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Planning and designing open spaces for the waterfront of Shatt Al-Arab corniche area in Basra governorate

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Abstract--This study was directed to one of the most distinguished areas in modern-day cities, which is the areas adjacent to rivers. Which reached the diagnosis and identification of problems according to a group of site analysis elements represented in functional and urban analysis, activities, movement paths, parking lots, analysis of structure indicators and indicators of the waterfront, and questionnaire data according to the harmonic derivation analysis system to determine the best briefing with the information required to be inserted into the design process, AutoCAD and 3DMax were used in the final output.

Keywords---waterfront, waterfront spaces, Corniche Shatt Al-Arab.

Introduction

Basra Governorate is unique in various Appearances on the surface because it contains many rivers and water gatherings, the most prominent of which is the Shatt Al-Arab, which is a major artery for the formation of the city and is part of the civilizational and cultural heritage of the population of the governorate (Al-Asadi, 2017). Rivers play a vital role in the recreational and environmental system and are active in the visual formation of the city in creating an exemplary environment that is safe, healthy and comfortable for the viewer (Kamel, 2018).

The waterfront: means the edge and boundaries of water in cities and capitals of all sizes (Breen and Rigby, 1994), and it is the point where the land meets the water body, which has distinctive characteristics that derive from the nature and type of the water element that overlooks it (Otto et al., 1997). These places are

suitable for recreational activities due to their visual and climatic capabilities, thus creating great opportunities to practice various sports, arts and cultural gatherings (Al-Badri, 2013).

The urban waterfront area is of vital importance to the modern urban formation, not only to improve the overall environmental quality of the city and increase the local urban taste and is part of the landscape that Shop architecture as a brick the basic for reconstruction contemporary with regards to many, across a range of disciplines, the landscape has become the lens through which the city is represented (Walheim, 2006).

The research of (Consulate and Debbana, 2018) stressed in the study on the development of the waterfront of the city of Lattakia in Syria the need to take into account a set of criteria to improve the quality of urban life in the city in terms of functional, planning and visual terms. The study also focused on rehabilitating axes and public spaces and ensuring their openness to the sea by finding recreational activities and distancing the car parks so that they are not close to the water and do not visually pollute the surroundings.

Waterfront edge components

The waterfront edge can be divided according to the physical components that it contains into several parts:

1. Sidewalks: The sidewalks are an opportunity to bring the community to the waterfront and transform low-used areas into high-use through good design, with the extension of the sidewalks to increase the area of the riverfront and deal with it at different levels, providing roofed river sessions and various visual scenes (Burden, 2000). The sidewalks must accommodate the movement of the pedestrians by increasing their width to accommodate larger numbers without affecting the installation of guide signs, lighting poles and others on their movement (Al-Asadi, 2020).
2. Slips: The water bodies inside the edge are called (cross gain connections). In modern designs, this part of the riverfront is dealt with by containing small kiosks, aquariums and children's playgrounds, and the presence of small parks, and sometimes they are gates to the water bank of the city (Burden, 2000).
3. Under Bridge: Bridges and their abutment that extend across the edge of the river usually constitute obstacles to the passage, so the area under the bridge must be designed to allow the spaces under the bridge for various uses along the river and link with the parts of the adjacent riverfront (Kamel, 2018). One of the most important points that must be addressed in the area under the bridge is to avoid dead corners when designing and sharp slopes that affect safety, as well as the importance of treating the roof area under the bridge to isolate the sound resulting from the vibrations resulting from the movement of cars (Casalino, 2005).
4. Green spaces represent the common factor along the waterfront and provide a unified identity for the interface. (Mohammed, 1986). The green color will be dominant in it, as the plants work to bring about some temperature adjustments by reducing the higher temperatures (Nasser, 2020).

5. Edge area: They are open spaces along the waterways and their edges, which are directly connected with the river, and their development encourages the access of the people to them (Al-Badri, 2013). It is a very important element in the formation of the urban water landscape, especially with regard to linking the spaces along the water landscape (Thamesweb, 2005).

Design criteria for waterfront spaces

Divided into functional, cosmetic or visual criteria and can be clarified as follows:

- 1- Functional criteria: It is a set of foundations that must exist in any outer space so that it can perform its function efficiently (Alwgeeh, 2000) and includes:

First: Physical criteria: These include general criteria of taking into account the site's topography, the nature of the soil and climate, providing an appropriate share of activities for the individual, and achieving communication between the elements of the space.

Second: Moral standards: they include achieving comfort, diversity, visual clarity, distinct personality and cultural traits.

- 2- Visual Standards: It is a set of foundations related to the visual or plastic aspect in the design of external spaces. The formation process is defined as the organization of elements within a governing framework of relationships and foundations determined by how these elements exist with each other (Nassar, 2001).

This dimension is considered very important in the design and coordination of any space, but it may cause many urban problems, as it is relied upon only without paying attention to the dimensions by taking into account the boundaries of space, the shape of the space, the scale or size, formative style and utilitarianism in space (Al-Asadi, 2020) (Faraj, 2005).

Design requirements for waterfront spaces

- 1- Regulatory requirements: It is the presence of a specific visual organizational axis in space that represents a symbolic trend that helps to unify and link a group of elements within a specific system by taking into account some of the requirements in the design, which are Continuity, Varied Repetition, and Proportionality: (2012, Romein) (2004, Dong).

- 2 - Performance requirements: include:

First: the requirements of the traffic function: It is the kinetic system of vehicle roads and pedestrian paths, as it works to divide and connect spaces and affects all levels of design and spatial use. This must create a level of clarity, correct orientation, and topographical treatments of the land to effectively shape the identity of the place and the nature of the feeling in it (Al-Haidari et al., 2002).

Second: The requirements for spatial orientation: and are defined in two main aspects: the first aspect enters into the human understanding of his location according to a mental representation within his presence in his surrounding space, which is the static aspect of space orientation (perception of the

presence), and the second aspect focuses on how to process information and mental images. It is the dynamic aspect of space routing, and it is possible to create a comprehensive concept of space routing that includes the first and second aspects in an advanced form (Al-Alwan, 2001).

- 3- **Dominance Requirements:** Hegemony is the element of emphasis and unity, which makes the group of elements linked to each other dominant within the overall composition, which helps to simplify the perceived image and helps to read all the aspects of the waterfront within the principle of similarity with the property of continuity (Moughtin, 1999). Through the creation of water spaces, it is through the concept of Monumentality within its constituent elements, such as sculptures, for example, or it may be achieved through a field of vision (Visual Scope) (Lynch, 1960).
- 4- **Aesthetic requirements:** This requirement depends on the principle of the relationship between the elements. A single element may not possess aesthetic energy except for its inclusion in a certain connection that links it to other elements. These relationships are subject to change over time (Spreiregen, 1981).
- 5- **Moral Requirements:** This type of requirement includes a set of values, namely:

First: **The mental image:** It is based on the visual perception of the physical structure in the spaces through the individual's recognition of the most prominent elements in the general composition of the external scene (Rapoport, 1977).

Second: **Identity:** It means diagnosing the body and distinguishing it as a separate entity, and it is perceived individually within the general framework as a whole. (Gospodini, 2009).

Third: **Affiliation:** It represents a sense of self-connection in a place, and that achieving belonging in a place necessarily means achieving two functions (direction and identity) (Schulz, 1971). Space, quality of scale, nature of activities, and a difference between skyline and ground levels (Ayman, 1996).

Fourth: **Symbolism:** It introduces the expressive meaning of a place that leaves an impression on the recipient so that it reflects a symbol and general expression and is achieved through the place's possession of the function and historical values (Lynch, 1994).

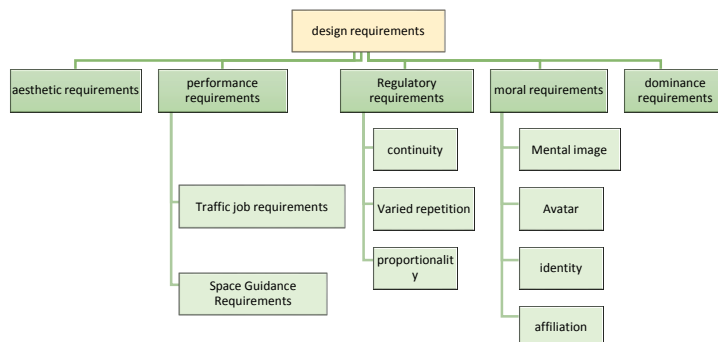


Figure (1) shows the design requirements

Study status

The Shatt Al-Arab Corniche is a unique linear urban park system with a length of 2.6 km parallel to the Shatt as an open space system. It is a major and important resource in the urban revitalization of the city and its urban facade, as it was opened in the year (1941) from Shatt al-Ashar to Shatt al-Khora (Barakat, 2013) and (Al-Ghareeb, 2012) and ends with the presidential palaces on the site of Park Al-Sarraaj previously.

Study site

The Shatt Al-Arab Corniche is located in the southeast of Basra Governorate with coordinates (773254.90 m E, 3379556.22 m N). It extends from the Al-Dakir area (772586.99 m E, 3380113.00 m N) to the presidential palaces (coordinates 774179.88 m E, 3377978.19 m N), represents a continuous waterfront of the Shatt al-Arab with a limit of 2600 m.



Figure (2) shows the location of the study within the base plan of Basra city

The limits of the study

The open spaces were chosen for the waterfronts overlooking the bank of the Shatt al-Arab path (Corniche), on the side of the city center, between the amusement park (Al-Ashar) to the presidential palaces and represented by No. (1) and (2) in the figure below, which have an area of 26,266 m² which is the applied model.

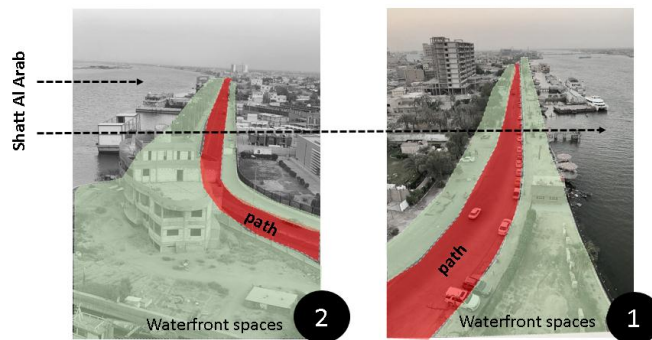


Figure (3) shows the study limits

Analysis of study site

The analysis included a set of monitored and captured content data, which is considered capital to achieve the extent of the future vision of the site, as follows:

1- Distinguished analysis of the place: It included:

- Configuration Optical: configuration optical at region weak very where that it no confer meaning formalism area nor there is design for this water spaces cross about it nor contains on determinants constructivism and aesthetics and region general nothing with structuring clear to distribute elements configuration constructivism congener and balance it with the movement in the area.
- Spaces area: The spaces were formed in different areas that do not fit the actual size for public use and the residential neighborhoods close to them, especially the river spaces in the Shatt al-Arab district. Different areas characterize them, and most of them are very few
- The high openness and the width of the beach give a visual significance and a cultural identity (the image of the city, the identity of the community).
- Mobility: the movement of people for hiking only by boats of one type along the shore.

2- Urban analysis:

- Confusion in land use In front of the Shatt al-Arab.
- Visual pollution resulting from urban sprawl on the waterfront (Casinos - Restaurants) and the consequent distortion of the landscape and blocking of vision and
- The lack of regulation of the berths and their quality.

3- Analysis of traffic and cars parking:

Traffic is very high Because the main street adjacent to the waterfront is considered a general traffic artery for communication between the two sides of the beach. There is also no car park for the place, but other parking spaces close to it, as it adopts the method of paving vehicles next to the sidewalk, which causes the public street to narrow and thus increases the congestion of the place with vehicles causes Noise and general disturbance.

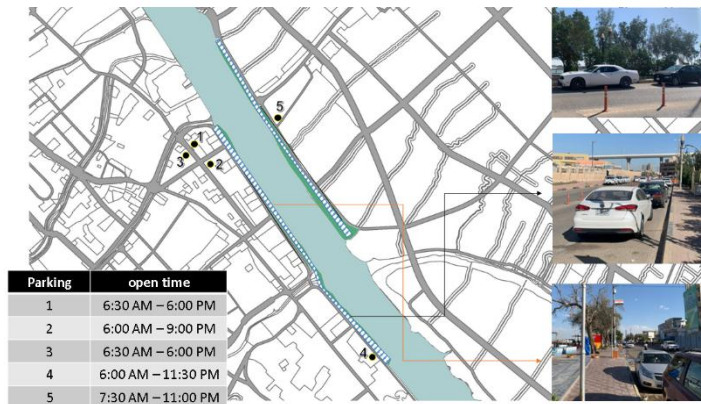


Figure 4 shows the analysis of car parks at the site

4- Analysis of the paths and arteries of movement:

- Part One: From the Central Bank to the Presidency of the University of Basra, as the Corniche roughly aligns with the width of the road and increases beyond the pedestrian sidewalk and does not take up more space with a small part of the few trees.
- The second part: is between the site of the presidency of the University of Basra and the Italian bridge. In this part, the sidewalk is not commensurate with the size of pedestrians and is somewhat narrow. Gradually widens until it reaches the bridge. The riverwalk has continuity in general without interruption, with a medium percentage of trees on the side, and in the middle of the motor path, there is a monument space.
- The third part: From the teaching hospital to the presidential palaces, it is characterized by narrow corridors and movement paths, and no zigzag walks are allowed on the river's edge.



Figure 5 shows the paths and arteries of movement on the site

5 - Analysis of Water interface:

Table No. (1) Shows the waterfront analysis indicators for the Shatt Al-Arab Corniche area

sequence	Indicator		Shatt Al-Arab frontage spaces
1	split facades		It is divided into administrative and commercial interfaces
2	modulation unit		There is a formation unit in the river axis
3	proportionality		The proportion is medium
4	continuity		strong
5	Performance requirements	Traffic requirements	The space is clear with the presence of river activity in it
		Orientation requirements	Guidance is available
6	dominance requirements		No functional or recreational activity highlights his identity
7	aesthetic requirements		It lacks aesthetic requirements
8	moral requirements		Its connection to the collective memory is like the Shatt Al-Arab space only, and the features of symbolism and belonging appear in a small way
formal relationships			
9	formal relationships		Lack of formal relationships (style – proportions)
visual relationships			
10	Building materials, texture and color		Lack of diversity in colors and building materials and the use of traditional building materials
11	Mass and void ratios		The existence of a deliberate rhythm between the blocks and the void
12	skyline		pretty clear
13	materials used		Old and unrenovated

2- Questionnaire form:

The questionnaire is one of the important means in the design studies because of the guarantee and clarity it achieves in answering the questions posed. It became the first tool by which information was collected and provided the researcher with the opportunity to check that information.

Design and preparation of the questionnaire form

A final model was reached after a complete analysis of the site and the relationships associated with it, and it was presented to specialists and those related to the field of study; they are:

- Prof. Dr Amjad Zaki Khalil- Department of Architecture - College of Engineering - University of Basra.
- Assist. Prof. Dr Raad Wahib Mahmoud - Department of Horticulture and Landscape Engineering - College of Agriculture - University of Diyala.
- Assist. Prof. Dr Areej Khairy Al-Rawi - Institute of Regional and Urban Planning - University of Baghdad.
- Assist. Prof. Dr Afaq Ibrahim Jumaa - Department of Forestry and Desertification - College of Agricultural Engineering Sciences - University of Baghdad.

The questionnaire form included a set of questions related to the assessment of reality and the future design vision for development as in appendix No. (1) The questionnaire form was randomly distributed to the site users during three time periods, the first on 09.01.2021 and the second on 04.02.2021, and the third period was on 03.08.2021, with a number of (873) forms, knowing that (91) were lost. A form and these results have been treated according to the harmonic derivation analysis, one of the most common and widely used measurement methods, especially in the field of investigation and the development of effective solutions "Osjid". Experts have recently developed it, and procedures have been put in place to suit it with the new scientific research premises. The sample members are asked to express their opinions towards possible solutions requiring specialists' collective participation. Or using the open spaces, and the answers within these levels determine the opinions of people that this histogram refers to; it goes towards the development of the attributes as follows:

very favorite	favorite	neutral	not preferred	very unfavorable
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The respondents put an (X) inside the box after receiving the question to provide the number that expresses their opinions, as follows:

1	2	3	4	5
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This number reflects the opinion or preference, and after completing the survey process, the researcher calculates the average of opinions. A mark is placed on the scale expressing the degree to which the direction of information is preferred. Then the results are compared and calculated according to the following mathematical formula:

The harmonic derivation equation =

$$(5 * \text{very favorite}) + (4 * \text{favorite}) + (3 * \text{neutral}) + (2 * \text{un favorite}) + (1 * \text{very un favorable})$$

Total number of questionnaire papers

(Al-Mosaed, 2000); (Al-Asadi, 2017).

Discussing the results of the questionnaire

- 1- Figure (6) shows the choice of most respondents to take all of the shapes mentioned above to make a good design according to their opinion. Then came the belief in activating regular shapes as a second belief for good design. At the same time, complex shapes and organic shapes an idea in the third and fourth degree, and the reason is different people's views of shapes, which requires choosing all of them without pre-determining the shape. At the same time, the regular shapes have high visual compatibility and harmony for all people. Harris (2007) points out the need to design the place beautifully by choosing the appropriate form with the detail in the building materials, considering that it is suitable for the site.

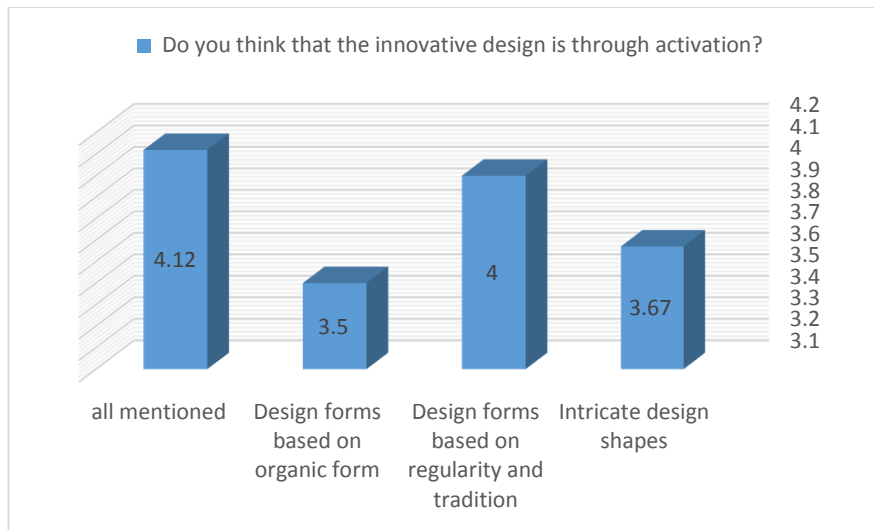


Figure)6(Activating the innovative design

- 2- From the results below in Figure (7), it appears that the indicators for choosing the significant change and the new design are close to the degree of evaluation and selection, as the belief in the big change as the first solution and the latest design as the second solution, and the reason is that both things lead to the emergence of a new, different reality for the place. Nik (1997) indicates that the change and the renewal must take place in a strong way represented by manipulating the distinctive characteristics of the place, the urban structure, the connected spaces, the streets, the desires of the people and the uses.

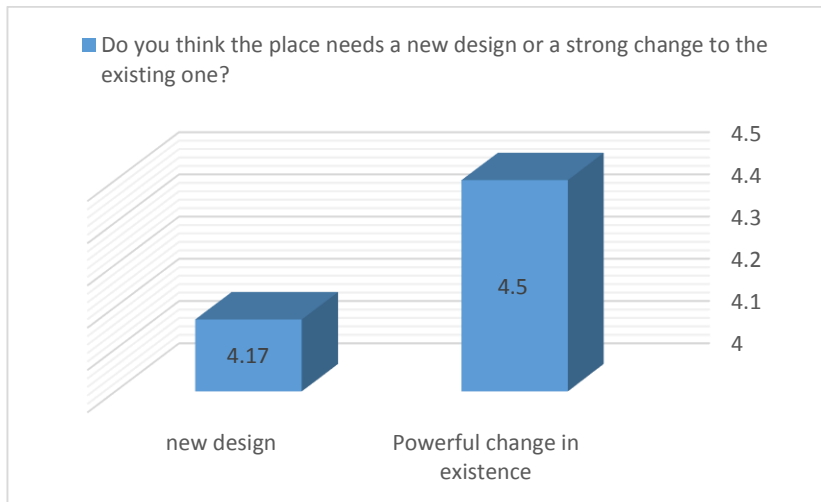


Figure (7): The place needs a new design or a strong change

3- The results show in Figure (8) that the facades of the buildings surrounding the site are considered the first problem to be addressed, followed by the green spaces and the site’s furniture, respectively. At the same time, the pollution of the place came to the last degree, and the reason is that some types of pollution are imperceptible in the place. Ayman (1996) showed a necessity to pay attention to the rivers' treatments and the environment because it is the source and the natural life artery that is evident in the region, which meets the various human requirements in life.

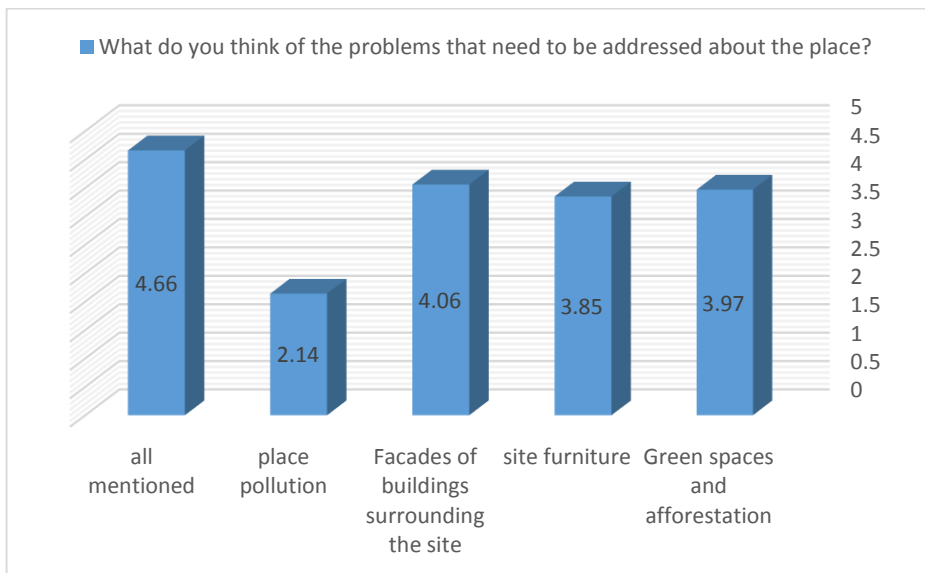


Figure (8) problems that must be addressed

4- It is clear from Figure (9) that the results are preferred in the presence of a design framework Unified came as a sweeter choice for indicative advertisements on the site, at a rate of (4.08), while the color option came as

a lower rank with a preference for consideration, while the shape and space got the lowest amount in the questionnaire by (1.91). The reason is that the indicative advertisements are more visible and prominent than others, so taking into account uniformity in the design is an important matter for it the shape and space because it is two elements that are not controlled and are subject to change.

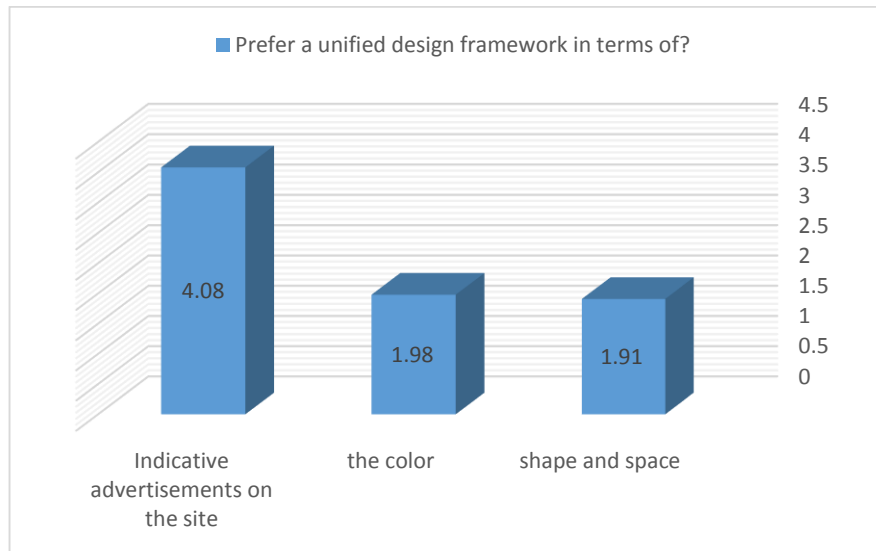


Figure (9) There is a unified design framework

5. It is clear from Figure (10) that the results required to make the design pattern expressive in the first place took the work of expressing the formal dimension only, as it obtained the highest amount of sites (4.06) While the design has to be expressive in terms of the functional dimension in the second degree. In the last degree, the expression for the design came from the environmental dimension with the least amount of (3.04). The form and function are directly related to the site's users and affect their feeling and acceptance of the place more than the environmental dimension. Nik (1997) believes that there should be consensus on the formal, functional and ecological dimensions in the habit of formulating and developing waterfronts because talking about the design of river banks is to renew them according to those dimensions. David (2001) refers to taking into account and taking the environmental dimension to enhance the concepts of ecological design of the waterfront spaces.

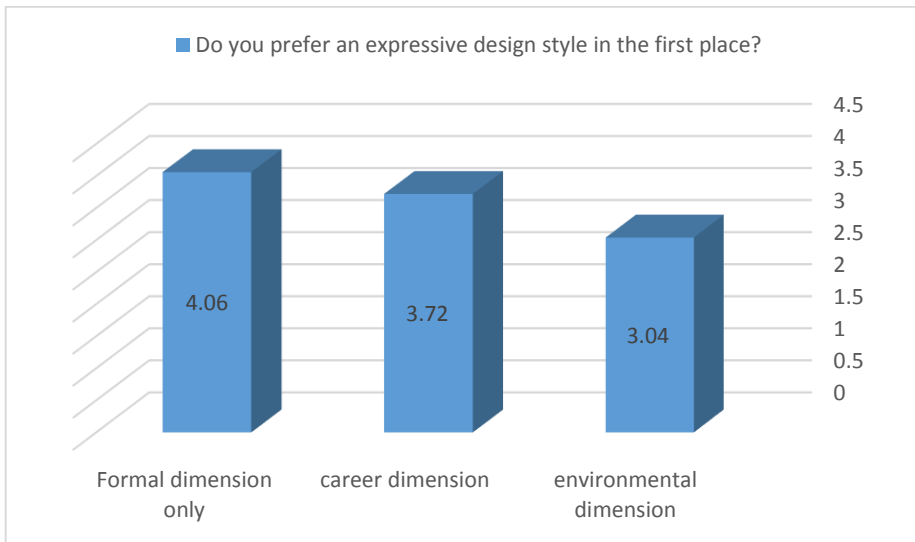


Figure (10) design pattern

6. The results (11) show that the green spaces near the water and through the lawns obtained the highest percentage (4.87 - 4.81), while the option of somewhat high edges and sidewalks extending into the water also came with a high a percentage (4.54 - 4.14) respectively. Natural got the least percentage as possible. The matter is that most are required in the design because it gives a character that distinguishes from the extent of creativity in forming the waterfronts. Harris (2007) believes that the paths and terraces should be designed to overlook the river to allow observation and extension. Visual, but for safety reasons, the sides of the river are raised as a defensive method, nothing more.

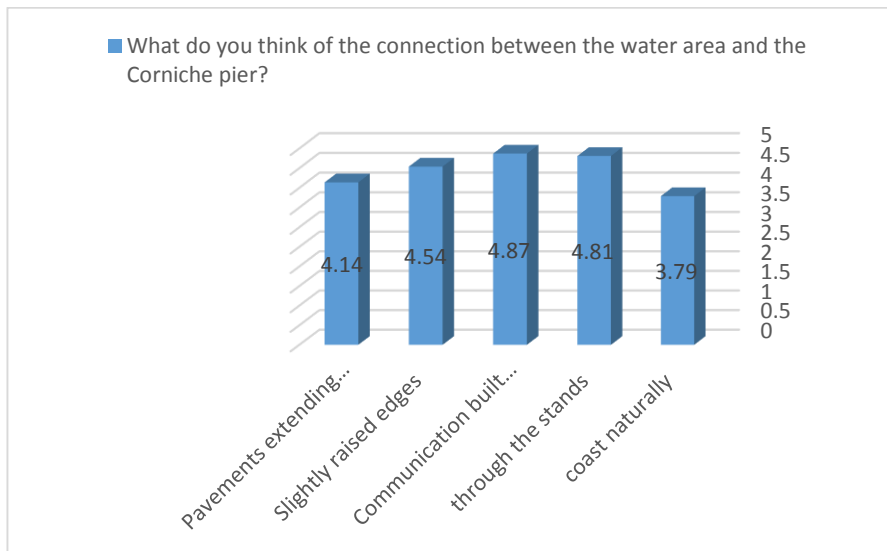


Figure (11) Type of water contact

7. Figure (12) shows that the type of plant and its identification are necessary for any site to be developed or remodelled. The results show that the green areas were the highest evaluation rate of the initial ankle for inclusion within the design (4.31). At the same time, the trees and shrubs were the second and third ankles To be included. At the same time, the climbers came as the fourth and last ankle; as for the annual plants, they did not take any evaluation mentioned in the questionnaire. The reason is that the green spaces and trees have a clear and strong effect on the design and directly enter into the human psyche and the sense of the human scale for this came as The highest percentage .In contrast, the annual plants are non-existent because they were not mentioned or seen on the site previously by the respondents. Harris (2007) believes that there should be proportion and balance in plant selection. It should be studied within the visual framework and carefully to draw a picture of the visual river and strabismus scene Without blocking it. Subhi (2002) indicates that the high density of trees in the area increases the sense of containment.

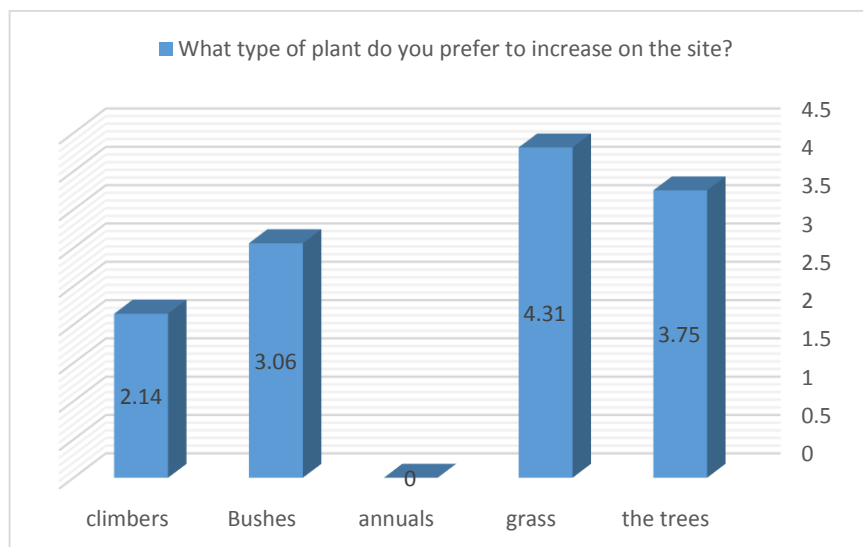


Figure (12) Type of plant in the site

Conclusion

1. A balance in the formation of the waterfront of the Shatt Al- Arab Corniche between the open spaces and the rest of the elements that require its presence.
2. Confusion in land use On the Shatt Al-Arab front and visual pollution due to urban sprawl on the waterfront and the lack of regulation of river transport and anchorage sites.
3. Movement paths are somewhat narrow, And the traffic is very high. Because it is considered a public traffic artery, and there are no private parking spaces for the site, the paving is on the same street, and thus leads to severe crowding, especially on (peak) days, holidays and occasions. On it, there is no privacy for families on the site. The special indicators of the area

were characterized by the weakness of the plastic unit (style and style), poor proportionality, mediation of orientation, poor clarity of space, lack of entertainment activities, functional and aesthetic requirements, and lack of studied rhythm between the blocks of space and the diversity of building materials and colors because they are old. and dilapidated.

4. The design should consider all organic, regular, and complex shapes, mainly regular geometric shapes.
5. Improving the type of corridors and maintaining them continuously and increasing their width (absorptive capacity) and the rest of the space elements such as lighting, fountains, sculptures and plant quality, such as using trees with high impact in shading with increasing green spaces (grassland).
6. The edge of the land contact with the water in the form of green spaces close with raised edges and terraces, emphasizing the green areas and some trees and shrubs.
7. That the design crosses the formal and functional dimensions in the formulation of the waterfront.

Recommendations

1. Improving the quality and maintenance of corridors while increasing their width as much as possible (carrying capacity) by providing all you need for lighting and signage requirements.
2. Working to connect the axes of direct pedestrian traffic b Waterways in the form of piers extending into the water for multiple uses to give a sense of nature and comfort.
3. Drafting regulatory laws to protect such sites' natural and cultural characteristics as they represent the main nerve of the city and tourism.
4. Activating the role of institutions and departments such as municipalities, the environment and the governorate to make a bold administrative plan through which such sites are managed to preserve them for current and future generations.

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Appendix

Questionnaire category	spaces waterfronts									
Site	Shatt Al Arab									
number the form		Date								
1. Do you think that the innovative design is through activation?										
Intricate design shapes	very favorite	favorite	neutral	not preferred	very unfavorable					
Design forms based on regularity and tradition										
Design forms based on organic form										
all mentioned										
2. Do you think the place needs a new design or a strong change to the existing one?										
Powerful change in existence	very favorite	favorite	neutral	not preferred	very unfavorable					
new design										
3. What do you think of the problems that need to be addressed about the place?										
Green spaces and afforestation	very favorite	favorite	neutral	not preferred	very unfavorable					
site furniture										
Facades of buildings surrounding the site										
place pollution										
all mentioned										
4. Prefer a unified design framework in terms of?										
shape and space	very favorite	favorite	neutral	not preferred	very unfavorable					
the color										
Indicative advertisements on the site										
5. Do you prefer an expressive design style in the first place?										
environmental dimension	very favorite	favorite	neutral	not preferred	very unfavorable					
career dimension										
Formal dimension only										
6. What do you think of the connection between the water area and the Corniche pier?										
coast naturally	very	favorite	neutral	not	very					

through the stands	favorite	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	preferred	<input type="checkbox"/>	unfavorable	<input type="checkbox"/>
Communication built with green elements		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
Slightly raised edges		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
Pavements extending above water level		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>

7. What type of plant do you prefer to increase on the site?

the trees	very favorite	<input type="checkbox"/>	favorite	<input type="checkbox"/>	neutral	<input type="checkbox"/>	not preferred	<input type="checkbox"/>	very unfavorable	<input type="checkbox"/>
grass		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		
annuals		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		
Bushes		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		
climbers		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		

Final design output

