The Impact Of 3d Public Art on Improving Visual Image and Identity of Urban Spaces

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ABSTRACT

Urban spaces are where history is narrated, values and norms are expressed, and people are interconnected; therefore, the quality of the urban spaces influences city dwellers' quality of life. This study is concerned with the quality of the urban space. It investigates the impact of 3D public art on the visual image and meaning of spaces by analyzing three primary parameters: Environmental, Formal, and Compositional Characteristics of 3D public art. A theoretical framework is formulated based on best practices and a literature review illustrating 3D public art design guidelines in urban spaces. Tahrir Square was selected to evaluate the old and new landmarks (3D public art) installed before and after the latest development project in 2020. A survey was conducted to gather data to implement the guidelines. The results indicate that the new 3D public art design improved the space visual image, attracted more users at nighttime, and fulfilled most of the design criteria.

تأثير الفن العام ثلاثى الابعاد فى تحسين الصورة البصرية وهوية الفراغات العمرانية

ملخص البحث

تمثل الفراغات العمرانية مكاناً يعكس تاريخ وثقافة وقيم المجتمعات، بالإضافة إلى زيادة التفاعل الاجتماعى، لذلك فإن جودة الفراغات العمرانية تؤثر على جودة حياة الأفراد. ومن ثم اهتم البحث بجودة الفراغات العمرانية من خلال دراسة تأثير ومساهمة الفن العام ثلاثى الأبعاد فى تحسين وتجديد الصورة البصرية وهوية الفراغات العمرانية. يهدف البحث إلى صياغة إطار مقترح للإرشادات العامة للفن ثلاثى الأبعاد من أجل تحسين جودة الصورة البصرية للفراغات العمرانية، ينقسم الإطار إلى ثلاثة معايير رئيسية: البيئية والتصميمية والتشكيلية للفن العام ثلاثى الأبعاد. تم صياغة الإطار المقترح من خلال الدراسات النظرية ومراجعة الأدبيات لمجال الفن العام ثلاثى الأبعاد وعلاقته بالتصميم العمرانى والفراغات العمرانية بالأخص، بالإضافة إلى دراسة مجموعة من التجارب العالمية لأهمية وتأثير الفن العام ثلاثى الأبعاد فى تحسين وتجديد جودة الصورة البصرية للفراغات العمرانية. ثم تم إختبار وتطبيق الإطار المقترح على ميدان التحرير من خلال عمل تقييم وتحليل مقارن بين الفن العام ثلاثى الأبعاد بميدان التحرير قبل وبعد مشروع التطوير لعام ٢٠٢٠، حيث تم تجميع البيانات والمعلومات بالإعتماد على المراجع والتقارير السابقة والزيارة الميدانية لميدان التحرير. ومن ثم تم إثبات صلاحية تطبيق الإطار المقترح، حيث أوضحت نتائج الدراسة التطبيقية أن تصميم الفن العام ثلاثى الأبعاد الجديد ساهم فى تحسين وتجديد الصورة البصرية لميدان التحرير، بالإضافة إلى توافر أغلب المعايير البيئية والتصميمية والتشكيلية المقترحة بالإطار فى الفن العام ثلاثى الأبعاد الجديد عن القديم بميدان التحرير.

INTRODUCTION

Urban spaces are considered one of the most significant places that provide an opportunity to create and enjoy social interaction. The efficiency of designing public urban spaces and the diversity of urban landscape elements positively affect urban life and the city's visual image quality. Contemporary global urban design concepts stress the importance of high-quality landscape elements and public art to reflect the character and significance of urban areas and create a connection with the local community. Public art is one of the urban space components that significantly impact how users preserve the place. It is an expression of art that is an innate human trait. At the beginning history of humanity, humans have been interacting with art, "art has always been one of the leading actors of the city-building process"(Mazzucotelli, 2011), that support innovation and diversity. Public art refers to works of art that have been designed and performed with the specific intention of being positioned and located in the physical public domain, and accessible to all (Davari, 2014; Kwon, 2002; Association for public art, 2021; Walsh, 2015; Januchta-Szostak, 2010; Zebracki, Van Der Vaart, & Van Aalst, 2010; Carrington, 2004; Miles, 1997; Rendell, 2006). Public art has the power to transform the space into an attractive avenue by reflecting the meaning of place, strengthening the identity and historical background, and enhancing the sense of place (Karimimoshaver, Eris, Aram, & Mosavi, 2021). Creative public art can increase imageability, educate audiences, support cultural and social trends, and create new dimensions. Nonetheless, if poorly designed and miss located, public art can destroy the meaning and the experience of the urban space, discouraging users from using the space and even promoting vandalism to express rejection and despise. Another correlation between art and urban design is mentioned by Marshall 2005, as shown in Fig 1., who refocuses on the art of urban design and the potential for artistic aspects to play a more definitive role in the future of urban design theory and practice. He suggested that fine art is one of the urban design inputs in addition to social and technical parameters (Marshall, 2005).
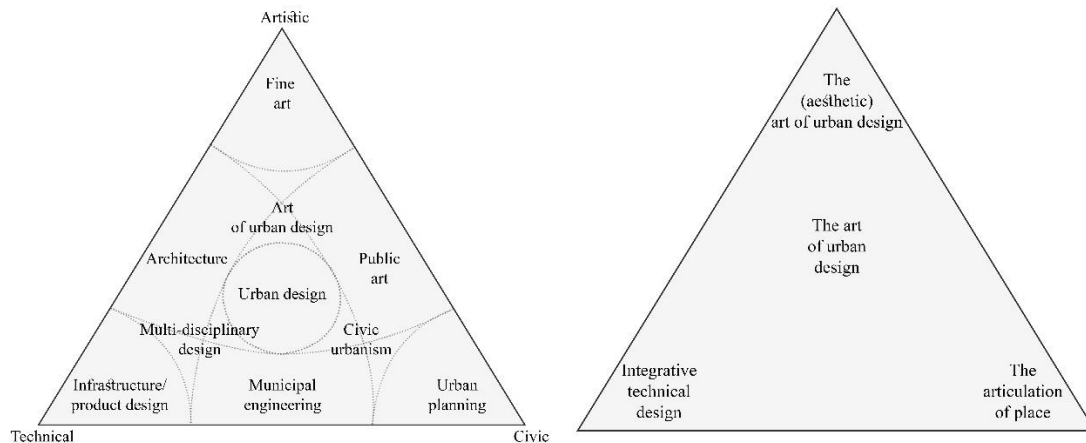

Fig 1. Public Art is a part of urban design
Source: (Marshall, 2015: 9)

Public art played an essential role in Egyptian cities over the county's ample history as urban spaces witnessed the introduction of public art since the early ages (pharaonic era) as seen in Fig 2. Luxor's Sphinxes Avenue "The Rams Road" and during the Greek, Roman, Coptic, Islamic, Mohamed Ali, etc., as shown in Fig 3. "The Alexandria Naval Unknown Soldier Memorial".

Fig 2. Luxor's Sphinxes Avenue "The Rams Road:"
Source: (Wikimedia.org, 2007)

Fig 3. The Alexandria Naval Unknown Soldier Memorial.
Source: (Wikipedia.org, 2012).

Nevertheless, Cairo city endorsed the renaissance of public art in the "Mohamed Ali era" while building the khedival Cairo figure. Spaces inspired by Paris were created in the khedival new district, and prominent leaders were commemorated adding a special flavor to Cairo's main spaces, as shown in Fig (4-5).

Fig 4. Opera Square (Statue of Ibrahim Pasha)
Source: (Hawass, S. Z., 2002)

Fig 5. Street scene at Soliman Pasha Square Cairo, Egypt 1937
Source: (Raafat, 1999).

Nowadays, Egyptian cities' reservoir of open spaces is depleting. The urban sprawl devoured most of the open spaces. Furthermore, poor attention and amateurish interventions decreased the quality of surviving spaces and public art within, altering the city's visual image. Additionally, another dilemma in new spaces is the incompletable public art, either aesthetically or semantically, where newly added public art lacks identity/ character and relation to the urban space composition figure. The artworks don't add meaning/ value to the urban spaces or assist in distinguishing and recognizing figures, as shown in Fig (6-7-8-9-10-11), The preceding leads to the goal of this study which seeks to provide guidelines for 3D public art in urban spaces, to improve and preserve the identity and visual image of the Egyptian urban space.

Fig 6. 'ugly' Nefertiti statue in El Minya

Fig 7. Naked Man Statue in the Masr Ismailia Road

Fig 8. Mermaid Statue in Safaga

Fig 9. Green Ahmed Orabi Statue in El Zagazig

Fig 10. Abdelwahab Nutella Statue in the bab el sha3reya

Fig 11. Refa3a El Tahtawy Statue in Sohag

Source: (ElSaady, 2016)

To achieve the paper goal, as shown in Fig 12, main concepts are tackled concerning public art and its relation to urban spaces. By analyzing some international case studies demonstrating the role of 3D public art in improving the visual image of urban spaces in the city, the study suggests guidelines for 3D public art in urban spaces.

1. METHODOLOGY

THEORETICAL BACKGROUND	URBAN SPACES	PUBLIC ART	INTERNATIONAL CASE STUDIES
	Identify the definition of the urban spaces	- Identifying definition of public art. - Studying types of public art and identifying the type of research which focuses on **(3D Public Art).** - Determining forms of 3D Public art.	Analyzing Case Studies concerned with the role of 3D public art in improving the visual image of the urban spaces and the city

Significance of public art in improving of urban space's visual image

The Proposed Guidelines of 3D Public Art in Urban Spaces.

Research Method

Applied Study: Tahrir Square, Cairo City **and Results**

Discussion and Conclusion

Fig 12. Research methodology
Source: Researcher

2. URBAN SPACES

Generally, there are numerous definitions of urban space. Many scholars described the urban space from different perspectives. The physical approach states that urban spaces are open to the public and defined by the physical boundaries as buildings and furniture therein. Urban spaces may be streets, squares, parks, playgrounds, public malls, etc. Thus, the urban space is defined as a set of free and open access to the various public (Sablet., 1991; Sitte, 1901; Lynch, 1960). While the social approach states that urban spaces embrace active or passive social behavior. It is where people from all classes, ethnicity, gender, and age, intermingle and are subject to general regulations that govern the use of the space (Madanipour, 1996; Mehta, 2013; Gaventa, 2006). Moreover (Walzer, 1986) declared that urban spaces gather strangers, relatives, friends, or work associates. They are spaces for politics, religion, commerce, sport, peaceful coexistence, and impersonal encounters. They provide a link between previous and subsequent generations. From a cultural and perception perceptive, they are spaces that express public life and culture, which helps create a sincere emotional experience delivered by color, art, forms, touch, and smell.

3. SIGNIFICANCE OF "PUBLIC ART" IN URBAN SPACES

Public art impacts five community values, aesthetical aspects, economic growth, cultural identity/attachment, physical, mental health/belonging, and social cohesion, which expresses its importance in the city, as shown in Table (1).

Table (1). The impact of public art on urban space.

Aesthetic influence	- Improving the visual image of the city. - Enriching physical environments and bringing streetscapes, plazas, town buildings, and schools to life. - Developing unique identities for urban spaces. - Increasing quality of urban spaces.
Economic growth	- Supporting cultural tourism and economic development strategies. - Enlivening places where people work, which can improve employee morale and productivity. - Boosting local economies, restaurants, hotels, and transportation companies benefit from a site that attracts visitors. - Increasing land values. - Providing professional opportunities for artists and cultivating an environment in which the creative class thrives.
Cultural identity and Attachment	- Connecting citizens to the neighbors, sharing the history, and making cultural heritage a tangible community asset. - Providing an intersection between past, present, and future. - Enhancing meaning in spaces and adding uniqueness to communities. - Reflecting and revealing societies, developing urban identity; proportionate to customs, traditions, and urbanism. - Developing a sense of place.
Physical, Mental health, and Belonging	- Building social cohesion creates a positive environment, which in return supports both physical health and mental well-being of the community. - Public artworks can address negative stigma issues towards another culture or group. - Located in healing spaces such as hospitals, public art improves healthcare and the healing process.

	- Addressing stigmas toward those mental health issues by using particular colors and shapes. - By engaging in public artwork development, individuals become aware of others and their role in their community. - Public art addresses public health and personal illness by reducing stress, providing a sense of belonging.
Social cohesion	- Providing a visual mechanism for understanding other cultures and perspectives and reinforcing social connectivity with others. - Supports urban engagement, building social capital, and encouraging civil discourse. - Activating the imagination through visual art and storytelling to emphasize the shared humanity of urban spaces.

Source: (Americans for the Arts, 2018; Hall & Robertson, 2006; Walsh, 2015; Lynch, 1972; Mazzucotelli, 2011; Selwood, 1995).

4. PUBLIC ART

In the 1960s, the notion of' public art' emerged as an alternative to gallery art. Gradually, public art became an opportunity to express society's current issues and communicate with its exposition places and its users. In the 1970s and 1980s, public art intersected with performance art, conceptual art, installation art, land art, process art, community-based art, and site-specific art. urban furniture, lighting, multimedia, graffiti, and even commercial art supported and completed the space (Januchta-Szostak, 2010; Kwon, 2002; Association for Public Art, 2021; Walsh, 2015; Miles, 1997; Rendell, 2006). Regarding the form of public art, there are four types; (Edmonton Arts Council, 2009; Davari, 2014; Halim, 2008).

- Performing arts: music, dance, or theatrical performances' happening art'.
- Three-dimensional arts: sculpture, environmental art, installation art, etc.
- Two-dimensional arts: outdoor paintings including graffiti and mural art, etc.
- Non-visual arts: sound art or aromatic art, etc.

The paper focuses on 3D public art and its impact on forming the space visual image.

4.1 Forms of 3D Public Art in Urban Spaces

The 3D public art placed in urban space can be categorized into urban sculpture, water features, monuments, decorative clocks, and installations, as shown in Table (2).

Table (2). Forms of 3D public art in urban spaces

Types of 3D public art	
Urban Sculpture	Statues, kinetic works, electronic works, light works, abstract works, aesthetic works; formed from any material that provides the type of durability required for the project Statue of Piazza de Campidoglio. Abstract lighted sculpture by Patrick Rimoux.

Fountains or water features	The movement of water in an urban environment is valuable, and it is an indispensable component of site coordination. It gives a sense of simulating nature. Trevi Fountain in Rome – Italy Artistic Fountain for the Hague Central Railway Station
Monuments	A monument is an edifice that is not built for utilitarianism but to commemorate something important such as monumental arch, City Gateways, Temporary Monumental arch, Obelisks, Monumental columns, and Monumental Bandstands. Victor Arch in Paris Obelisk of King Ramses II Place de la Concorde in Paris-France
Decorative clocks	The decorative clocks are eye-catching; they are not only functional elements but also one of the most important aesthetic elements, as well as it gives a particular character. The decorative clock in the middle of Najma Square, Beirut Clock tower or Zytglogge, Bern, Switzerland
Installations	Installations are part of the site furniture as light facilities, kiosks of various types, bus shelters, public conveniences, and shades. Metro rail station in Paris at the Montmartre. A typical example of French Art Nouveau. Artistic Installations Make Public Squares A Lot More Fun

Source: (Project for Public Spaces, 2010; Sabouri, Yousefi, & Yousefi, 2015; Moughtin, Oc, & Tiesdell, 1995; Adshead, 1912; Sitte, 1901)

5. PUBLIC ART IN INTERNATIONAL URBAN SPACES

5.1 Cyryla Ratajskiego Square in Poznan, Poland

Cyryla Ratajskiego Square "Plac Cyryla Ratajskiego" is located in the center of Poznań, west of the medieval part of the city, it is one of the heritage conservation areas. Traffic is organized like a roundabout. A double-track tram line runs through the center of the square. Cyryl Ratajskiego Square is one of the largest centers of socialist realist architecture in Poznań. Previously the space contained scattered 3D public artworks in the green area, with no meaning or direction. In 2012 a 'statement piece' - a large fountain was placed in the space. The 9-meter-tall glass, metal, and LED geometric structure has water flowing down its two wing-like elements and underneath a small wooden footpath. Placing the 3D public art added a new spirit, renewed and improved the visual image of the space, identified the urban space, and gave it its own identity, as shown in Fig 13. As for locating the artwork parameters such as cultural, functional, social, architectural, aesthetic, exposition, and compositional values were considered (Januchta-Szostak, 2010).

Before   **After**

Fig 13. The change in C. Ratajskiego Square in Poznan after localizing a sculpture accompanied by water forms
Source: (Google Maps, n.d.; Januchta-Szostak, 2010: 98).

5.2 Fuman County, Iran.

Fuman County is one of the most important and historical coastal cities in northern Iran. The history of this city dates back to the pre-Islamic age. The city is named "City of sculptures", this titular is due to different sculptures scattered around the city. The 26 sculptures represent symbols of the city's past. (Sabouri, Yousefi, & Yousefi, 2015) as

shown in Fig 14. A study by (Moradi, 2007) analyzed and evaluated ten urban sculptures in the city by a questionnaire and used the design criteria including identity, structure, and meaning. Identity comprised distinct, independent existence, integrity, and independence of field—structure tackled color, shape, scale, form, and materials. While meaning addressed functional aspects, usefulness, identifiability, and integration, as shown in Fig 15. The obtained results from the questionnaire showed a positive correlation between sculptures fulfilling design criteria and high ranks of satisfaction and acceptance.

Fig 14. Fuman County urban sculptures
Source: (Sabouri, Yousefi, & Yousefi, 2015).
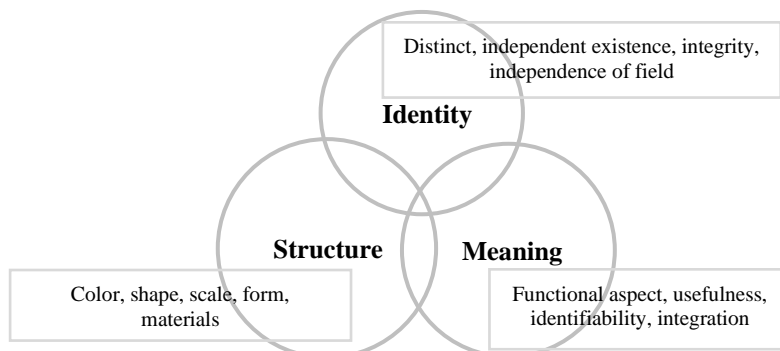
Fig 15. The design criteria to evaluate urban sculptures
Source: (Moradi, 2007).

6. GUIDELINES OF 3D-PUBLIC ART IN URBAN SPACES
The relationship between public art and its impact on the image of the urban space has been the concern of many researchers and organizations such as (Project for Public Spaces, 2008; Toronto Urban Design, 2010; Moughtin, Oc, & Tiesdell, 1995; Lynch, 1960; Helmy, 2005; Wong, 1991; Wong, 1987; Zucker, 1970; Collins, Collins, & Sitte,

1986; Sitte, 1901; Lauer & Pentak, 2011; Ching, 1979). The work of previous scholars was analyzed, assembled, and assorted in the form of guidelines governing the placement/ design /meaning of 3D public art in urban spaces. The guidelines are divided into three parts: environmental, formal, and compositional characteristics, as shown in Fig 16.
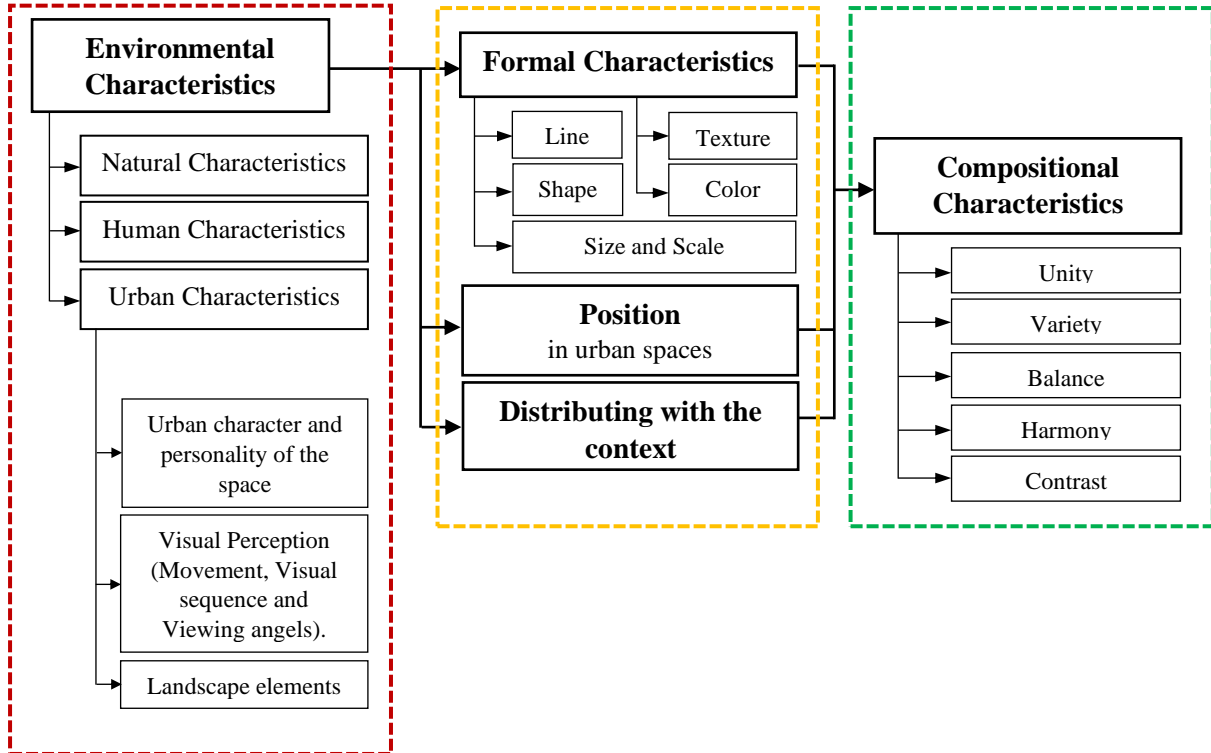

Fig 16. Formulated guidelines of 3D public art in urban spaces.
Source: Researcher after (Project for Public Spaces, 2008; Toronto Urban Design, 2010; Lynch, 1971; Moughtin, Oc, & Tiesdell, 1995; Zucker, 1970; Collins, Collins, & Sitte, 1986; Sitte, 1901; Shehata, 1998; Wong, 1991; Wong, 1987; Lauer & Pentak, 2011; Ching, 1979).
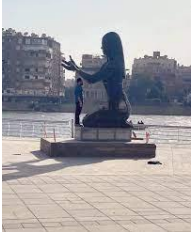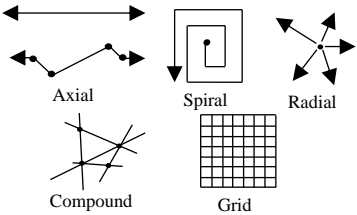
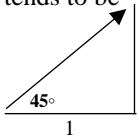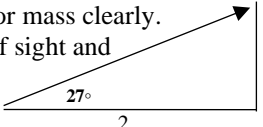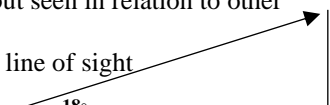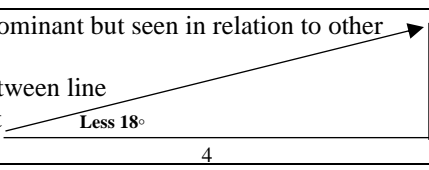## 6.1 Environmental Characteristics

The 3D public art is affected by the surrounding environment, whether natural or human, as shown in Table (3). (Project for Public Spaces, 2008; Shehata, 1998; Lynch, 1960; Helmy, 2005; Januchta-Szostak, 2010; Sabouri, Yousefi, & Yousefi, 2015; Ching, 1979).

Table (3). Environmental characteristics

Environmental characteristics			L. review	Case studies
Natural	The natural environment, including climatic and geographical characteristics, has a great impact on the 3D public art			
	Climatic conditions	It impacts the use of materials to coexist with different weather factors.		
	Light	It has a great impact on the formation of 3D public art, as it impacts certain proportions of prominence on the surface.		

	The geography of the earth	It has an impact on the status of the artwork, which provides it with an appropriate, safe, platform in addition landform can integrate with the design		
Meaning	\multicolumn{2}{c}{Analysis of people's manner under the cultural framework is accounted as the center of gravity in designing 3D public art in urban spaces. The society with its history and beliefs somehow imposes on the artist to express the community culture and perceptions. In designing 3D public art following factors are to be considered:}		
	1	The 3D public art represents value for locals and relevance to the city		
	2	Recalling past experiences and memories of the urban space		
	3	Represent a symbolic, cultural, historical, and spiritual aspect (Intriguing)		
	4	Expressing the past space events, history meaning or function		
	5	Consistent with social norms		

Urban Characteristics

The 3D public art is directly affected by the space (I) character and personality (II) Movement, Visual sequence, and Viewing angles (III) Landscape elements.

1	**Urban character and Personality of the space**

3D Public art may match the façade character as shown in Street Getreidegasse in Salzburg, Austria, which is approaching a classic theme.

3D Public Art might be contrary and add a new version as shown in South Molton Street by using modern street furniture in a classic theme

Homogeneous elements in Getreidegasse street in Salzburg, Austria.

A new benches, planters, and flags along South Molton Street.

Urban space may impose the artwork direction if the space has a clear personality, such as if it witnessed a famous battle, demonstration, birth, death of politicians, religious, or artistic symbols, as shown in Chinatown, England, London.

Urban space may not have an evident personality and doesn't carry any special memory such as squares in new cities, as shown in Seed Sculpture, East Manchester. Which gives more freedom in designing the artwork

Chinatown, England, London

The Seed Sculpture, East Manchester's regeneration zone.

2	**Visual Perception (Movement, Visual sequence, and Viewing angles and light)**

Among the factors determining the location, scale, and proportions of the 3D public art within the space and aiding in perceiving it is the speed of movement, the visual sequence, and the viewing angle.

Speed	Pedestrian Movement	Low speed: user has plenty of time to perceive the 3D public art, which means the 3D public art can be placed on a human scale or less with details, as shown in Statue "Mamsha Ahl Masr".

Bicycle Movement	Medium speed: 3D public art can be placed on a human scale but couldn't be perceived on a more minor scale.	
Motoring Movement	High speed: 3D public art needs to be perceived at a huge scale, as shown in Place de l'Étoile, Paris.	
Artificial light	3D public art should be visible at night without glare	

Statue "Mamsha Ahl Masr", Cairo's Nile Corniche, 2021   Place de l'Étoile is a large road junction in Paris

Visual Sequence			
	The visual sequence includes the sense of movement and vision, changing the scenes and the visual image from one point to another, as shown in types of paths of visual sequence.		
	Axial Path	It leads the user to the target visually in a straight linear path, as shown in Les Champs-Elysées and la place de la Concorde.	
	Diagonal Path	The time of visual sequence increases, it adds new dimensions to the interface.	
	Spiral Path	A continuous path that starts from a central point and revolves around it. It allows seeing the 3D public art from all sides.	
	Radial Path	These paths start from a central point, as shown in Piazza del Popolo.	
	Organic Path	It allows seeing the 3D public art in points and disappearing at others, which causes a suspense factor.	
	Grid Path	It doubles the visual vision in different directions.	
	Compound Path	It consists of parts of intersecting paths in random directions that connect visual targets in space. This type is used when more than one 3D public art is placed.	

Types of paths of visual sequence   Les Champs-Elysées and la place de la Concorde   Piazza del Popolo

Viewing Angles			
	Viewing Angles 45°	3D Public art is challenging to see as a whole but tends to be analyzed in detail. 1:1 The proportion between the line of sight and the height of 3D public art.	
	Viewing Angles 27°	3D Public art can be seen as a whole or mass clearly. 1:2 The proportion between the line of sight and the height of 3D public art.	
	Viewing Angles 18°	3D Public art is still dominant but seen in relation to other objects. 1:3 The proportion between the line of sight and the height of 3D public art.	

					L. review	Case studies
	Viewing Angles less than 18°	3D Public art is still dominant but seen in relation to other objects 1:4 The proportion between line of sight and the height of 3D public art.				
3	**Landscape elements**					
	Consider using landscape elements to highlight 3D Public Art.					
	Landscape elements may be hemogenic with artwork, as shown in seats in Schouwburgplein, Rotterdam.					
	Consider decreasing the visual distortion between landscape elements and 3D public art.					
	Consider adopting lighting to highlight the 3D public art at night, as shown in illuminating the fountain of Piazza Navona.					
	Seats in Schouwburgplein, Rotterdam compatible with the artistic formation of the square's floor		Lighting at Piazza Navona.			

Source: (Project for Public Spaces, 2008; Lynch, 1960; Shehata, 1998; Helmy, 2005; Januchta-Szostak, 2010; Sabouri, Yousefi, & Yousefi, 2015; Ching, 1979).
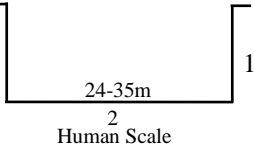
6.2 Formal Characteristics

The formal characteristics are the tools used by the artist /designer to create 3D public art, as shown in Table (4). (Wong, 1991; Moughtin, Oc, & Tiesdell, 1995; Shehata,1998; Wong, 1987; Ching, 1979).

Table (4). Formal characteristics

Formal characteristics					L. review	Case studies
Line	The line expresses the message that the 3D public art sends, when converting forms to their basic lines, this helps understand the visual composition.					
	Horizontal line	Refers to static, comfort, continuity, and calm	**Curved line**	This reflects continuity, comfort, and relaxation		
	Vertical line	Refers to alertness, action, activity, and strength, as shown in the Eiffel Tower, Paris.	**Broken line**	Indicates feelings of anxiety and violence, as shown in the Denver art museum.		
	Horizontal and vertical line	Indicates a sense of balance, stillness, and equilibrium.	**Intersected line**	Gives focus of vision at the point of intersection		
	Diagonal line	This reflects dynamism, movement, and instability				

Eiffel Tower, Paris

Denver Art Museum

Shape	Analyzing the constituent shapes of artwork helps perceive the visual composition.			
	Squares and Rectangles	Discipline, strength, courage, security, reliability, trust, authority, as shown in Victor Arch in Paris.	**Curves**	Flexibility, Adaptability, Compliance
	Triangles (up pointing)	Excitement, balance, stability, as shown in 3D public art in Louvre Museum, Paris.	**Pentagons, Hexagons, and Octagons**	Unique feel, Hexagons: unity, balance
	Triangles (down-pointing)	Instability, Provide direction	**Spirals**	Growth, creativity a fresh mind, calmness, intelligence
	Circles, ovals, and ellipses	Eternity, universe, magic, Mystery.	**Natural shapes**	Originality, organic balance, refreshment
	Rhombus	Vibrant, contemporary	**Abstract shapes**	the duality of meaning uniqueness, elaborate.

Victor Arch in Paris

3D public art in Louvre Museum, Paris

Size and Scale	Size and proportions play a significant role in 3D public art, not only in its formation but also in connotations highlighting some sensory and symbolic aspects. The size of 3D public art becomes more powerful when it is suitable for the scale of urban spaces	
	Scales of 3D public art	**The proportion of urban spaces**
Macro Scale	3D public art that is on the level of the city as a whole and cannot be found in urban space but can be seen through the city.	- Form the mental image - Form visual impression of the city. - Express culture and personality - Affect the formation of the horizon line in the city.
	Guggenheim Museum, Spain	Silhouette of London
Monumental Scale	It is a large scale compared to the human scale, usually found in wide urban spaces or on the sides of wide roads (Monumental arch, city gateways, obelisks, temporary monumental arch, monumental columns, monumental Bandstands).	more than 100m $\frac{1}{4}$ Monumental Scale

Obelisk of King Ramses II Place de la Concorde in Paris-France

Human Scale	This level includes all kinds of public art at the human scale; they are the most used and found in urban spaces (fountains, urban sculptures, abstract art sculptures, utilitarian street equipment). Trevi Fountain in Rome - Italy	24-35m 1 2 Human Scale

Large sizes indicate prestige, control, and strength, as shown in Arc de Triomphe in Place de la Star

Small sizes indicate a sense of human scale, as shown in Trains to Life. Trains to Death

Arc de Triomphe in Place de la Star   Trains to Life. Trains to Death

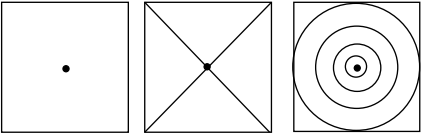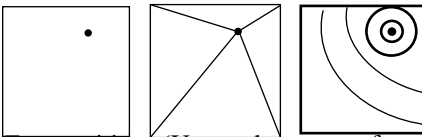| Color	One of the essential elements that should be used with caution when designing 3D public art is color, as it has a fundamental effect and can by is self-send a strong message.	
	Warm Colors	Red, Yellow, and Orange colors seek to attract attention and evoke happiness, optimism, and energy, as shown in a bus shelter prototype design.
	Cool Colors	The use of colors such as Blue, Green, Purple seeks to generate calmness smoothness to express sadness, health, beauty, and security.
	Neutral Colors	Pure and complex colors such as Black, White, Grey, Beige Brown are used as neutrals in the design, as shown in Obelisk of King Ramses II Place de la Concorde in Paris-France.

		L. review	Case studies
	Bus Shelter Prototype Design Competition Obelisk of King Ramses II Place de la Concorde in Paris-France		
Texture	Texture in 3D public art can be perceived through touch (physical texture) and sight (visual texture).		
	The texture affects the recipient; it can match the place's personality, as shown in the Fountain of Piazza Navona, Rome. Or it gives a new spirit to the space as shown in new benches along South Molton Street, London.		
	Fountain of Piazza Navona, Rome. New benches along South Molton Street, London.		

Source: (Wong, 1991; Moughtin, Oc, & Tiesdell, 1995; Shehata,1998; Wong, 1987; Januchta-Szostak, 2010; Sabouri, Yousefi, & Yousefi, 2015Ching, 1979).

6.3 Position of 3D Public Art in Urban Spaces
The 3D public art would be placed in either a free position or a geometric position, as in Table (5).

Table (5). Positions of 3D public art in urban spaces.

Positions		L. review	Case studies
Geometric Position	Depending on the space's geometric characteristics, the 3D public art would be placed on the point where it will be most exposed. As shown in Place Vendôme, Paris. Geometric positions (Equal exposure from all sides) Place Vendôme, Paris		
Free Position	Another option is to place the 3D public art away from the middle to facilitate movement and natural flow; in addition, it gives different exposure levels, as shown in Place Des Terreaux, France. Free positions (Unequal exposure from all sides) Place Des Terreaux, France.		
Urban spaces can be categorized based on their geometry and enclosure - Closed space: A well-defined space with walls and a high enclosure. - Dominated Space: A space with a dominant building as a church. - Linked Space: A space linked with another space.			

	- Nuclear Space: A space is formed as a result of the presence of large and controlled fixed elements. - Amorphous Space: A space having no definite form.			
Positions in different types of urban spaces	**Closed Space**	For a closed space with a simple geometric formation and semi-plane horizontal line, the 3D public art can be placed on the geometrical or a free position. The Placa Rieal in Barcelona		
	Dominated Space	In a space with a dominating building, the 3D Public art should be placed on the other three sides of the space, or placed in the center of the space St. Peter's Square in Rome		
	Linked Space	In linked spaces, 3D Public art is placed flexibly at many points. Saint Mark's Square in Venice		
	Nuclear Space	In nuclear space, 3D Public art is the main and dominant element. Piazza Santi Giovanni I Paolo in Venice		
	Amorphous Space	In an amorphous space, there are no constants that control the positions of 3D public art. It is better to place more than once in the space. Trafalgar Square in the center of the English capital.		

Source: (Collins, Collins, & Sitte, 1986; Zucker, 1970; Sitte, 1901; Ching, 1979).

6.4 The distribution of 3D Public Art with The Context

The distribution of 3D public art with the context has 5 ways, as in Table (6).

Table (6). The distribution of 3D public art with the context.

The distribution of 3D public art with the context	L. review	Case studies
1 3D Public Art is an "Independent" or "Standalone" element. "Between the Eyes", Richard Deacon – World Trade Centre Saad Zaaloul, Cairo		
2 The 3D Public Art is "Integrated" into a built form or flooring. "Leaf Garden", Barbara Steinman – Opera Place Clock tower or Zytglogge, Bern, Switzerland		
3 The 3D Public Art is a "Gate Way" to a site or marks the "Entryway". The Gateway Arch--St. Louis, Missouri El-Kebash Entryway, Luxor, Egypt.		
4 The 3D Public Art as part of "Streetscape" improvements. "The Dance", Robert Sprachman – North York Civic Centre (median) Outdoor parametric furniture		

5	3D Public Art that comprises or is part of the "Landscape Design".		
	Crown Fountain in Chicago Flatiron Skyline is situated next to Madison Square Park in New York		

Source: (Project for Public Spaces, 2010; Toronto Urban Design, 2010)

6.5 Compositional Characteristics

Formal characteristics, the position of 3D public art in urban spaces, and the distribution of 3D public art with the context have a significant role in demonstrating the compositional characteristics to achieve aesthetic and artistic values, as shown in Table (7). (Gad, 1980; Wong, 1991; Wong, 1987; Ching, 1979).

Table (7). Compositional characteristics (Aesthetic and artistic values).

Compositional characteristics		L. review	Case studies
Unity	It is the visual linking of various elements of urban space.		
	It is created by using proximity, repetition, continuous, and rhythm.		
	Plaça Rieal, Barcelona		
Balance	Urban designers and artists combine elements to establish equilibrium and stability inside spaces.		
	The square of the Great Mosque The square of St. Peter		
Variety	It is concerned with diversity and contrast.		
	It is achieved by using different colors, sizes, and shapes.		
	Urban designers and artists seek to balance the variety and unity.		

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	Plaza de las Tendillas, Spain		
Harmony	It is the visually satisfying effect of combining similar elements: similar lines, adjacent colors, texture, or size.		
	It helps bring unity.		
	360-degree view of Trafalgar Square (A) National Gallery, (B) 8. St Martin's Pl, (C) Golden Cross House, (D) Nelson's column, (E) Canada House		
Contrast	The contrast in designing 3D public art refers to how different artwork is from the surroundings, yet it completes a cohesive scene.		
	Contrast is created when two elements are total opposites.		
	It can be achieved with lines (classic – contemporary) / colors (white – black) / size (small – large).		
	To work successfully, it must be strong and prominent.		
	Louvre Museum with Louvre Pyramid		

Source: (Gad, 1980; Wong, 1991; Wong, 1987; Ching, 1979).

7. RESEARCH METHODS

This paper aims to formulate a theoretical paradigm that can be used to evaluate the quality of 3D public art in urban spaces. The theoretical background is concluded with the most prominent design guides for 3D public art. The following section will implement the previous guidelines to public art placed in Tahrir square in Cairo city to compare the space design before refurbishment and adding the artwork (before 2020) and after the project was completed. Environmental, formal, and compositional characteristics are used to evaluate the extent to which the new landmark impacts the visual image of the urban space.

Tahrir square was selected due to its importance as a significant node in the downtown district, as in Fig 17. The square is the entrance of khedival Cairo and is a transportation hub (car parking – metro – bus station). It hosts prominent uses such as the Tahrir administration building (Mogamaa), AUC, Tahrir underground parking, mixed-use, a hotel, the headquarters of the League of Arab States, the old palace of the Egyptian Ministry of Foreign Affairs, and the Egyptian museum. In addition to Tahrir square's association with the revolution and its symbolic representation of freedom, as it witnessed many protests against the rolling regimes in 1919, 1935, 1977, and 2011.

The 3D public art is an ancient obelisk placed in the space in 2020 during the refurbishing project. A site survey was conducted, and photos were taken from different angles in addition to referring to second-hand data represented in reports and old photos of the space

Fig 17. Tahrir square layout, Egypt (Google Maps, n.d.).

8. APPLIED STUDY: TAHRIR SQUARE, CAIRO CITY.

Tahrir Square is the largest space in Cairo city; it was constructed in 1865 with a French-style and named Ismailia Square relative to Khedive Ismail, then was officially changed to Tahrir Square in 1952, as in Fig 18 (Cairo Governorate Electronic Gate, 2021).

1865	1900	1907
1919	1941	1963
1980	2015	2021
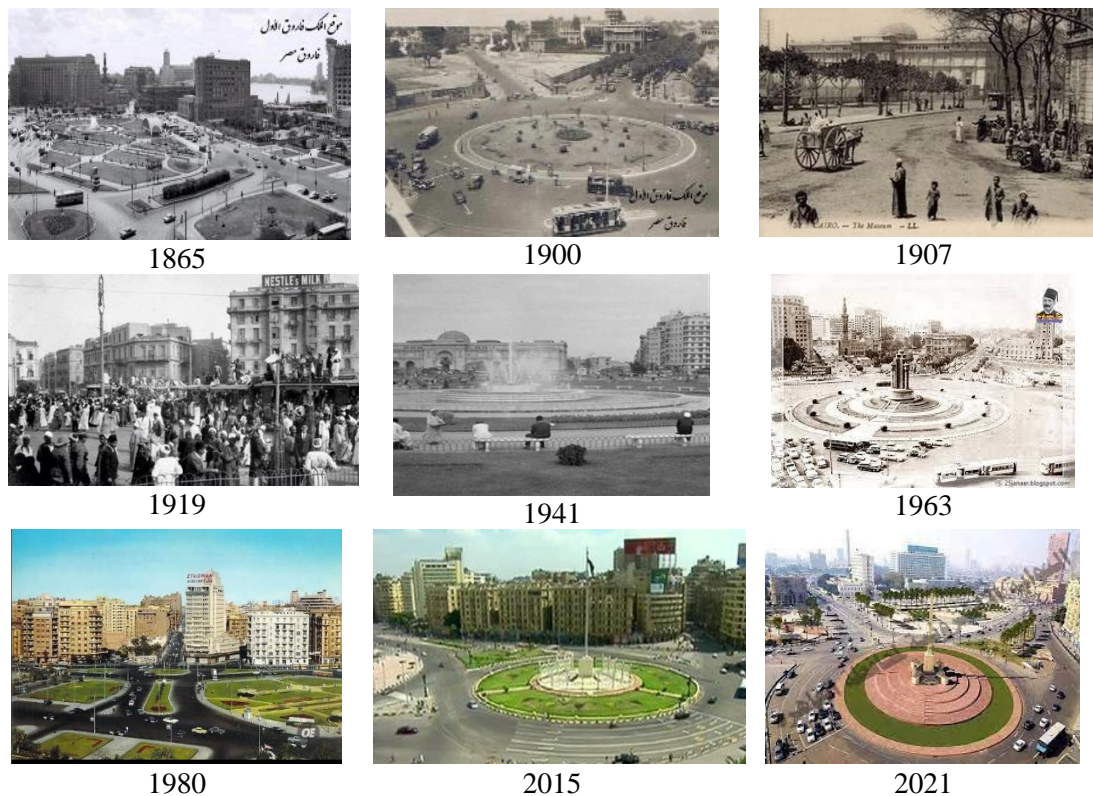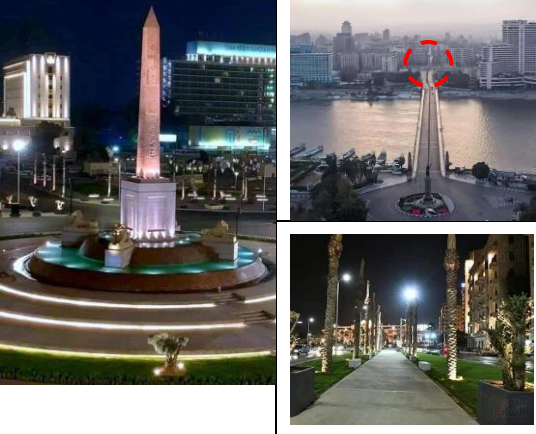
Fig 18. Tahrir square's design transformation
Source: (Cairo Governorate Electronic Gate, 2021; Skynewsarabia, 2020; Al Sayyad, 2012)

Many features changed in Tahrir square, which distorted its identity. In 2020, Tahrir square witnessed a colossal development project to restore its value, function, and visual identity. The roundabout expressed the country's ancient history, showcasing a pharaonic obelisk transformed from San El Hager /El Sharqia, four rams transformed from Karnak Templet / Luxor, a water fountain, and lighting features, as in Table (8).

The paper will implement the proposed guidelines to public art placed in Tahrir square in Cairo city to compare the space design before refurbishment and adding the artwork (before 2020) and after the project was completed.

Table (8). The change in Tahrir Square in Egypt before and after 2018
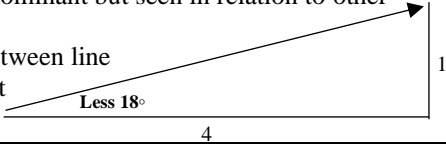
Before	After
The space composition: - The roundabout comprises a green area and a platform for a flag (height 20 m). - A deteriorated space at the administration building (mogamaa el Tahrir) - Unused space on the surface of the underground parking lot. - Street Island is covered with lawn area and hardscape - Large billboards on the building facades	The space composition : - The round abound hosts four steps with a granite obelisk of King Ramses II (height 19m, weights 100 ton) engraved in holographic and four rams and a water fountain - Tree planters (olive trees)and palm trees are added to the space above the underground parking - Plam trees, pedestrian concrete paths, lawn, and concrete seats are added to street islands - The space in front of the administration building (mogamea el Tahrir) and the space preceding the mosque was redesigned by adding palm trees, lawn areas, pedestrian paths, and seating areas. - Vulgare billboards were removed and replaced with appropriate signage.
The change in Tahrir Square in Egypt before and after 2018	
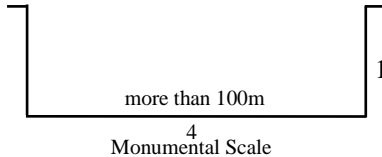
Source: (Cairo Governorate Electronic Gate, 2021; Skynewsarabia, 2020)

8.1 Results

A comparison was conducted between the space before and after adding the artwork and landscape elements to extract the impact of the new landmark on the visual image of the space, as in Table (9).

Table (9). Applied proposed guidelines of 3D public art on Tahrir Square.

			Environmental characteristics	Before	After
Climate			Materials coexist with different weather factors.	×	√
			An appropriate, safe, platform	√	√
Human Ch.	1		The artwork represents value for locals, relevant to the city	√	√
	2		Recalling past experiences and memories of the urban space	×	√
	3		Intriguing	×	√
	4		Recalling past experiences and memories of the community	√	√
	5		Expressing the space past events, history meaning or function	√	×
	6		Symbolic, cultural, historical, and spiritual aspects in urban spaces	√	√
Urban Characteristics	1		**Urban character and Personality of the space**		
			3D Public art matches the facades and site furniture style	√	×
			3D Public art contrast the facades and site furniture style	×	√
			Urban space personality impacts the 3D concept or design	√	×
	2		**Visual Perception (Movement, Visual sequence, and Viewing angles)**		
		Speed of	Perception of the concept compatible with type and speed of movement	√	√
			Perception of details compatible with type and speed of movement	√	×
			Exposure from distance and at night	×	√
		V. S.	Visual Paths — The artwork is placed in the center of the roundabout with Radial paths which allow decent exposure to the 3D public art.	√	√
		Viewing	Viewing Angles less than 18° — 3D Public art is still dominant but seen in relation to other objects 1:4 The proportion between line of sight and the height of 3D public art. Less 18°	√	√
	3		**Landscape elements**		
			Consider the design of landscape elements to highlight 3D Public Art.	×	√
			Landscape elements may be hemogenic with artwork	√	×
			Decreasing the visual distortion between landscape elements and 3D public art.	×	√
			Considering the design of special lighting to highlight 3D public art at night.	×	√

			Formal characteristics	Before	After
Line	**Vertical line**		Refers to alertness, action, activity, and strength.	√	√
	Horizontal line		Refers to static, comfort, continuity, and calm	×	√
	Horizontal and vertical line		Indicates a sense of balance, stillness, and equilibrium.	×	√
	Diagonal line		This reflects dynamism, movement, and instability	×	√

Shape	**Triangles (up pointing)**	Excitement, balance, stability		×	√
	Shapes of artwork help perceive visual composition.				

Size and Scale		**Scales of 3D public art**	**The proportion of urban spaces**		
	Monumental Scale	Since Tahrir Square is a memorial square, public art must fit with the dimensions of space	Tahrir Square is a monumental scale. Its width is more than 100m more than 100m 4 Monumental Scale 1	×	√

Color	**Warm Colors**	Red, yellow, Orange. To attract attention, evoke feelings of happiness, optimism, and energy.	×	√
	Cool Colors	Blue, Green, Purple. To calm and smooth, express sadness, health, beauty, and security.	×	√
	Neutral Colors	Black, White, Grey, Brown. They are strong, pure, and complex colors and are used as neutrals in the design.	√	√

Texture	Texture in 3D public art can be perceived through touch (physical texture) and through sight (visual texture).	×	√
	The texture matches the personality of the place.	√	×
	The texture gives a new spirit to the space	×	√

Positions			Before	After
Geometric Position	The 3D public art is placed at the point where it will be most exposed.		√	√
Types of spaces	**Amorphous Space**	There are no constants that control the positions of 3D public art; each space has its own case.	√	√

The distribution of 3D public art with the context		Before	After
1	3D Public Art is an "Independent" or "Standalone" element.	√	√

Compositional characteristics		Before	After
Unity	It is the visual linking of various elements of urban space.	×	×
Balance	The feeling of equilibrium and stability inside the space	×	√
Variety	Diversity and contrast.	×	√
	Different colors, sizes, and shapes.	×	√
	Balance variety and unity.	×	×
Harmony	Combining similar elements, whether they are similar lines, adjacent colors, texture, or size.	×	×

Source: Researcher

9. DISCUSSION

This study analyzed the impact of placing a new ٣D artwork in one of Cairo city's most prominent urban spaces (Tahrir square). The absence of identity and personality for the square and visual distortion caused by many billboards catalyzed a development project in 2020. The project included adding ancient artwork in the center of the roundabout; the obelisk indicates eternity and ambition, and the four pharaonic rams express strength. New seats, planters with trees and palm trees, green areas, pedestrian paths, and a completely new illumination system were added to compliment the new landmark. Furthermore, building facades were repainted, and new signages were added to regulate the random ones. The refurbishment generated more pedestrian movement, and the lighting added a new horizon to the space attracting users at night to enjoy the ambiance. The concept of placing a historical piece in a public place in khedival Cairo raised turmoil. A party supporting the idea that Egyptian obelisks are placed worldwide in cities' urban spaces, for example, Place de la Concorde in Paris and Lateran Plaza and Montckiitori Plaza in Rome. In addition, the landmark represents a significant era in the history of the country and connects Cairo Museum with the space. As for the modern landscape, it expresses the modernity of the country.

10. CONCLUSION

The study results indicate that the placement of the new 3D public art positively impacted the visual image of Tahrir square with the assistance of the new landscape features. By analyzing the environmental characteristics of both artworks before (flag) and after the development project (obelisk / 4 rams), the new 3D public art is more appropriate in withstanding materials and represents an important era in the county's history. The location is seen as a vista from four streets, which increases the exposure. The new landscape elements contradicted in style with the 3D art; nevertheless, adding pedestrian paths, lighting, a water fountain, and setting areas created more exposure and visual attraction compared to the flag that was not visible from a distance.

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