the functional efficiency of these spaces.

- To document and analyze the principles and standards used in color design for urban spaces according to their functional, social, environmental, economic, and other components.
- To monitor and document the psychological and physiological effects of colors on the user and, in turn, on improving the urban environment.
- To arrive at a set of recommendations highlighting the importance of using colors in various urban spaces.

1.3. Methodology:

The research followed several methodologies in its different stages. Firstly, the documentary method through existing theoretical studies in addition to observation and viewing. The research then employs the comparative analysis method in the applied parts of the research through executed studies and projects, recording their data, and then analyzing them collectively. Following this, the deductive method is adopted to address general results and a set of recommendations specific to the research topic. Figure (1).

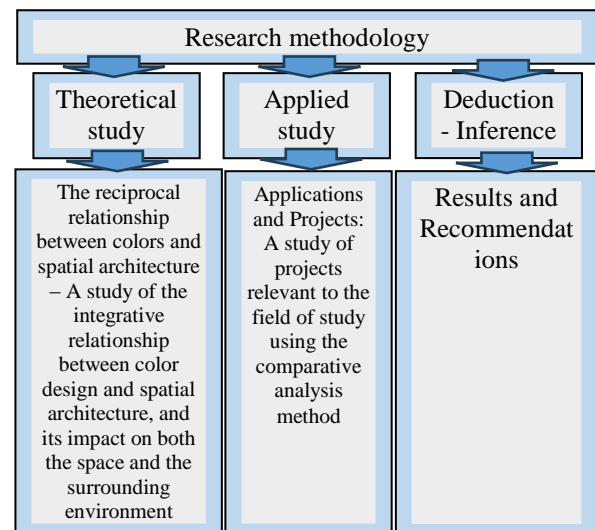


Figure (1): Research methodology
Source: Adapted by the researcher through

1.4. Research Limitations:

The general structure of the research is shaped by a set of limitations:

The focus is on urban spaces within the city as an entry point and nucleus to achieve the highest percentage of visual comfort and benefit through various activities within the spaces, and as an expression of the urban environment and its characteristics.

The study and determination of color design regulations as a basic component to improve the efficiency of the formation and design of urban space.

2. The Integrative Relationship Between Colors and Various Urban and Architectural Spaces:

The study explores different and multiple methodologies for studying the relationship between color and urban spaces from the perspective of users. This is achieved by presenting various previous methodologies and studies in different countries around the world that were analyzed by several architects. Through these studies, a methodology for evaluating color across different urban spaces is derived. Using this proposed methodology, an approach for monitoring and documenting the analysis in the applied part can be achieved.

2.1. Study of Johannes Uhl - Germany:

Johannes Uhl's study explores four scales for viewing and expressing color: adjacency, street, individual buildings, and building details. He emphasizes analyzing buildings as groups, considering how colors interact in various layouts based on their placement. Uhl discusses the influence of perspective, noting that colors are perceived differently depending on the viewer's angle, location, and role (e.g., resident vs. visitor). He highlights variations in urban space design, such as streets, squares, and courtyards, and their impact on color perception. Uhl also addresses factors like lighting and building orientation, which affect how colors appear, particularly in different climates. He conducted a field study on Kreuzberg Street in Berlin to apply these concepts, focusing on the environmental context, systematic photography, and the preparation of building models

Uhl conducted an extensive field study to apply his concepts on Kreuzberg Street in Berlin, Germany, following several steps: [2]

1. **First: Survey the Environment:** Assess the condition of buildings in the area, mostly old with some new ones, affected by the changing weather. The predominant color is brown, appearing purplish from a distance. The only bright colors were from foreign shops (Turkish shops in turquoise, pink, brown, and dark green). This structure was recorded on film and printed in black and white.
2. **Second: Systematic Photography at One Scale:** Take photos of each building from both sides along 800 meters. Fix the camera at the first-floor openings of the facing buildings, using a wide-angle lens to avoid distortion. Each frame contains a section of both sides of the street and the sidewalk. These negatives are used to create copies at a 1/100 scale to clearly show each facade.
3. **Third: Preparing Photos and Tracing Paper:** Prepare the facades at a 1/100 scale, leading to

copies and reflective paper at various scales (1/1000, 1/500, 1/200, 1/100).

4. **Fourth: Preparing Building Models:** Enlarge individual facade photos to a 1/50 scale for different floors, then prepare wooden models based on these photos. The final result is silicone-cast plaster models, left in their wooden frameworks for three weeks to ensure drying

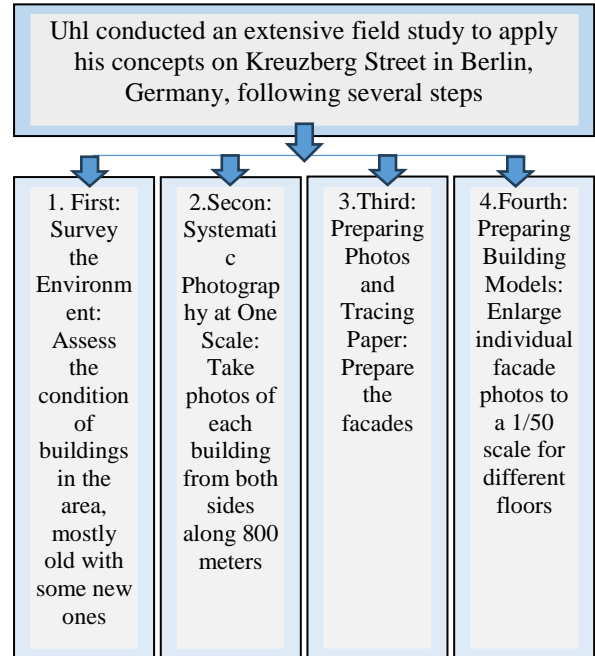


Figure (2): Action Steps

Source: Adapted by the researcher through and hardening. Figure (2).

2-2- Study on the city of Turin, Italy:

Previously, the city of Turin was characterized by a monochromatic color scheme dominated by yellow, which made it undistinguished (Figure 4). There was no differentiation between its buildings, whether decorated or not, leading to a misunderstanding and lack of distinction in its construction materials and elements. In December 1978, a redevelopment program was initiated by Turin's Housing Authority led by Enzo Biffi Gentili. This project was executed under the leadership of an architectural team comprising historians, color experts,

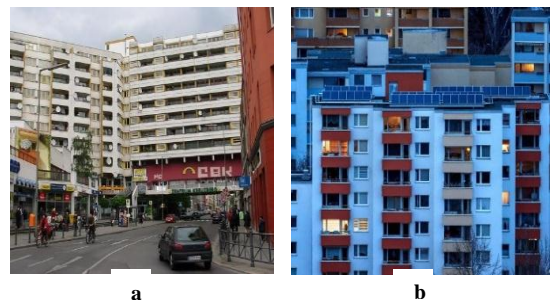


Figure (3): (a,b) Some of the buildings studied by Uhl in Berlin.

Source:

https://commons.wikimedia.org/wiki/File:Kotti_Berlin.J

and architects, all guided by architect Giovanni. [3]

This integrated team reconstructed the color map dating back to the 19th century, attributed to the quality



Figure (4): Valentino Castle in monochromatic colors.
Source

<https://www.viator.com/Turin-attractions/Valentino-Castle-Castello-del-Valentino/overview/d802-a24703>

of maintenance and preservation of stored color samples, in addition to referencing the Munsell Atlas. These colors were applied to the original city of Turin, its centers, and extensions, resulting in the repainting and decoration of over a thousand buildings according to the new color system and maps that were introduced.

Architect Paolo Portoghesi played a pivotal role in the experiment of revitalizing colors in Turin. However, he pointed out the risk in renovating buildings by comparing them with the original city structures, emphasizing that their restoration and coloring should not strip the city of its civilization and culture. Therefore, any renewal and reconstruction process involving these colors among this cluster of blocks must reflect popular taste. Portoghesi proposed to underscore his goal and purpose by coloring the ancient center of Rome in ochre yellow, contrasting with the traditional silver color.

2-3- A.C. Hardy's Study - England:

Hardy focused his study on large-scale buildings and identified their colors based on the overall regional colors perceived from a distance, resembling distinct colors that give the impression of flowers, plant leaves, and trees. The second phase of Hardy's study involved the colors used in new buildings and their relationship with surrounding site planning, among other aspects. This phase presented a shift from studying the background of the building to studying the building itself. Hardy early on observed that colors are designed and constructed using the same materials as the building itself, such as the materials of the surrounding earth. [4]

Hardy added several factors contributing to the appearance of colors, including:

- Reflections of shadows on the color surface itself.
- Shape and proportion.

- Effects of different scales for both the building and the color.
- Other architectural elements resulting from the interaction of building materials.

It was established that all these factors have a significant and clear impact on color decisions, especially when the interaction between the building and its surroundings reaches very similar degrees.

Considering these factors, Hardy found after several years of investigation that there is very little available information for architects interested in selecting colors suitable for large-scale buildings located in vital and important areas of the city. He deemed it natural to overlook this vast scale of these buildings and found that the solution for such buildings is to paint them in closely related colors to each other but different from their surroundings, as Lenclos did in France. However, the results were contrary to his expectations, revealing quickly that coastal areas and marshlands are difficult to categorize into uniformly colored areas due to the extreme diversity in building materials.

3- Proposed Methodology for Evaluating Color in Urban Space:

3-1- Summary of Previous Experiments:

Here, we present several points summarizing methodologies and previous experiments aimed at improving and evaluating color design or the use of colors in urban spaces, both internally and externally. Below are the key points:

3-1-1- Study of Surroundings (Surrounding Colours):

The study of surroundings refers to the visual extension of color perception from within the urban space to its exterior. This study focuses on three fundamental elements:

Overall perspective: This holds significant importance as it considers how this vision complements and extends the visual experience for users of this urban space. Therefore, it is imperative to consider this study and its impact on color design or the use of colors, whether from an individual perspective or by organizations concerned with this matter. (Figure 5).

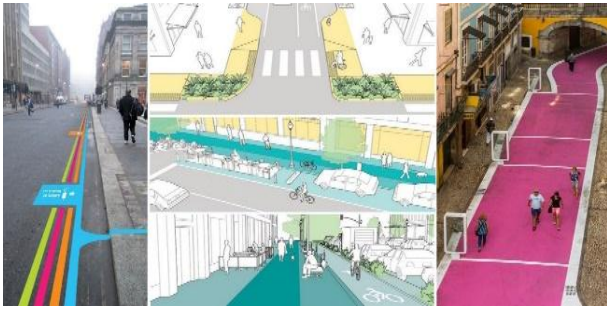


Figure (5): General Perspective (Wide View of Urban Space)

Source: <https://www.pinterest.com/>

Buildings: Studying the facades of buildings surrounding the urban space is considered one of the most important elements in studying the environment. It is possible to change the color concept or the overall color design by studying their colors based on the method or system used to color these facades, whether based on color harmony, contrast, or a different color study approach, as is the case in residential buildings for new urban communities in the same area. (Figure 6)



Figure (6): Use of Colors in Building Facades
Source: <https://www.arch2o.com/colorful-facades-contemporary-architecture/>

Hence, the importance of studying the colors of surrounding facades for their effectiveness in enhancing the color design efficiency of urban spaces.

Surrounding Streets: Surrounding streets are considered an integral part of the urban space itself, and sometimes they are even seen as the urban space itself. Therefore, studying the surrounding streets and assessing their impact and effectiveness in terms of color design or proper use of colors in all their aspects is essential. This includes signage and the colors of movement paths, for example, which enhance the visual perception of urban space users or visitors. (Figure 7).

3-1-2- Study of Urban Space Elements

Here, we review some previous approaches to enhancing and evaluating the color design of urban space components, categorized based on the perspective of using colors to increase functional efficiency and positive psychological impact of these elements. Urban space elements can be classified as follows:



Figure (7): Some examples of the use of colors in the streets surrounding the urban space

Source: https://www.re-thinkingthefuture.com/city-and-architecture/a5123-cities-and-their-colors-an-architectural-discourse/#google_vignette

-Movement Paths: Movement paths within urban spaces are the main arteries of their effectiveness and the primary measure of their efficiency. Therefore, studying the colors used in these paths of various types is essential to enhance their functional efficiency.

-Multi-functional Spaces: These spaces can be considered the largest part of urban spaces and are thus the most effective element in terms of functional efficiency. Here, the role of color design or the use of colors comes into play to enhance functional efficiency and improve the performance of the urban space. It is important to note that the color design approach varies depending on the activity. For example, areas designated for relaxation and leisure cannot be treated the same way as playground areas in terms of color usage; each requires a suitable style and colors that are more appropriate for the type of activity.



Figure (8): Examples of spaces allocated for various activities in the urban space. Surrounding the urban space
Source: <https://www.bbc.com/culture/article/20200602-five-stunning-outdoor-spaces-for-all>

Table (1) Monitoring Suitable Colors for Different Activities in Urban Spaces
 Source: As managed by the researcher <http://www.cjolliffe.com/Resources/CJGA-Color-Theory>

	Stabilization activities	The appropriate color	Movement activities	The appropriate color
Social activities	Sitting	Gray	moving assemblies	light gray
	Relaxation	Herbal green	running	Havan
	Speaking	White	Dating places	yellow
	Meditation	Bluish violet	volunteer workspaces	Pink
Recreational activities	Reading	Gray	fitness facilities	Red - pink
	Watching shows	Amber	performing arts	Reddish orange
	Places for mental games	Charcoal grey	Party places	Reddish violet
Business activities	Places to sell products	Yellow	spaces for street vendors	Gray
	Places of rest	light blue	physical activity and arts education	Water green
	Places for distributing commercial advertisements	Red	shopping spaces	Light yellow
Service activities	Inquiry locations	White	internal transport corridors	Light grey
	Awareness centres	Light purple	service corridor	Dark grey
	Medical aid places	Golden yellow	medical emergency corridors	Coral

Complementary elements: As the design elements that complement the urban space are considered among the most important factors influencing vision and visual perception, therefore the importance of the study of color design comes in those elements that are represented by landscaping, various coverings, seating places, lighting units, and other such elements.

3-1-3- Lighting:

Here we discuss one of the most important factors influencing the use of colors in urban spaces, which is lighting. Lighting greatly affects the clarity of colors, so it is essential to consider how the urban space is illuminated to enhance the performance of the color design. Factors influencing natural lighting should be taken into account, such as geographic location, seasonal and daily timing, and orientation. Regarding artificial (night) lighting and its impact on colors used, there are various methods including direct, dim, and intense lighting, as well as indirect lighting which relies on reflective surfaces or light-colored surfaces to aid in distributing light effectively in the desired environment.

3-1-4- Monitoring Suitable Colors for Different Activities in Urban Spaces:

Monitoring and selecting suitable colors for various activities in urban spaces is crucial for enhancing both functionality and aesthetics. Colors can significantly influence mood, behavior, and overall experience in public areas. For instance, vibrant colors may stimulate activity and energy, while calming hues can promote relaxation and tranquility. Effective color choices can lead to improved usability of spaces, encouraging specific activities and making environments more engaging. And this is evident from (Table 1), which is used to monitor the suitable colors for the key activities in urban spaces.

3-2- Analytical Study Evaluation Methodology:

Here we present the methodology used to evaluate the research case study resulting from previous methodologies, along with the key elements affecting the color design of urban spaces. The evaluation methodology consists of two main parts, each containing several points through which the researcher evaluates the case studies. Subsequently, conclusions are drawn from this evaluation. [5]

1- Part One: Assessing the functional efficiency of the urban space:

In this part of the methodology, the urban space is evaluated in terms of functional efficiency through an assessment system developed by a global organization



Figure (9): The Four Components of Urban Space According to the Evaluation by P.P.S Organization

Source: Adapted by the researcher through by

<https://www.pps.org/product/how-to-turn-a-place-around-2>

called Project for Public Spaces (P.P.S). This organization acts as a key partner for the European Union in developing and improving the performance of urban spaces worldwide. The assessment system consists of four main components represented by a set of criteria and points that should be present in the urban space (as illustrated in Figure 9). The four main components are:

- Sociability
- Uses and Activities
- Access and Linkage
- Comfort and Image

To illustrate the following diagram, we can imagine that the center of the circle shown in the diagram represents a specific place such as a street corner, a playground, or an outdoor space of a building. This place can be evaluated according to four criteria represented by the smaller circle around it. In the middle circle, there are a number of intangible assets or intuitive aspects through which the place can be judged. The large circle or the outer ring represents a set of aspects that can be measured through statistics and research, representing the tangible assets combined with the intangible assets to judge the essential components that should be present in the urban space as shown in the following table.

Sociability:

Achieving sociability in public urban spaces is challenging, but once it is achieved, it becomes a clear and strong feature of the space. It is possible to feel welcomed and a sense of fulfillment among neighbors,

as well as comfort and interaction with strangers. At this point, the place becomes great for hosting this type of social activity.

Questions to consider for achieving sociability include:

- Is this space suitable for meeting friends and neighbors? Does the place suit the people you want to meet?
- When people are in groups, do they talk to each other?
- Do people know each other by name or by appearance?

Uses and Activities:

The activities that take place in the urban space are the cornerstone of the place. It should provide users with a reason to visit and a desire to return to engage in these activities again.

Principles to consider when evaluating uses and activities in the space include:

- The more activities and opportunities for participation, the better.
- There should be a balance between activities for men and women.
- Providing activities for different ages and needs throughout the day.

Access and Linkage:

Accessibility can be judged by pathways or visual design relationships. The space becomes successful when internal movement is easy through short paths that meet needs and connect different activities within the same urban space.

Questions to consider for evaluating access include:

- Can the space be seen from a distance? Can it be seen from the inside from the same distance?
- Is there a good relationship between the space and the surrounding buildings?
- Can users easily walk to and within the space?
- Are there spaces or access for people with disabilities?

Comfort and Image:

A comfortable space presents itself well, and the appearance and general image of the urban space are key to its success. Comfort includes aspects such as security, safety, cleanliness, and other features that should be present in a comfortable space with a good visual image.

Questions to consider for evaluating comfort and image include:

- Does the place make a good first impression?
- Are there enough seating areas? Are they comfortable?

- c. Is the place safe? Is there a nearby security presence?
- d. Do people take photos? Are there multiple photo spots?

Part Two: Evaluation of Color Psychology:

(Positive and Negative Effects on the Efficiency of Urban Spaces) (Table 2)

In this part of the methodology, the colors used in different urban spaces are evaluated from a psychological perspective, assessing their impact on the functional efficiency of the elements and components of these spaces, taking into account the varying uses and activities from one space to another. Many researchers in the field of color have studied the psychological and physiological effects of each known color on humans. A group called CAREY JOLLIFFE conducted a study on the colors used by designers and their psychological impact, whether positive or negative (as shown in Table 2). This study can be used to evaluate the color design of urban spaces for the case studies in the research. [6] [7]

3-3- Methodology of Analysis:

The purpose of the analysis methodology is to present case studies in an organized scientific framework that facilitates deriving insights from those cases. Therefore, the analytical approach followed to achieve the method of comparative analysis can be outlined in the following steps:

- Documentation: This stage involves defining and documenting the case study through several key factors, such as function, activity, dimensions, and components of the urban space, as a model for application.
- Analysis: At this stage, the researcher analyzes the case study focusing on critical points that facilitate the evaluation process.
- Evaluation: In this stage, the researcher evaluates the case studies within the scope of the proposed evaluation methodology mentioned earlier.
- Comparison: This stage involves analyzing the evaluation results of the case studies and comparing them with each other to deduce significant positive and negative points. This process helps improve the performance and design efficiency of the urban space.

Table (2): The Psychology of Color"
Source: Adapted by the researcher through

red	Lust - Power - Excitement - Love - Speed -Anger
Yellow	Competence - Happiness - Inexpensive - Low Quality
Green	Good Taste - Envy -Eco-Friendly - Health -Money
Blue	Sophistication - Competence - High quality - Corporate -Reliability
Pink	Authority - Feminine and Flirty
Violet/Purple	Warmth - Sophistication – Power
Orange	Ruggedness – Excitement
Brown	Grief
Black	Happiness - Sophistication - Expensive -Fear
White	Sincerity – Purity

Table (3): Evaluation of Urban Spaces According to the PPS Organization
 Source: Adapted by the researcher through <http://www.pps.org/>,
https://journals.ekb.eg/article_289998_ac26a2442c09192761d6a6b545f60559.pdf

Components	Intangible items	Achieve	not achieve	Tangible Elements	Achieve	not achieve
Sociability	Welcome			Street liveliness		
	Interaction			Evening use		
	Friendliness					
	Feeling proud			Volunteer work		
	Neighborhood cooperation			social networks		
	Hospitality					
	Diversity			The presence of different groups and ages		
Uses and Activities	Continuity			traffic movement		
	Degree of proximity					
	Connection			Division method		
	Ease of handling					
	Possibility of walking around			Transportation		
	Keeping up			Pedestrian activities		
	Access			Waiting places		
Access and Linkage	Fun			Local business		
	Activity					
	Vitality nature			Floor shaping		
	Excellence			Real estate value rate		
	Benefit					
	Common sense			Rental rate		
	Possibility of celebration					
Comfort and Image	Sustainability			Market sales		
	Safety			The fight against crime		
	cleanliness					
	Greenery			Health system		
	Wandering around					
	Sitability			Condition of buildings		
	Spirituality					
	Sedition					
	Attraction			Environmental surroundings		
	History					

4- Analytical and Applied Study:

The study is conducted through examining specific cases and projects related to various urban spaces, culminating in evaluating the color design of urban spaces using the proposed methodology. [8] [9]

4-1- Objectives of the Analytical and Applied Study:

The study aims to achieve several important points, including:

Documenting selected projects and case studies relevant to the thesis topic.

Analyzing case studies through the color design of urban spaces and assessing its positive or negative impact through comparative analysis methodology.

Demonstrating the importance of color design in urban spaces through case studies in the field of application.

4-1-1- Scope of the Study:

The scope of the study involves documentation, analysis, and evaluation of projects matching the research topic, which is the color design of urban spaces.

4-1-2- First Case Study: Superkilen Park Project:

The case study is approached through the analytical method outlined, which includes:

a- Monitoring and Documentation - Project Definition

The documentation of the case study (Superkilen Park Project) relies on several important points:

1- Case Study Definition:

Superkilen Park is located in the Nørrebro area of Copenhagen, Denmark.

Architect: BIG - Bjarke Ingels Group

Year: 2012

This project received the National Award for Regional and Urban Design in 2013. [10]



Figure (10): "Project Site Perimeter"
Source <http://www.big.dk/>

The project consists of an urban park with three distinct activity zones: Red Square, Black Square, and Green Zone.

2- Boundaries and Dimensions:

The project is situated in a diverse residential area, bringing together over sixty different nationalities.

Architectural boundaries include major streets to the north and south (in the Nørrebro area of Copenhagen), an indoor sports hall to the east, and residential areas to the west.

Architectural dimensions span 750 meters in length and 40 to 50 meters in width, covering an approximate total area of 30,000 square meters.

3- Function and Usage:

The focus of this project, from a functional perspective, is on bringing together the diverse nationalities surrounding the urban park and meeting most of their desires by providing spaces for various activities that might occur outside the home. The project's functions or uses can be divided into three main categories:

Physical activities.

Static physical activities.

Relaxation, enjoyment, and comfort.

This results in enhancing the physical and mental health of the community surrounding the project.

4- Design Methodology (Design Concept):

The design concept of the project revolves around dealing with more than sixty different nationalities to encourage diversity among local residents using globally sourced items that symbolize the homelands of those living in the area. These items include neon lights from Qatar and Russia, rope fixtures from Ghana, a giant sculpted bull from Spain, and Palestinian soil. It's an international exhibition over a half-mile stretch.

Jacob Finger from the artistic group says, "Typically, when you design a public park in Copenhagen, you're limited to choosing between two or three types of benches. But now we have the whole world (to choose from)."

5- Key Features of the Project:

The park is divided into three different activity zones:

The Red Square: An area for sports, cultural activities, and a weekly market.

The Black Square: The "urban living room" where locals can gather to play chess, read, and more.

The Green Park: A green landscape and playground where families with children can have picnics, sunbathe, and take breaks on the grass.

b- Project Analysis - Case Study:

In analyzing this project, it is essential to consider that it is divided into three distinct areas. Therefore, each of these areas must be analyzed separately as follows:

1- The Red Square (Physical Activity Area):

When analyzing the physical activity area or the Red Square, two crucial aspects must be considered:

First: The Design Aspect:

This square is a colorful space with a ground that features various warm colors, including shades of red, purple, and violet, in a contemporary style characterized by modern design lines. This space includes a variety of physical games, along with a designated bike path that runs from the main street in the south to its northern end. Additionally, the design aspect of this area is marked by the colors on the surrounding walls

Secondly: The Functional Aspect:

When analyzing the functional aspect of the Red Square as part of the project under study, we find that the primary objective of the designer in this area was to develop, improve, and enhance the health of the surrounding community by providing the opportunity to gather most of the physical activities in one place



Figure (11): The main features and components of the project

Source <http://www.big.dk/>



Figure (12): A plan of the play area and the formation of the floors with the used colors.

Source <http://www.big.dk/>

(Figures 11, 12,).

It is also remarkable that all these activities are suitable for almost all ages, nationalities, and diverse cultures present in the surrounding community.

Additionally, we notice on the functional level of the space the attention given to children's play areas, with consideration for elements of safety and public security.

2- The Black Square (Urban Living Room):

In analyzing the Black Square, also known as the Urban Living Room, in the same manner as the previous analysis, we find the following:

Firstly: The Design Aspect.

This area is distinguished by a set of flowing white lines on the gray floor, which in turn reflects modernity and keeping up with the times (Figure 13). We also notice the presence of some elements from different cultures, such as Japanese cedar trees, ropes from Ghana, a Moroccan fountain, and other elements that represent various nationalities.



Figure (13): Some of the activities available in the project's play area

Source <http://www.big.dk/>

Secondly: The Functional Aspect.

The function of this area in the project is to serve as a place for quiet activities such as playing chess, reading, walking, and meditation, among other activities that bring together the different cultures of the surrounding residents.

3- The Green Square (Grass Park):

When analyzing the Green Square, or grass park, using the same approach as before, we find the following:

Firstly: The Design Aspect.

The green area is distinguished design-wise by its curved pathways and grassy hills that extend between residential areas to the right and left of the park. It also includes a multi-court for hockey, basketball, and handball, making this park a focal point for local residents.

Secondly: The Functional Aspect.

The function of this area in the project is to serve as a place for relaxation, leisure, and enjoyment of nature. Activities include sunbathing, meditation, picnicking,

reading, and others that bring together different cultures of the surrounding residents.

c- Initial Case Study Assessment:

1- Evaluation of the Case Study in Terms of Color Design:

In evaluating the case study from a color design perspective, the assessment is conducted by referring to the proposed table for evaluating colors in urban spaces according to the desired functional activities. In this case study, the intention is to evaluate it using the same analysis approach by dividing the project into three zones to assess each zone separately. Below is the evaluation of the project's parts in terms of color design or color usage:

Red Square (Play Area):

In this area, the designer used warm colors and shades of red, purple, and violet. Referring to the mentioned table, these colors are noted for their common positive psychological effects such as activity, strength, excitement, and stimulation. They also share common negative psychological effects such as noise and disturbance.

Black Square (Urban Living Room):

It is noted that neutral colors such as white, gray, and black were used in the open area for residents - the Black Square. Referring to the table, the positive psychological effect of these colors includes calmness, purity, stability, and focus. The negative psychological effect includes loneliness and stagnation.

Green Area (Grass Park):

This area features natural green hues of vegetation and grass, complemented by elements in white. Referring to the table, the common positive psychological effects of the colors used include relaxation, balance, harmony, and purity. The negative psychological effect includes boredom and monotony.

2- Summary of the Initial Case Study Evaluation:

The summary reflects the results of the methodical evaluation approaches previously mentioned, along with a comparison with the architectural design concept discussed in the project analysis, as well as feedback from the judging committee and critics, and some public reactions. The results are as follows:

Firstly: Functional Case Study Evaluation:

The evaluation of the following components is divided into two categories: intangible assets, tangible assets. Below are the functional evaluation results:

Social Interaction: In terms of intangible assets, the project achieved 8 out of 10 points, and in terms of tangible assets, the project achieved 3 out of 5 points.

Uses and Activities: In terms of intangible assets, the project achieved 6 out of 9 points, and in terms of tangible assets, the project achieved 3 out of 5 points.

Accessibility: In terms of intangible assets, the project achieved 5 out of 7 points, and in terms of tangible assets, the project achieved 3 out of 5 points.

Comfort and General View: In terms of intangible assets, the project achieved 6 out of 9 points, and in terms of tangible assets, the project achieved 2 out of 4 points.

Secondly: Color Design Evaluation:

Different parts of the project used colors according to similar design activities but in different ways. Below are the results of the color design evaluation:

Play Area (Red Square): The choice and use of warm colors, including shades of red, purple, and violet, received an excellent evaluation for their ability to stimulate and increase positive energy and courage in users.

Urban Living Room (Black Square): The choice and use of neutral colors, including shades of white, black, and gray, were evaluated positively for their ability to instill calmness, focus, and stability in users.

Grass Park (Green Area): The choice and use of natural elements and green hues, complemented by white, received a very good evaluation for their ability to provide relaxation, purity, refreshment, and renewal to users.

4-2- Second Case Study:

The redevelopment project of Nicholson Street Mall has been selected (Figure 14). We can approach this case study through an analytical method that follows a



Figure (14): Nicholson Street Mall
Source: <http://www.hassellstudio.com/en/>

sequence of documentation, analysis, and evaluation.

a- Monitoring and Documentation - Project Definition:

Documentation of the case study (Nicholson Street Mall)

We rely on documenting the case study (Nicholson Street Mall) on a set of important points, including:

1- Case Study Definition:

Nicholson Street Mall is located in the center of Victoria, Australia.

Architect: Hassell Studio

Year: 2008

The project involves revitalizing the cultural and commercial heart of the Footscray sector. It was initiated by a competition from urban revitalization authorities in Victoria in 2004, won by the mentioned architect. Implementation was completed in 2008. [11]

2- Boundaries and Dimensions:

Nicholson Street Mall is located in the center of the Footscray area in Victoria, which represents one of the oldest residential urban areas in the city.

Architecturally, the project is bounded by two main streets to the north and south, and surrounded to the east and west by commercial shops, cultural venues, and libraries. Architecturally, the project extends 120 meters longitudinally and ranges from 15 to 20 meters in width, with a total area of approximately 1900 square meters.

3- Function and Use:

Functionally, the project focuses on revitalizing the residential heart of the study area to serve as a combined urban commercial and cultural center, contributing to the city's economic development and creating job opportunities for local residents. Thus, the project can serve the surrounding civil society in meeting their commercial and cultural needs. [12]

This enhances the culture and social interaction of the project's surrounding population.

4- Design Methodology (Design Concept):

The design concept of the project revolves around a unique and sensitive reinterpretation of the central urban void. This is a clear example of landscape architecture's ability to directly benefit the local community by enhancing and activating urban spaces.

Hence, there was a need to use colors in the design, as the use of color greatly helped in distinguishing movement areas from seating and rest areas.

5- Key Features of the Project:

We can identify the key features of the project in the second case study if we take into account the clear color intervention by the designer, which formed the most important element in the design process by defining and categorizing the functions of various project areas. The following are presentations of project elements and design components:

Pedestrian and shopper pathways.



Figure (16): Some activities and uses of the project." Source: <http://www.hassellstudio.com/en/>

Paving pathways in front of commercial shops.

Seating and rest areas.

Green spaces.

b- Project Analysis _ Case Study:

In analyzing this project, we must take into account the elements and axes of the aforementioned analysis. Hence comes the analysis of the second case study within the framework of two important axes:

1- Design Aspect:

The design of the project is characterized by a strip of yellow color drawn on the project floor along the street's length, gathering custom-designed benches that reflect the shapes of the strip's angles (Figure 13), and other urban elements, where trees were introduced whenever possible. They were arranged in close groups accommodating social activities, cultural events, markets, and gatherings. Contrasting floors were also used to distinguish between spaces and enhance the visual language. Healthy large trees ensure continuous shade in shopping centers. The street was also left as open sky space as much as possible to increase solar exposure in winter.



Figure (15): Project Features and Design Principles Source: <http://www.hassellstudio.com/en/>

2- Functional Aspect

The primary function of the project is to provide a cultural-commercial center within the residential neighborhoods of Footscray, as part of the urban development envisioned by Victoria's relevant authorities (Figures 17, 16).

It is evident that each element and component of the project plays a crucial role in achieving this goal or

fulfilling its intended function. Below are some design elements of the project along with their functions and the color scheme used by the designer for each element:

Pedestrian Pathways: Dark gray color has been used in pedestrian pathways to facilitate movement.

Frontage Paving: Light gray color has been used to distinguish them from pedestrian pathways.

Temporary Rest Areas: Yellow flooring has been used for identification, complemented by green elements representing plantings and trees.



Figure (17): layout illustrating design lines and available spaces for activities

Source: <http://www.hassellstudio.com/en/>

c- Evaluation of the Second Case Study:

1- Evaluation of the Case Study in Terms of Color Design:

The evaluation is conducted by referring to the proposed table for assessing colors in urban spaces based on the desired functional activities. In this case study, the evaluation should follow the same analytical method in terms of dividing the project into its key elements and components. Below is a presentation of these elements:

Yellow Areas (Rest and Seating)

In this area, the designer used bright shades of light and dark yellow on the flooring. Referring back to the mentioned table, the common psychological effects of these colors include optimism, intimacy, warmth, and brightness. However, the common negative psychological effects are fragility and anxiety.

Light Gray Pathways (Frontage Areas)

Neutral colors such as white and gray were used in the frontage areas in front of the commercial shops. Referring to the table, the positive psychological effects include calmness, purity, stability, and focus, while the negative psychological effect is solitude and stagnation.

Dark Gray Areas (Pedestrian Walkways)

These walkways feature dark gray flooring complemented by green elements like trees and plants. Referring to the table, the positive psychological effects of dark gray are endurance, stability, and expertise; and

green signifies relaxation, balance, and purity. The negative psychological effects are boredom and weariness

2- Summary of the Evaluation of the Second Case Study:

The summary reflects the results of the systematic evaluation approach previously mentioned. This includes comparing the design concept by the architect discussed in the project analysis, alongside feedback from the judging committee, critics, and public responses. The results are as follows:

Firstly: Functional Evaluation Results of the Case Study:

The evaluation of the following attributes is divided into two sections: intangible and tangible assets. The functional evaluation results are as follows:

Social Interaction: Regarding intangible assets, the project scored 5 out of 8 points; for tangible assets, it scored 2 out of 5 points.

Uses and Activities: Regarding intangible assets, the project scored 5 out of 9 points; for tangible assets, it scored a full 4 out of 4 points.

Accessibility: Regarding intangible assets, the project scored 5 out of 7 points; for tangible assets, it scored 4 out of 5 points.

Comfort and Overall View: Regarding intangible assets, the project scored 5 out of 9 points; for tangible assets, it scored 3 out of 4 points.

Secondly: Results of Color Design Evaluation:

Different sections of the project addressed similar activities in terms of color design in varying ways. The results of the color design evaluation for each are as follows:

Yellow Areas: The designer used bright shades of light and dark yellow, fostering intimacy and optimism among users, making it a good choice but not the best.

Light Gray Pathways: Neutral colors like white and gray were used, promoting focus and calmness, making it a very good choice for that function.

Dark Gray Areas: These areas feature dark gray flooring with green elements, promoting clarity, focus, and balance, making it also a very good choice.

4-3 Comparative Analysis:

4-3-1 Functional evaluation of case studies:

This assessment is conducted using the evaluation system established by the "Project for Public Spaces" organization (Table 4).

Table (4): Functional evaluation of case studies according to the 'Project for Public Spaces' system

Source: Adapted by the researcher through <http://www.pps.org/>, https://journals.ekb.eg/article/289998_ac26a2442c09192761d6a6b545f60559.pdf, Mehta, V. "Evaluating Public Space" in Urban Design and Planning.

		The first case study				
Components	Intangible items	Achieve	not achieve	Tangible Elements	Achieve	not achieve
Sociability	Welcome	•		Street liveliness	•	
	Interaction	•		Evening use		•
	Friendliness	•				
	Feeling proud	•		Volunteer work	•	
	Neighborhood cooperation	•		social networks		•
	Hospitality	•				
	Diversity	•		The presence of different groups and ages	•	
Uses and Activities	Continuity		•	traffic movement		•
	Degree of proximity	•				
	Connection	•		Division method	•	
	Ease of handling	•				
	Possibility of walking around	•		Transportation	•	
	Keeping up		•	Pedestrian activities	•	
Access and Linkage	Access	•		Waiting places		•
	Fun	•		Local business		•
	Activity	•				
	Vitality	•		Floor shaping	•	
	nature	•				
	Excellence	•		Real estate value rate	•	
	Benefit	•				
	Common sense		•	Rental rate	•	
	Possibility of celebration		•			
	Sustainability		•	Market sales		•
Comfort and Image	Safety	•		The fight against crime	•	
	cleanliness		•			
	Greenery	•		Health system		•
	Wandering around	•				
	Sitability	•		Condition of buildings		•
	Spirituality		•			
	Sedition	•				
	Attraction	•		Environmental surroundings	•	
	History		•			
			The second case study			
Components	Intangible items	Achieve	not achieve	Tangible Elements		
Sociability	Welcome	•		Street liveliness	•	
	Interaction	•		Evening use	•	
	Friendliness	•				

	Feeling proud	•	Volunteer work	•	
	Neighborhood cooperation	•	social networks	•	
	Hospitality	•	The presence of different groups and ages	•	
	Diversity	•			
Uses and Activities	Continuity	•	traffic movement	•	
	Degree of proximity	•			
	Connection	•	Division method	•	
	Ease of handling	•			
	Possibility of walking around	•	Transportation	•	
	Keeping up	•	Pedestrian activities	•	
	Access	•	Waiting places	•	
Access and Linkage	Fun	•	Local business	•	
	Activity	•			
	Vitality	•	Floor shaping	•	
	nature	•			
	Excellence	•	Real estate value rate	•	
	Benefit	•			
	Common sense	•	Rental rate	•	
	Possibility of celebration	•			
	Sustainability	•	Market sales	•	
Comfort and Image	Safety	•	The fight against crime	•	
	cleanliness	•			
		Greenery	•	Health system	•
	Wandering around	•			
	Sitability	•	Condition of buildings	•	
	Spirituality	•			
	Sedition	•			
	Attraction	•	Environmental surroundings	•	
	History	•			

4-3-2 Comparison of Key Features:

It has become clear that the evaluated cases exhibited many positive aspects. Through (Table 5,6), a comparison will be made between them in terms of their key features and how functional efficiency is achieved.

Table (5): Comparison of Key Features of the Case Studies, Source: Adapted by the Researcher



The key features of the case study

Superkilen Park is located in the Nørrebro area of Copenhagen, Denmark.

Nicholson Street Mall is located in the center of Victoria, Australia.

Location and total area	Copenhagen, Denmark. The total area: 30,000 square meters	Victoria, Australia. The total area: 1900 square meters
The general surroundings and the architectural boundaries of the project	The northern and southern boundaries consist of main streets in the Nørrebro area. The eastern boundary is a covered sports hall, extending into a residential area, while the western boundary is a residential area.	The northern and southern boundaries consist of main streets in the Footscray area. The eastern and western boundaries are commercial areas with cultural clubs and libraries.
Primary function (activity)	An urban park for the surrounding residents, featuring dynamic and static play areas and a relaxation zone.	A cultural and recreational shopping center (shopping, strolling, waiting, and relaxation).
Distinctive design features of the case study	Straight and curved lines with contour hills made of natural grass	1-Straight lines at different angles. 2-Creating a preparatory space for the commercial area by shaping the flooring in the same design style. 3- Placing seating units at the design angles.
The colors used and their physiological effects	1-Red and purple: activity, strength, and excitement 2- White and gray: calmness, focus, and stability. 3- Green: comfort, balance, and purity.	1-Yellow: warmth and optimism. 2-Shades of gray: calmness, focus, and stability. 3-Green: comfort, balance, and purity.

4-5-3 Comparison of Case Evaluations:

Table (6): Comparison of Case Study Evaluations.
Source: Compiled by the researcher

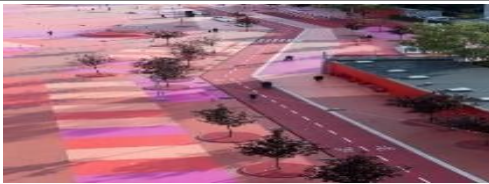

					
First aspect of the evaluation (Functional Efficiency)		Superkilen Park is located in the Nørrebro area of Copenhagen, Denmark.		Nicholson Street Mall is located in the center of Victoria, Australia.	
Sociability	Achieve	eight points	8/8	eight points	5/8
	not achieve	five points	3/5	five points	2/5
Uses and Activities	Achieve	nine points	6/9	nine points	5/9
	not achieve	five points	3/5	five points	5/5
Access and Linkage	Achieve	seven points	5/7	seven points	5/7
	not achieve	five points	3/5	five points	4/5
Comfort and	Achieve	nine points	6/9	nine points	5/9
	not	four points	2/4	four points	3/4

Image	achieve	
The second aspect of the evaluation (Psychology of colors)		
The results of the positive and negative effects of colors used in design on the functional efficiency of the space, along with comparisons based on activity.	1- Using shades of red and purple is excellent for the play area.	1- Using yellow is good for relaxation and seating areas.
	2- Using shades of gray with white is good for the urban living area.	2- Using shades of gray and white is very good for the shopfront preparatory area.
	3- Using shades of green with white is very good for the grassy park area.	3- Using shades of green and dark gray is very good for pedestrian walkways.

5- Results and Recommendations:

5.1 Results:

5.1.1 Theoretical Study Results:

- Colors can make buildings and urban areas more attractive and beautiful, creating a comfortable and welcoming environment for residents and visitors.
- Colors can influence people's emotions and behaviors. For example, vibrant colors like blue and green can create a sense of calm and comfort, while warm colors like red and orange can stimulate energy and activity.
- Colors can be used to guide people and organize spaces.
- Colors can be used to enhance safety in public places. For instance, bright colors can be used to identify hazardous areas or distinguish essential elements such as emergency exits.
- Colors can reflect the cultural and local identity of a community. Using colors inspired by local heritage can enhance a sense of belonging.
- Using different colors can help distinguish various spaces in design, making it easier to differentiate between different areas and enhancing clarity in planning.
- Smart use of colors in urban design can create a more attractive, comfortable, and safe urban environment, enhancing users' experience of different spaces.

5.1.2 Applied Study Results:

- The proposed evaluation methodology was applied to two case studies to identify key positive aspects, as well as areas of improvement that can enhance efficiency and be utilized in similar situations within the contemporary Egyptian context.

- Different design approaches to the use of colors were identified through the analysis of case studies that reflect the international community.

- Identifying international, regional, and local organizations that contribute to and promote the value of color designs as an essential part of the integrated design process.

- There is significant importance to color design and the science of color psychology as evidenced by evaluating various projects and their impact on the functional efficiency of those projects' activities.

- Analyzing the color design of case studies reveals the influence of design on different urban cultures and communities, as well as the stability of certain color impressions and designs.

- Through analyzing case studies, the ease of expression through color designs and their effective positive impact on project function is evident.

- A comparison was made between the case studies and analyzed in detail to extract points of agreement and similarity, which can be utilized in practical applications or in further research in this field.

- The evaluation methodology consists of two main parts, each containing several points through which the researcher evaluates the case studies. Conclusions are then drawn from this evaluation.

Part One: Assessing the Functional Efficiency of the Urban Space:

In this part of the methodology, the urban space is evaluated in terms of functional efficiency through an assessment system developed by a global organization called Project for Public Spaces (P.P.S). This organization acts as a key partner for the European Union in developing and improving the performance of urban spaces worldwide. The assessment system consists of four main components represented by a set of criteria and points that should be present in the urban space. The

four main components are: Sociability-Uses and Activities-Access and Linkage-Comfort and Image

Part Two: Evaluation of Color Psychology:

In this part of the methodology, the colors used in different urban spaces are evaluated from a psychological perspective, assessing their impact on the functional efficiency of the elements and components of these spaces, taking into account the varying uses and activities from one space to another. Many researchers in the field of color have studied the psychological and physiological effects of each known color on humans.

Methodology of Analysis:

The purpose of the analysis methodology is to present case studies within an organized scientific framework that facilitates deriving insights from those cases. Therefore, the analytical approach followed to achieve comparative analysis can be outlined in the following steps:

Documentation: This stage involves defining and documenting the case study through several key factors such as function, activity, dimensions, and components of the urban space, as a model for application.

Analysis: At this stage, the researcher analyzes the case study focusing on critical points that facilitate the evaluation process.

Evaluation: In this stage, the researcher evaluates the case studies within the scope of the proposed evaluation methodology mentioned earlier.

Comparison: This stage involves analyzing the evaluation results of the case studies and comparing them with each other to deduce significant positive and negative points. This process helps improve the performance and design efficiency of the urban space.

5.2 Recommendations:

5.2.1 Recommendations for Architects and Designers:

- It is essential to experiment with various color structures suitable for different activities in urban spaces to enhance their functional efficiency.
- Color design should be an integral part of the design process in designing public urban spaces with various functions.
- It is important to adhere to Egyptian and international codes in urban space design, contributing to the activation of color design roles and color use.
- Recommendation to consider different cultures and communities in the use of colors, which affects urban color design from one community to another and from one culture to another.

5.2.2 Recommendations for Relevant Authorities and Decision Makers:

- There is an utmost necessity to activate and enable a guidance and evaluative system for color designs in urban spaces that align with the culture, customs, and traditions of the community.
- Emphasize the importance of monitoring the implementation of approved designs that follow Egyptian and international codes on the ground to showcase color designs in urban spaces in the best light, contributing to highlighting the role of color designs in urban spaces.
- Emphasize the importance of supporting researchers, designers, and specialists in the field of design, especially color design, by providing opportunities to apply experimental projects on existing urban spaces as a practical means to monitor positive and negative results, aiding in the development of this field.

6- References:

Journal Articles:

- [1] B. M. Böhringer & S. Schindler, "Color in Urban Design: Psychological and Environmental Impacts." *Journal of Urban Planning and Development*, 2022.
- [2] L. M. Lee & T. Chang, "The Role of Color in Enhancing Public Spaces: A Review of Recent Research." *Landscape and Urban Planning*, 2021.

Books and Book Chapters:

- [1] B. F. Birren, "Color and Human Response." New York, NY: Van Nostrand Reinhold, 3rd ed., 2004.
- [2] B. G. Brino, "Colour in Turin," 3rd ed., 1996.
- [3] M. V. Mehta, "Evaluating Public Space" in *Urban Design and Planning*, 2014.
- [4] P. T. Porter, "Colour Outside," *Architectural Press*, 5th ed., 2002.
- [5] R. R. Re-Thinking The Future, "Use of Colour in Architecture and Urban Design," 2023. Retrieved from www.re-thinkingthefuture.com.

Thesis:

- [1] A. I. Alawadi, "Color Design in Urban Spaces." Master's Thesis, Cairo University, Faculty of Engineering, Department of Architecture, 2016.

Websites:

- [1] <http://www.big.dk> , last search ,5-2023
- [2] <http://www.cjolliffe.com> , last search ,8-2023
- [3] <http://www.hassellstudio.com> , search ,5-2023
- [4] <http://www.landezine.com> , last search ,5-2023