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RECONNECT AND INTEGRATE OF HISTORIC CITY CENTER WITH RIVERFRONT

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Abstract- Although water is the main source for the emergence of cities in the past, and it is considered one of the most important elements of tourist attractions, we see that most cities, after the developments that took place in the means of transportation, given up on the water bank, and this seems obvious in the historical center of the city of Baghdad overlooking the Tigris. The concept of the research presented in this paper was based on presenting an integrated theoretical framework that includes the axis of the urban and natural environment, and the axis of addressing urban integration between these two environments, based on the research problem that was summarized in the lack of clarity of strategies to achieve urban integration between the historical Baghdad city center and its riverfront, to achieve cities Integrated, sustainable, away from urban environmental and health problems by open urban spaces through urban integration between the water natural scene and urban fabric, this is what represented the aim of the research. Six strategies were proposed within the two axes of the research based on the effective indicators that were tested at the site of the case study, which included clarifying the main axes between the two environments through interventions at the level of street spaces, pedestrian paths, and parking , as well as reusing neglected squares, street intersections and the river's edge with various cultural and recreational activities, which enhances the identity of the city in its history, culture and its association with the river.

Keywords: Urban Environment, City Center, Natural Environment, Riverfront, Reconnection, Urban Integration.

1. INTRODUCTION

Originally, most of our cities were founded along rivers, which gave people the opportunity to walk and sit in natural conditions where they could watch the water and life on it, enjoy the wide view of the open sky and the reflections of the water stream and the opposite bank, this added prosperity to the city itself, the health and happiness of the people and enhanced their identity and local belonging [1]. As Olmsted explains, the enjoyment and fullness of a city relate to its rivers. But in fact, many rivers were neglected, ignored, or completely forgotten, and those rivers became one of the most neglected and misused resources, and urban riverfronts later became places for industry and transportation, especially after the means of transportation changed from water to rail transport, cars, and others during the late ninth century. Ten, and this is what led to move away from the rivers and become abandoned places and completely far from the centers of cities and society. Many cities that took advantage of the opportunity of their rivers to obtain interconnection at various levels between the river and their city centers to achieve urban integration and create cities with typical architectural sites. The most problems that the city center and riverfront suffer from were identified, including access problems, physical barriers such as dams, bridges, buildings, streets, parking lots, and lack of activities, in addition to visual barriers that led to the misuse of rivers, neglect and distancing them from city centers and the loss of the city. Its connection with its history, culture and rivers.

In Baghdad, the rapid urban expansion witnessed by the city in recent decades created huge social and economic challenges for its historical areas, especially in the main city center located in Rusafa, where it was exposed to deterioration in all its urban aspects, social, economic, environmental and urban. Most of the solutions proposed in the past decades, such as restoring buildings or changing sidewalks and paving streets, did not produce any tangible results at the level of the general urban landscape of the historic city center overlooking the Tigris River, which today is in dire need of a comprehensive and radical treatment. It is what will be worked on in the theoretical framework presented in the research in order to reach strategies based on effective indicators that are applied to achieve urban integration between the historic city center of Baghdad and its river front.

2. THE CONCEPT OF ENVIRONMENT (URBAN AND NATURAL)

Amos Rapoport defined the environment as a series of relationships between the physical elements and man, this relationship is on levels, on the one hand, between elements and other elements, between elements and man, and on the other hand, between man and man, these

relationships that composed the environment are characterized by regularity, consistency, and have a form and structure, the environment is not Randomly organized, but subject to a pattern of spatial relations and not limited to the elements and the human being, but they are interrelated and in varying degrees to achieve spatial separation between its occupants [2].

While Jadrji referred to the environment as "the phenomena that the individual - society deals with in the environment, and they are two types of phenomena, natural: they are fixed as an entity and changeable in relation to human thought and his discovery of them and his knowledge of them are cumulative knowledge, social: they are variable according to human thought and his reaction towards their generation" [3].

Al Alwan described the environment as "the framework or background in which a living organism operates and develops, including the sum of the perceptible and unconscious conditions, components, and factors that the living organism deals with and interacts with, affecting its biological nature and its mental, emotional, physical, and motor activities" [4].

Thus, we find that the environment: an integrated system that represents the container containing all the environments, which consists of a set of parts and elements to be a connected chain of relationships that affect and are affected by it, and it is of two types: a physical environment, which represents the physical side and a behavioral environment, which depends on the background of the recipient and the extent of awareness of these elements.

2.1. Urban Environment

The urban environment is considered part of the geographical (physical) and cultural (intangible) environment, as it consists of a set of changes and modifications that humans introduce to their natural and cultural environments, these changes may be in lighting, comfort, heat, sound, and other physical factors, in addition to social and cultural changes that affected of interaction between people [5]. Al-Nouri also indicated that the urban environment is an organization that involves a dynamic movement on three main components, which are (the human being, the dimensions of space and time) and can reached it through human interaction with the environment within a system in which human existence and its surroundings are integrated, represented by the urban environment and its contents [6].

The urban environment has a significant impact on people's welfare and physical activity, whether at the level of physical aspects such as the provision of attractive pedestrian and bicycles paths, sidewalks of appropriate dimensions, well-lit, and connected to public transportation and other urban resources, or at the psychological level such as the individuals' sense of safety, belonging to the place and the enhancement of their sense of collective equality to preserve community centers and parks [7].

Thus, the urban environment can be defined as an integrated system containing a number of elements and people in the form of patterns combined by a system, in addition to the social and cultural relations into a physical structure, whether built or natural, and it is the place where the actual existence of man is achieved.

2.1.1. Elements of the Urban Environment According to (Lynch Study)

Lynch identified the elements of the city based on the mental images generated in the human mind, as in Figure 1, through which he recognizes his external world, and concluded that the visually acceptable image resides in the minds of individuals and not in the material components of this image, so he determined the elements of the urban environment of the city accordingly [8]:

- Paths: They represent the paths that individuals pass through, whether they are the main or secondary movement channels (pedestrian paths, streets, and axes parallel to rivers), and they have an impact on the formation of the urban image in the mind of the recipient, given that individuals observe the city and its spaces during their movement within it.
- Sectors: It has a two-dimensional extension in the general formation of the city, and it is small parts that compose the city as a whole and can be distinguished by shape and borders, such as river islands.
- Edges: They separate two parts that define the end of a part and the beginning of a part as the boundary of land and water, and they cannot be considered paths for people because they are linear elements that impede movement and vision, rivers, and mountains.
- Nodes: It consists of the convergence of movement paths of different types and is a center for an activity, these nodes may be central as the heart in many cities, and they can be natural nodes, transportation points and concentration points.
- Landmark: They are the signs by which a person can distinguish a place without reaching it. It is called a spatial sign, and it is the element that the largest number of residents agree to run, and it is closely related to the place.

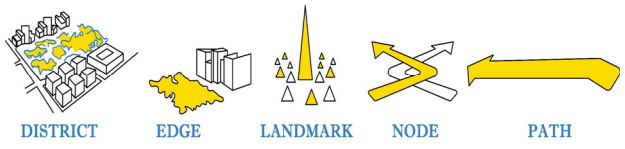

Figure 1. Elements of the urban environment, drawn by author depending on [8]

2.1.2. City Center

Cities arose as commercial and administrative centers for human settlements, and with the increase in population and economic development, these centers included various financial, commercial, educational, health, entertainment, cultural, and other activities, residential neighborhoods have spread around city center, and city centers have become a major part of the city's economic base, embodying the city's history and

civilization. Will be recognized Urban Design Guidelines that proposed from LMN architects used in the design of American city centers, that used on the downtown site in Lynwood/Washington [9].

- Accessibility: Ensuring the continuity and safety of pedestrians and other non-motorized users, by providing pedestrian crossings defined by a material or color such as stamped concrete or colored asphalt, and suitable sidewalks that suit the property boundaries and the aesthetic requirements of streets such as green spaces and others.
- Car parking locations: To ensure that surface parking lots are not the dominant visual landscape within the city center and to try to create a pedestrian-friendly environment.
- Street spaces: Producing a street scene inside the public road that is comfortable, safe, attractive to people, encouraging pedestrians, and defining the streets with plants.
- Lighting: Lighting gives character to the site, so providing lighting achieves safety on the pedestrian scale throughout the site, provided that it does not disturb the neighboring residences. It can also be used to highlight the focal points in the urban scene of the city center, such as building entrances, public art, and landscapes.
- Vehicle Communications: Allowing private vehicle communications through blocks between public streets in coordination with pedestrian walkways, taking into account the safety and priority of pedestrians.
- Bicycle facilities: Providing bicycle booths and parking lots and supporting reducing the demand for parking lots, and their design should be integrated with the facilities of the urban landscape, with safe locations that do not interfere with pedestrian or vehicle paths.
- Public squares and open spaces: Its necessary to allocate a group of public places associated with individual buildings, which can be used later for gatherings of friends and customers and enjoying the good weather.
- Major intersections (Gated communities): Major intersections in and around the city center may be distinguished by the use of art, water features, and open spaces, provided they do not affect pedestrian and vehicular paths [9].

2.2. Natural Environment

For sustainable development of cities, a balance must be achieved between nature and the urban environment. Urban natural water features play a significant part in creating this equilibrium, because water is one of the most essential ingredients of tourism as well as human physical and psychological comfort.

It has an important role in city planning, as it provides a number of aesthetic and functional features as well as the aesthetic effects achieved by landscapes associated with water on humans, these effects are visual, educational, tactical and psychological. Most of the designs related to water add vitality and excitement to the urban space, whether in moving water (waterfall and rivers) or in stagnant water [10].

The urban design, which includes the use of natural components such as water bodies and green belts, which are of great importance in regulating the local climate of the region, providing recreational activities, encouraging pedestrian movement and community participation, is healthier and seeks to achieve a livable, resilient and sustainable city [11].

2.2.1. Riverfronts

Urban river fronts are an important factor in the emergence of cities, which are specific areas of the city referred to as land or buildings adjacent to the city's part of the water surface such as lakes, rivers and oceans, as shown in Figure 2. Riverfronts are among the important resources that distinguish cities from others and have a great economic value, the riverfront area enhances the unique cultural values of the community because it provides people's lives with water-loving sites and a point of attraction for various businesses and people to enjoy water scenes, as water can be used as a starting point to show the city's story throughout history, the river front can also regulate the local climate, clean the environment and provide people with health, entertainment and a very good quality of life through its natural advantages.

In addition to the advantages of the river front, it must be noted the risks of floods, which pose a major threat to its security, as it must focus on preventing flood risks within the principles of urban design for the river front area to ensure its safety [12].

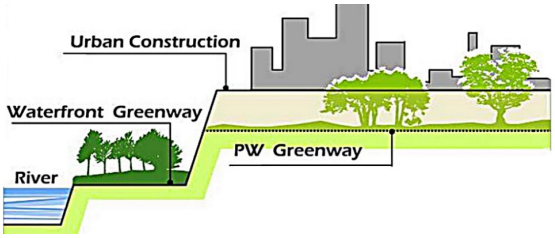

Figure 2. Riverfront and its levels, by Zhao Hongyu and Yu Ruhai depending on [12]

Thus, the objective of the urban design of the river front is to [13]:

- Acknowledging and enhancing the unique identity of riverfronts
- Expansion of public access to the riverfront.
- Revitalizing the riverfront with a range of attractive uses.
- Supporting economic development activity on the working riverfront.
- Improving water quality through measures that benefit natural environments.
- Support public recreation by restoring damaged areas of riverfront and protecting wetlands and beach areas.
- Integration of the city with the riverfront.
- Allocating space for cultural, social and public uses.

2.2.2. Guidelines for Effective Urban Riverfront Development

Riverfront plans are of great value to the development of riverfronts, where public access and open spaces are

considered the most important principles for the successful development of urban riverfront areas. Accessibility can be defined in three patterns: (the connection between the city and the riverfront, the continuity of the riverfront area, and the connection between the riverfront and the water) [14].

In Torre's view, the success of riverfront development is achieved by working at all levels and stakeholder participation, he believes that "no matter how unique or exciting a riverfront development may be, it can only be successful if it works at all levels, the ease and convenience of pedestrian traffic, territorial access and circulation, sufficient parking space, and the overall visitor experience, all levels must be successfully sequenced in addition to meeting capacities on peak activity days". To achieve this, ten elements must be taken into account while planning the development of the riverfront, as in Figure 3 [15].

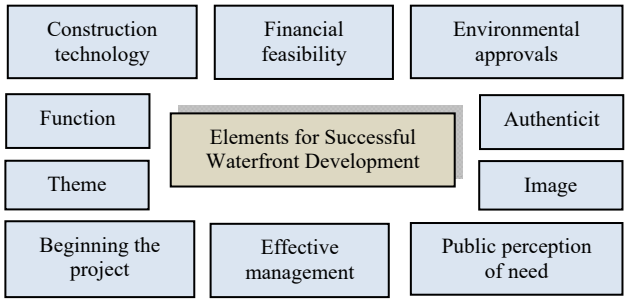

Figure 3. Elements of a successful waterfront development [15]

Additionally, it was found that the following guidelines be taken into account while establishing planning for riverfront areas: 1. Accessibility, 2. Integration, 3. Benefit sharing, 4. Participation of stakeholders, 5. Construction phases [15].

2.2.3. Principles of Sustainable Development for Urban Riverfront Areas

Nowadays, most of the urban design issues are dealt with within sustainability framework, which it has been assessed in three dimensions: economic, environmental and social, within various levels [16]. In the proposals of the World Conference on the Urban Future (URBAN 21), which was held in Berlin in July 2000, ten principles were introduced to achieve sustainable development of the urban riverfront region. Which are [17]:

1. Securing Water Quality and the Environment: All riverfront projects require good water quality in the system of streams, rivers, lakes, bays, canals, and the sea.
2. The River Front is One of Elements of the Current Urban Fabric: Riverfronts should be seen as part of the existing fabric of the city, and have a major role in its vitality, where water is part of the urban scene and is used for recreation, cultural identity and water transportation.
3. Historical Background Lends Personality: The nature, collective heritage of water, and city events, should be used to give meaning and personality to the redevelopment of the riverfront and to preserve the past and heritage identity which are integral to sustainable redevelopment.
4. Mixed use has Priority: Riverfronts must use the water for various commercial, residential, and cultural uses, as priority should be given to uses that require access to water.
5. Public Access is a Prerequisite: Riverfronts should be physically and visually accessible to local residents and tourists of all ages and incomes.
6. Public-Private Partnerships Accelerate the Riverfront Planning Process: Planning for new riverfront projects should be in the form of public-private partnerships, ensuring quality design, generating social balance and infrastructure supplies.
7. Public Participation is a Component of Sustainability: Cities can gain from sustainable riverfront urban design in environmental and economic terms, also in social terms, so the community must be systematically informed and involved in discussions.
8. River Fronts are Long-Term Projects: The step-by-step redevelopment of the riverfronts for the entire city to realize its potential has been a challenge for several generations and needs a variety of personalities in architecture, art, and urban designer for public space.
9. Reactivation Process is an Ongoing: Whole significant design processes must be founded on a thorough examination of the meanings and functions associated with the riverfront, and all resulting plans must be adaptable and flexible.
10. River Fronts Benefit from International Networks: The participation of many disciplines in the development process provides an interchange of information in a global network of contacts specialized in the design of river fronts at different levels.

3. URBAN INTEGRATION

Integrated urban design is a design approach linked to the complex nature of cities and the need to create sustainable and resilient settlements. It offers robust solutions in many ways that are able to withstand unexpected challenges and have high flexibility to adapt to new situations, which constitutes support for the implementation of urban development projects.

Urban scientist Peter Calthorpe said "The more comprehensive we make systems the more sustainable they are" [18]. It is the recurring events that are factors of urban integration that are used in the processes of renewal and integration of urban areas and that, when they do not occur, contribute to the physical separation of those new urban areas from the existing context. Among these factors are [19]:

- Visibility of borders: The vision leads to achieving a balance between the content of urban space and its accessibility and gives people an axiom to build their perception of space accurately, which facilitates the selection of movement paths into and out of urban space.
- Diversity: Spatial diversity is related to visual and functional diversity, which is achieved by the diversity of the different elements and the addition of elements as mediators between the components of the urban space.

➢ Continuity: The strong interdependence of urban elements gives unity and continuity between urban spaces.
➢ Organization and Hierarchy: The hierarchical organization from small to large for the components of urban space of different sizes and dimensions and their sequence achieves urban integration and harmony between urban spaces.
➢ Communication: Communication between urban spaces is achieved by giving priority to pedestrians, achieving social interaction, and using urban elements that achieve this communication, such as networks of pedestrian roads, trees, water paths, and others.

Sternberg referred to what urban integration aims at [20]:

- Reducing the effects of natural disasters and environmental damage.
- Encouraging development generated by urban functions and improving the relationship between city and country.
- Enhancing and developing accessibility.
- Promotion and protection of natural resources and cultural natural heritage.
- Safety and development of energy resources.
- Encouraging sustainable tourism with high quality.
- Strengthening regional cohesion through more balanced social and economic development between regions.

Thus, urban integration is considered as a process of multidisciplinary communication and cooperation to reach comprehensive solutions that can contribute to linking two different environments or making one complementary to the other, by finding common indicators and achieving an integrated system between them at various levels, which achieves adaptation, diversity and continuity.

3.1. The Variables of Urban Integration between the City and the River

These variables are based on evaluating the integration of the city's river at the regional and national levels, so on the local level, the city's structure, river characteristics, and urban paths linking the city to the river are analyzed according to these variables [16]:

– Physical Geography and Morphology: It is represented in the average slope on every bank, the ratio between a slope's steepest slope to its flattest surface, the distance from the river and the nearest center of the city, and the average height of the city. These variables are among the main factors for the local integration of the city's river system.

– Urban Dimension: It is related to the total population of each city and the number of residents divided per river bank who live within the central nucleus of the city in terms of population and population density.

– River Dimension: It includes the average width and average flow of the river estimated for five years at least, the size of the river basin that flows through the city, and the river's urbanized areas' length, excluding the width of the river, which changes as a result of the channeling of parts of the river. All these variables depend on the external factors of the city, whether they are natural (precipitation, evaporation) or human factors (dams).

– City-Riverfront Relations: The greater level of integration between the riverine areas and the wider variety of land uses along the river's banks are made possible by the longer river frontage. As a result, a fair measure of how close a city is to a river is the length of the riverside seam between its populous sections and the river, as well as the ratio between this variable and the city's entire urban area. Typically, a 15-meter-wide narrow strip is used to depict it.

– Spatial Configuration: The number of river crossings within the urban tract and the number of crossings per kilometer define the spatial configuration correlation between the city and the river. When there are more of these crossings, will get best integration of the urban system around the river bank, while when there are less of them, the city's attention is diverted from the river.

3.2. Integrative Theory and its Role in the Integration of the City Center and the Riverfront

To give the river front a good sense of place, urban design must include the contextual aspect of the region, which is includes the economic, social and political aspects of the site and its distinctive character. The building and its surroundings, not including the development site only [21]. It is acknowledged that all forms of water -lake, sea, and river- are essential parts in the fabric of the city, as it gives the city a special character.

Kotval and Mullin discussed in the book "Redevelopment of Downtown America" that cities that have water in their geographical context are very fortunate because they can always exploited for the benefit of society [22], so that the response of the waterfront and its connection to the city center or any urban space depends on the integration of many features in the context of the city, which can be evaluated depended on integrative theory's five guiding principles that proposed by Sternberg that include five major principles (Good form, Legibility, Vitality, Meaning, comfort). These principles will be briefly explained and their effectiveness in achieving urban integration between the city center and the riverfront [20]:

3.2.1. First: Good Form

Good urban design depends on the technical principles of good form, for example, the interconnection of buildings within the urban space requires dealing with spaces outside these buildings, as well as the proportions of these buildings, and this is usually measured through the experience of the viewer of the space, and this is what can be applied by urban designers in the case of linking the city center with riverfront.

3.2.2. Second: Legibility

Sternberg interprets the principle of legibility based on Lynch, who said that city should be imaginable for the viewer to build a mental image of it, he regards nodes, landmarks, path, and edges as essential components for

achieving the principle of intelligibility in designing cities through the interconnection of parts into a whole. The realization of this principle in the integration of the city center with the river front relates to the possibility of visual access and the connection of people and buildings along the water's edge.

3.2.3. Third: Vitality

The principle of vitality is linked to the activity and events generated between the riverfront area and the city center and the diversity of uses. The continuous activities, events and various uses encourage use and stay for a longer period in these places.

3.2.4. Fourth: Comfort

Sternberg focused on the principle of comfort, which is considered one of the simplest principles that must be available and achieve psychological and physical harmony for the human being with the surrounding environment. Thus, it is necessary to achieve this principle in the integration of the city center with the riverfront to create a comfortable and attractive environment.

3.2.5. Fifth: Meaning

Sternberg sees the importance of the notion of meaning by the ability of urban space to portray its history, culture, traditions, nature, and customs that enhance the identity of this space. Urban design based on this principle must include the shape, history and culture of the local place by understanding how the constructed environment's physical and functional aspects interact with the freely context in which it was raised.

Based on the foregoing, the classified characteristics that belong to the functional and material dimensions within the principles of (good shape, clarity, vitality and comfort), and the features of the use of place and awareness and connection with it into the principle of (meaning), are essential to achieve urban integration between the city center and riverfront the, which contributes to making the river front within city context.

Table 1. The indicators of urban and natural environment from theoretical framework (Authors)

		Main Vocab.		Sub Vocab.		Case Study
Common Indicators between the Urban Environment and Natural Environment	Design principles for the city center and riverfront areas	Open spaces/public squares	X_1	Provide public spaces linked to individual buildings	Y_1	✓
				Providing seating for friends and colleagues and places to eat	Y_2	✓
				Introducing elements of art, water and green spaces to reflect the identity of the city	Y_3	✓
		Gated communities / Major intersections	X_2	Distinguishing major intersections within the city center	Y_4	
				Definition of the entrances and gates of the city, and instructions for access to the edges of the city and the water's edge	Y_5	
		Parking	X_3	Preferably, these surface parking spaces are not the dominant visual element in the city	Y_6	
				Allocating the area behind the buildings for these parking lots	Y_7	
				The distance of car parks from the intersection areas and the edges of the buildings	Y_8	✓
		Bicycle facilities	X_4	Providing booths and parking for bicycles and reducing the demand for cars	Y_9	✓
				Their sites are safe and do not interfere with pedestrians and vehicles	Y_{10}	✓
				To be integrated with the design of streets and public spaces and accessible to the general public	Y_{11}	
				Suitable for night use so that it is well lighting	Y_{12}	✓
		Street spaces	X_5	Designing street spaces to give priority to pedestrians and their safety	Y_{13}	
				The street scene should flow smoothly with the city spaces, comfortable and safe	Y_{14}	
				Providing street furniture by locating sidewalks, adding plant pots, protective poles, and temporary rest seats.	Y_{15}	✓
				The possibility of using private vehicles between buildings on public streets, without affecting the safety of pedestrians and street spaces.	Y_{16}	
		Lighting	X_6	Provide lighting sources throughout the site	Y_{17}	✓
				The presence of lighting enhances protection and safety for users and reduces crime spaces	Y_{18}	
				Specific lighting can be used to define the transition from one space to another, such as creating paths from the city center to the rivers' edges, or defining the entrances of important buildings in the city.	Y_{19}	
				Keeping the height of lighting in pedestrian paths and others, while ensuring that protection for this lighting is provided and maintained	Y_{20}	
		Accessibility	X_7	The safety and continuity of pedestrians and other users with pedestrian priority	Y_{21}	✓
				Adding suitable sidewalks and pedestrian crossings with their aesthetic requirements such as trees and green plants	Y_{22}	✓
				Enhance accessibility through colors, textures or ground and hanging signs	Y_{23}	
		Stakeholder Participation	X_8	Participation of the public and private sectors in the development of plans for the city center and the riverfront	Y_{24}	✓
				Public participation	Y_{25}	
		Priority for Mixed Use	X_9	Activate different uses in one place to activate the area	Y_{26}	✓
				At the water's edge, priority is given to uses that require water	Y_{27}	
		Construction Plan	X_{10}	The development plans should be flexible and subject to modification in the future	Y_{28}	
				Collaboration of various disciplines taking into account the material costs	Y_{29}	
		Securing the Quality and Environment of Water	X_{11}	Water recycling	Y_{30}	
				Possibility of using rainwater and groundwater	Y_{31}	

Table 2. The indicators of urban integration from theoretical framework (Authors)

		Main Vocab.		Sub Vocab.		Case Study
Indicators of Urban Integration	Urban integration variables between the city and the river	Physical Geography and Morphology	X_{12}	The average height of the city from the water's edge	Y_{32}	
				Average slope of each bank	Y_{33}	
				Average river width and average water flow for a five-year period	Y_{34}	✓
		Urban Dimension	X_{13}	The total population of each city	Y_{35}	
				The population within the central core of the city	Y_{36}	
				Administrative divisions of the city's location and historical factors	Y_{37}	✓
		The Relationship between the City and the Riverfront	X_{14}	The length of the seam between the river (the path of the riverfront) and the inhabited area (the city center) between this factor and the total surface area of the city.	Y_{38}	
				Number of river crossings per kilometer within urban routes	Y_{39}	✓
	Principles of integrative theory between the city center and the river front	Good form	X_{15}	Address the size and shape of the water's edge area	Y_{40}	
				The different treatments of the buildings and their synchronization with the surrounding urban context	Y_{41}	
		Legibility	X_{16}	Activating visual accessibility between the city center and its riverfronts	Y_{42}	
				Connection and continuity of pedestrian movement at the water's edges	Y_{43}	
		Vitality	X_{17}	The diversity of different uses in public urban spaces and the diversity of social and cultural activities	Y_{44}	✓
		Comfort	X_{18}	Appropriate climate conditions, such as providing shade and recreation areas in the sun	Y_{45}	✓
		Meaning	X_{19}	Enhancing the city's identity and its association with its river front, history, culture and customs	Y_{46}	✓

5. CASE STUDY

5.1. Description and Identification of the Study Area (The Historic City Center of Baghdad and the Bank of the Tigris River)

The historical center of the city of Baghdad overlooking the banks of the Tigris River is of particular importance because it represents the historical heart of the city and being the center of the capital of Iraq. The historical center of Baghdad extends for more than three kilometers on the bank of the Tigris River, which starts from Bab Al-Sharqi and ends with Bab Al-Muadam in the north and Al-Rashid Street in the east. The case study focused on the area between the Al-Shuhada' Bridge and Bab al-Mu'adham Bridge Figure 4, as it includes a number of distinctive historical monuments, heritage buildings that were used for administrative purposes, in addition to the existence of historical markets and paths that originate from the river bank in different directions.

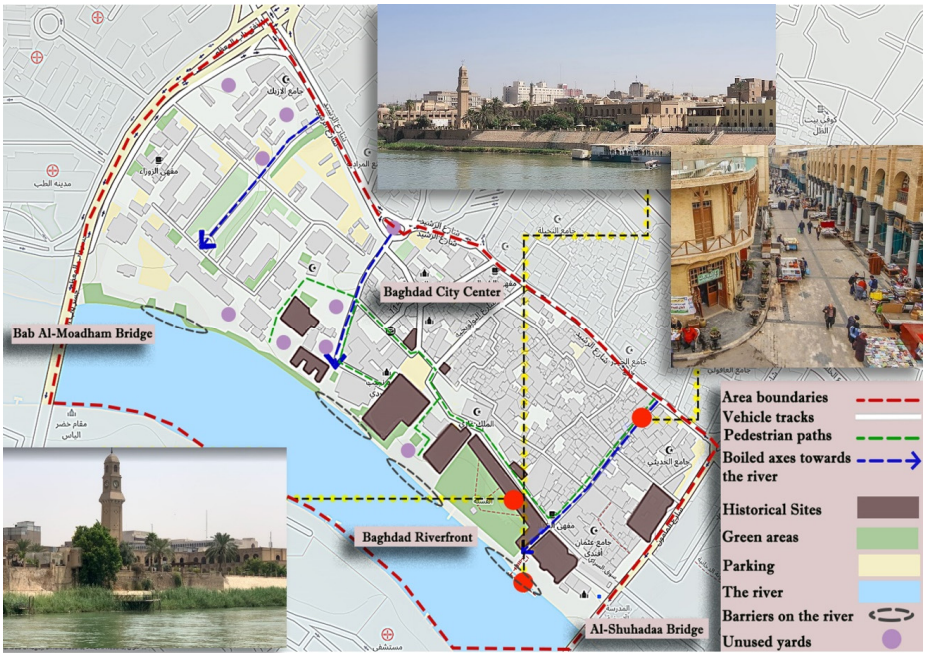

Figure 4. Description and identification of the study area [23]

5.2. Problems that Baghdad City Center and the Riverfront Area Suffer from

Wars, conflicts, and indiscriminate interventions by man in the twentieth century had a great impact on severing the city's connections and paths, and it worked to change its character by renovating its buildings in the wrong ways and not caring about the results of those works, which changed the urban character of the city and

its loss of much of its archaeological and heritage stock, through:

❖ The rupture and lack of integration of the urban fabric of the city center, its loss of its distinctive identity and urban effectiveness, and its complete isolation from the river front that extends along it.

❖ The loss of the main axes from the city center towards the river and the implementation of the earthen dam covered with stone along the river bank led to the severing of the organic, visual and

❖ Psychological relationship between the river and the urban fabric of the city center and between the city's residents and the river on the other hand.

❖ The decline in the river level and the difficulty of reaching the river bank, which has become more than eight meters deep, doubled this cutoff, and the Tigris River disappeared from view.

❖ The decline of pedestrian roads from the city center Street, and the absence of them beside the river, and the lack of recreational and cultural activities that reflect the historical identity of the city.

❖ Neglecting the heritage places in the region, such as the Saray Palace, the Qishla building, and others, and not exploiting the open spaces for activities that restore the vitality of the place.

6. SIMULATION RESULTS

Based on the effective indicators that were extracted in Table 1 and 2 from theoretical framework presented in this paper and the analysis of similar international projects, by studying the location of the case study area and identifying the obstacles that prevent the historical city center of Baghdad and its river front, we proposed several strategies that can be applied to the study area. In two axes: the urban environment (natural and built) and the axis of urban integration, as follows:

➢ Urban Environment Strategies (Natural and Built Environment):

6.1. A Strategy to Clarify the Paths between the City Center and its River

• Adding paths for bicycles, sidewalks with plant beds, and various relaxation and seating areas.

• Unification of retail spaces with the introduction of the water element within these urban spaces such as fountains and small waterfalls.

• Adding a water path next to the pedestrian sidewalks that leads the user to visit the river front and enjoy its activities.

• To create a safe environment, lighting must be provided in these paths and gradually towards the city center to the river, and lighting must be distinguished at the entrances to heritage and distinctive buildings in the region, while ensuring their protection and permanence.

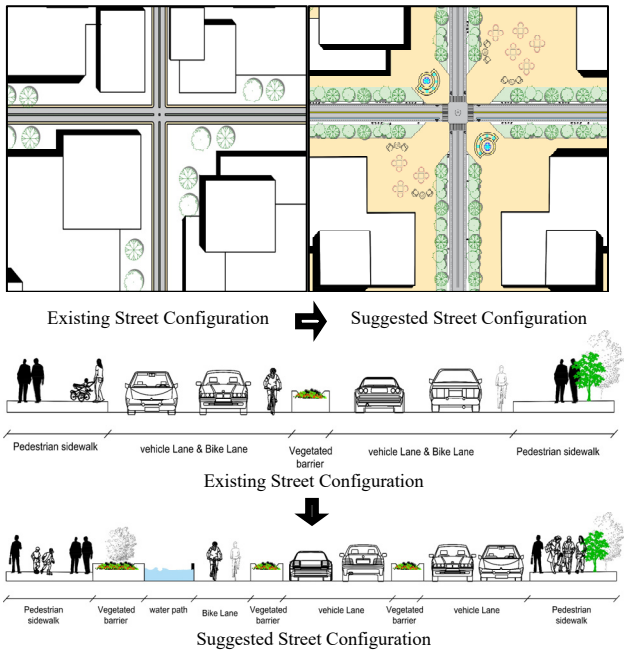

Figure 5. Existing and Suggested Streets Configuration

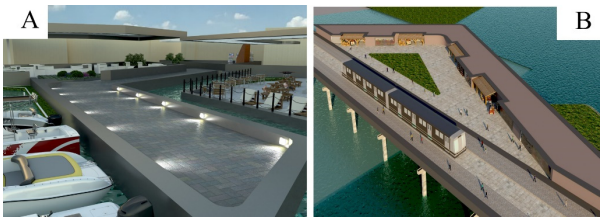

Figure 6. (A) The path determination by lighting, (B) Consolidation of retail premise

6.2. Car and Bicycle Parking Strategy with Pedestrian Priority at the Site

• Distributing car parks based on the land use plan in the region and trying to use the back spaces of buildings for this use to ensure the quality of the urban scene and give priority to pedestrians.

• Allocating places for bicycle parking and urging their use to ensure a sustainable environment, including introducing the user to the important and heritage places on the site.

• Providing safety and distinctive lighting for these parking, informing the user of the importance of using them, and the facilities that accompany their use, for example renting them for use within the site.

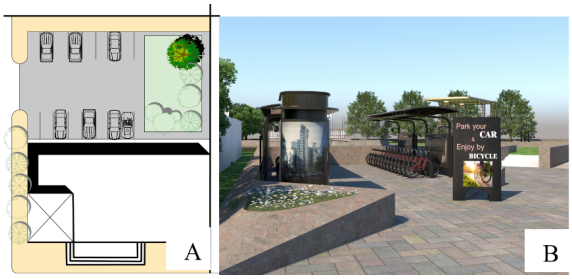

Figure 7. (A) Car parking behind building, (B) Encourage the use of bicycles

6.3. The Strategy of Activating the River's Edges and the Intersections of Street Networks

- Activate the neglected squares, especially those that are close to the heritage buildings, with cultural and vital activities, thus perpetuating their use.
- Exploiting the intersection of streets in organizing the city's scene with symbols and arts of the city without affecting pedestrian and vehicle paths.
- Activating river edges through activities that help attract people to the river front area, giving priority to water-related activities, and perpetuating visiting them on a daily basis by introducing users to activities on the riverfront.

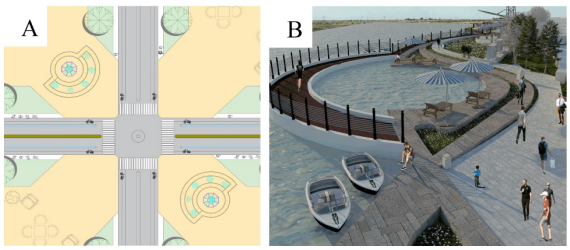

Figure 8. (A) Activating squares at street intersections, (B) Various activities on the river bank

➢ Urban Integration Strategies:

6.4. Mixed Use Strategy and Enhancing Comfort Levels in Urban Spaces

- Achieving the good form of the urban scene through studied formations in dividing the spaces and streets of the city, for example, defining the paths of vehicles and pedestrians by using specific materials and finishes that are distinguished in color and texture to determine the use.
- Achieving comfort levels by adding facilities, services, green and blue network, which supports survival and continuity of use between the city center and the riverfront.

6.5. Topographic Strategy and River Levels

- Considerate the topography of the riverfront area by taking into account the mean slope on each bank, the ratio between its steepest slope to its flat surface, and the distance from the river and the nearest town center.
- The number of residents in the city center and the number of crossings of the riverfront per kilometer to achieve a seam between the riverfront and the city center.

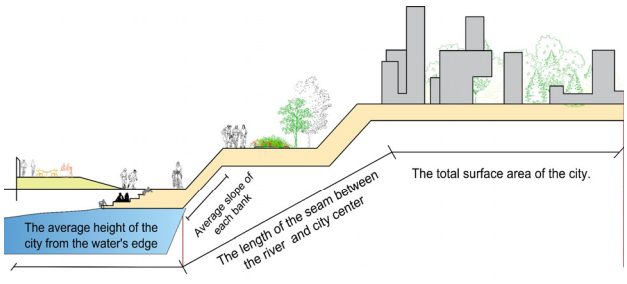

Figure 9. Topographic strategy and river levels

6.6. The Strategy of Consolidating and Strengthening the Identity of the City and Linking its Center to its River

- Preserving the identity and character of the city and its connection with its river by enhancing the sense of place with symbols and heritage buildings that distinguish the city from others.
- The use of art that reflects the character and history of the city, in addition to the element of water and green networks, as elements within the urban design of the city with the aim of directing the viewer to the space of the riverfront, heritage buildings, important squares, borders and gates of the city, which achieves multi-level urban integration between the city center and its river.

7. CONCLUSIONS

In this research, a theoretical framework was presented that dealt with the axis of the urban environment (built and natural) as a basis for solving the research problem represented in separating the environment of Baghdad city center from its river front and the absence of effective urban strategies that restore the integrated urban scene between the city and its river, while the second axis dealt with the concept of urban integration as a solution to this problem. The most important indicators in both axes were extracted based on the proposed theoretical framework, and the extent of their application or possibility of applying them to the case study was measured, as well as international projects with similar topics were analyzed (this part was not mentioned in this paper). Six strategies were reached within these two axes based on the analysis of the case study site and its most important features enables the establishment of a balanced urban ecosystem that makes water an included element in the city center environment. These strategies focused on clarifying urban paths with their various gradations between the urban and natural environments, unifying the urban scene between the city center and the riverfront through organizing and allocating services through lighting fixtures, colors and textures, and introducing green and blue networks through it, and exploiting the city's heritage and history in restoring neglected spaces and promoting activities. cultural and social. So, according to the proposed strategies, the city center of Baghdad can be made vibrant and sensitive to the river, thus restoring the quality of the urban scene of the city center, where the city meets its river.

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