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Quality Evaluation of Algiers Bay Promenade for Future Waterfront Development in Algeria HANNOUFA Nada¹, ALKAMA Djamel², SALAH SALAH Hana³

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The urban waterfront promenades are linear public spaces that have a significant role in coastal cities. In Algeria the development of the Sablettes promenade on a neglected site for years is a new experience integrated into a sustainable development approach aimed at improving the user's quality of life in Algiers.

In order to make this promenade a welcoming public space, and ensure the well-being of its users, it must meet certain quality criteria. theaim of this article is to evaluate the quality of the Sablettes promenade in order to identify deficiencies that need to be addressed and effective parts that need to be promoted to allow for the verification of the development's success through a quantitative analysis by using the contextualized QUEP method (Quality evaluation of public spaces). This method contains a grid of 40 indicators and 10 criteria.

The results of this evaluation clearly show by radar representations, the indicators attached to their criteria responsible for the poor and/or good quality of the promenade, allowing for its improvement by proposing several strategies and recommendations that can be generalized during the next developments of urban promenades on the Algiers waterfront.

Keywords: Quality evaluation, QUEP method, Urban promenade, Waterfront.

INTRODUCTION

For a long time, industrial activities dominated the waterfront that separated the coastal city from its coastline, but since 1960, contemporary urban societies have rediscovered their potential, and it has become a paradigmatic element in the actions of urban space regeneration (Srir, 2017) as an economic development tool. (Cuedari and Nepravishta, 2016). As a result, de-industrialization initiatives have expanded around the world, through the decrease or disappearance of industrial uses in favor of social and environmental opportunities; therefore, walking and biking promenades are often deemed a good way to re-connect the city with the waterfront.(Macdonald,2018)

This reconnection is linked to the location of urban promenades along the beachfront, which attract a wide range of the public due to the openness of the space and attractiveness of the sea, providing everyone with an area that naturally encourages tourist and leisure activities. (Miaux. 2020) « These areas served as locations for wandering, self-exposure, and social hierarchies, and were the genuine beating hearts of the coastal resort. » (Barbedor et al., 2001; Rouillard, 1984) in (Bigo and Depeau 2014).

European cities are pioneers in waterfront urban redevelopment. Barcelona's Passeig Maritim is an unprecedented example of a city that once almost completely turned its back on its waterfront, recreating itself as a beachfront city by creating a long stretch of beaches, starting near the city centerand connecting them with a continuous promenade (Macdonald, 2018). The Vlora Promenade in Albania was successful in transforming the city into a regionally important urban coastal area for pleasure and tourism (Cuedari and Nepravishta, 2016).

In North America, there are a variety of classic and modern beach boardwalks spread across several coastal cities including Toronto, Washington, Californiaand Miami. Each one of them is designed differently, but what unites them

is their immediate relationship to the beach, creating a linear social space and a place of public gathering (Macdonald, 2018).

In UAE, Dubai city focuses on the development of its waterfront, by the urbanization of Khor Dubai with residential and commercial areas including hotels, resorts, and markets giving Dubai a reputation of continuously growing city (Jung et al, 2021).

Even in South Africa, where the port has been separated from the city for over thirty years in Durban, the coastline is now open to city dwellers by the promenade and its beach (Chevalier, 2021).

In Algeria, the city of Algiers plans to return to its waterfront, through a program of reconquest of its bay in the context of the major urban project initiative, which began in 1997, and consists of realizing structuring projects linked by a large 70 km long promenade. (Arte charpentier, 2009)The section achieved until now is called « the Sablettes promenade » and is 4.5 km long, located in the center of Algiers bay, responding to two objectives; the first one is to sustainably preserve places threatened by natural disasters and the second one is to provide the community with all the luxuries and comforts leading to enjoyment, well-beingand social happiness.

The Algiers waterfront, which has been restored and developed as a promenade, has become a popular touristic destination for thousands of Algerians, and it attracts a diverse range of users (adults, children, elderly, ...). In order to meet the needs of all users, while providing a high quality and enjoyable experience, it will be required to know what quality was intended in the Sablettes promenade, and how can it be evaluated to determine the project's performance level ?

This article aims to evaluate the quality of the Sablettes promenade, to discover the project's weaknesses and achieve a level of performance worthy of such a large investment.

« Quality is a complex concept » (Bailly & Marchand, 2019) ; it has been evaluated by many researchers in many fields using different methods, and thus a brief contextualization of public space quality assessment approaches is necessary to understand how to assess quality in this context.

Quality evaluation approaches are grouped under two components: quantitative and qualitative. In the quantitative component, researchers rely on objective measurements by developing multiple criteria that analyze the quality of space by understanding its physical elements.

Jan Gehl developed 12 quality criteria for effective design of public open spaces in 1987, which were divided under three primary themes: protection, comfort, and enjoyment (Gehl, 1987). While the study of Whyte focused on spatial, sensory, and social qualities of the public spaces of New York City (Whyte, 1980). Others have focused on the attributes that make spaces successful such as Carr & al (1992), who believe that a space should fulfill five needs: comfort, relaxation, passive participation, active engagement, and discovery (Carmona, 2010). Matthew Carmona in 2010, in turn, developed the quality criteria that include the social, economic and environmental characteristics of public spaces (Praliya and Garg, 2014).

Hadji Lydia in 2014 also developed a method to support the design and to assess the quality of public spaces in Algeria due to a lack of quality assessment tools at the project level. Her method is based on the three dimensions of sustainable development (economic, social, and environmental).

In this article a quantitative approach were favored, through a contextualized QUEP method because of its flexibility, and because its application leads to recommendations, corrections, or potentially enhancements to the specifications (Hadji, 2012).

METHOD

The Algiers waterfront recovered after years of neglect; later on, it has been renovated as a promenade, attracting the interest of investors and users, but no evaluation has been conducted to determine its quality and level of performance.

The concept of quality has a complex and multidimensional meaning, and quality indicators change according to the space analyzed, so it is necessary to offer indicators that take into consideration the type of public space being assessed before proceeding to the evaluation.

The QUEP method will be used to evaluate the quality of the sablettes promenade, which analyzes public space quality from a sustainable development perspective. It consists of a grid that is fixed only in structure but transposable to any local context in terms of criteria and indicators; hence, before moving to the evaluation phase, the multi-criteria grid must be first contextualized.

Contextualization of the Quep Method

The QUEP method, which was used in this evaluation, consisted of a multi-criteria grid of 40 indicators distributed under 10 criteria, with a global index of public space quality (IGQUEP) calculated at the end. The indicators were contextualized through in-situ observations and the synthetic analysis of several documents (books, planning guides, and the charter of board walking spaces), leading to the adoption of 16 indicators, the modification of five and the addition of 19 indicators.

The Evaluation Process

According to(Hadji, 2014) there are three steps for the implementation of the QUEP method. These steps are outlined in the table below.

Weighting	Notation	Aggregation
Weighting of criteria: Weighting of criteria is carried out according to the opinions of users, inhabitants and urban professionals (designers, decision-makers and managers) through questionnaires	The notation exercise is subjective, but it is founded on observation, documents analysis and exchanges with professionals. The use of a (rating scale) between 1 and 3, chosen according to the context of the action or evaluation,	Aggregation offers a synthetic vision of public space quality, which facilitates decision-making. An aggregative method is preferred at three levels:
(in situ and online) and targeted interviews.	makes the procedure easier to use for the evaluators.	Level 1: Aggregating the four indicators of each criterion to
Weighting of indicators:	We attribute 1 to low performance,	obtain a synthetic indicator
Weights are attached to the criteria based on the judgments of the evaluators, and depending on the method of assigning scores (fixed point scoring), which is the distribution of a sum of points over all the criteria or indicators using a weighting tree (Boulanger, 2004). In this case, the scores correspond to the weights. This weighting was chosen because of its simplicity and convenience of usage without the need of software.	2 to threshold performance and 3 to high performance. This measured value must be compared to a reference value, which is based on a reference framework produced from diverse bibliographic studies, in order to carry out an evaluation according to the previously defined scale. N.B.: we have developed a reference framework for adapted and added indicators specific to urban waterfront promenades.	Level 2: Aggregating the synthetic indicators to obtain the indices Level 3: Aggregate the indices into a single index called the Global Index of Quality of Public Spaces (IGQUEP)

Table 1. Phases of QUEP evaluation method(source: Hadji,2014. Adapted by authors, 2022)

CASE STUDY PRESENTATION

Redevelopment of Algiers bay

Within the context of Algiers' transformation, four long-term phases have been planned, the second of which is the development of the bay. This phase focuses first and foremost on the reconquest of port spaces through the relocation of nuisance-generating activities (Arte Charpentier. 2009) and the realization of structural projects developed with the image of a string of pearls around the bay (figure,01) linked by a long promenade from Cape Caxine in the west to Cape Matifou in the east, to rehabilitate the maritime frontage, allowing Algiers to be ready to host all types of international events and reclaim its relationship with the waterfront.



Figure 1. Algiers Bay redevelopment (Arte Charpentier Group 2009, modify by authors).

The Sablettes Promenade

The sablettes promenade, located in the center of Algiers Bay, is 85% complete and spans 80 hectares over three municipalities: El Mohamadia, Hussein Dey, and Belouizdad. It is bordered by Highway 11 and serves a variety of urban functions, including a pedestrian walkway, a bicycle path, artificial beaches, sea jetties, picnic areas, games and sports, restaurants (figure 2), and a number of other planned developments that were never realized due to financial constraints.



Figure 2. The planning of the Sablettes promenade (DTP of Algiers, modify by authors).

Evaluation and Results of the Sablettes Promenade

After the quality evaluation of the Sablettes promenade using the contextualized QUEP method, the values were obtained for 40 indicators, 10 synthetic indicators and 10 indices are presented in (table 2) and their graphical representation in the form of radar diagrams in (figure 3). They are discussed in details with the proposal of quality improvement strategies from the perspective of sustainability.

Evaluation criteria	Evaluation indicators of waterfront promenades	Weighted value of the indicator / Maximum value	Values of synthetic indicators / Maximum value	
	Use of renewable energy in	0.7/2.1		
Economy of use		2 4 5 / 2 4 5		
	Economicefficiency	3.15/3.15		
	Flexibility of amenities	1.05/3.15	VI.S1= 6.3/10.5	
	use of recyclable and sustainable materials	1.4/2.1		
Value of the indice	Cost-effectiveness of the amenitie	S	1.6	
	Maintenance of physicalelements (materials, benches, ramps, etc.)	8.4/12.6		
	Arrangement of wastespaces	6.3/9.45		
Management	Maintenance of trees and planted areas	2.1/3.15	VI.S2=21/31.5	
	Quality of pedestrian and bicycle path	4.2/6.3		
Value of the indice	Offer of management resources		5.25	
	Development of multi-service spaces in the promenade	5.7/8.55		
A	Availability of recreationspaces	5.7/5.7		
Attractiveness	Spaces reserved for the event in the promenade	8.55/8.55	VI 62- 21 0F /20 F	
	Availability of TIC for users	1.9/5.7	V1.53= 21.85/28.5	
Value of the indice	Functionalattractiveness		5.5	
	Quality of openness	4.95/4.95		
Safety and security	Presence of a various people from different origins	9.9/9.9		
Safety and security	Presence of a various people from different origins Presence of appropriate lighting at night	9.9/9.9 6.6/19.8	VLS4= 26.4/49.5	
Safety and security	Presence of a various people from different origins Presence of appropriate lighting at night Existence of surveillance systems	9.9/9.9 6.6/19.8 4.95/14.85	VI.S4= 26.4/49.5	
Safety and security Value of the indice	Presence of a various people from different origins Presence of appropriate lighting at night Existence of surveillance systems Security of movements	9.9/9.9 6.6/19.8 4.95/14.85	VI.S4= 26.4/49.5 6.6	
Safety and security Value of the indice	Presence of a various people from different origins Presence of appropriate lighting at night Existence of surveillance systems Security of movements Unineterruptedmovement	9.9/9.9 6.6/19.8 4.95/14.85 2.25/2.25	VI.S4= 26.4/49.5 6.6	
Safety and security Value of the indice	Presence of a various people from different origins Presence of appropriate lighting at night Existence of surveillance systems Security of movements Unineterruptedmovement Homogeneity between the different soft modes (walking, cycling)	9.9/9.9 6.6/19.8 4.95/14.85 2.25/2.25 6.75/6.75	VI.S4= 26.4/49.5 6.6	
Safety and security Value of the indice Mobility	Presence of a various people from different origins Presence of appropriate lighting at night Existence of surveillance systems Security of movements Unineterruptedmovement Homogeneity between the different soft modes (walking, cycling) Width of the promenade for pedestrian flow	9.9/9.9 6.6/19.8 4.95/14.85 2.25/2.25 6.75/6.75 9/9	VI.S4= 26.4/49.5 6.6 VI.S5= 19.5/21	
Safety and security Value of the indice Mobility	Presence of a various people from different origins Presence of appropriate lighting at night Existence of surveillance systems Security of movements Unineterruptedmovement Homogeneity between the different soft modes (walking, cycling) Width of the promenade for pedestrian flow Offer of circulation spaces for PRM (Persons with Reduced Mobility)	9.9/9.9 6.6/19.8 4.95/14.85 2.25/2.25 6.75/6.75 9/9 1.5/3	VI.S4= 26.4/49.5 6.6 VI.S5= 19.5/21	
Safety and security Value of the indice Mobility Value of the indice	Presence of a various people from different origins Presence of appropriate lighting at night Existence of surveillance systems Security of movements Unineterruptedmovement Homogeneity between the different soft modes (walking, cycling) Width of the promenade for pedestrian flow Offer of circulation spaces for PRM (Persons with Reduced Mobility) Mobilityefficiency	9.9/9.9 6.6/19.8 4.95/14.85 2.25/2.25 6.75/6.75 9/9 1.5/3	VI.S4= 26.4/49.5 6.6 VI.S5= 19.5/21 4.9	
Safety and security Value of the indice Mobility Value of the indice	Presence of a various people from different origins Presence of appropriate lighting at night Existence of surveillance systems Security of movements Unineterruptedmovement Homogeneity between the different soft modes (walking, cycling) Width of the promenade for pedestrian flow Offer of circulation spaces for PRM (Persons with Reduced Mobility) Mobilityefficiency Link to the surrounding tissue and emergency evacuation	9.9/9.9 6.6/19.8 4.95/14.85 2.25/2.25 6.75/6.75 9/9 1.5/3 3.9/11.7	VI.S4= 26.4/49.5 6.6 VI.S5= 19.5/21 4.9	
Safety and security Value of the indice Mobility Value of the indice	Presence of a various people from different origins Presence of appropriate lighting at night Existence of surveillance systems Security of movements Unineterruptedmovement Homogeneity between the different soft modes (walking, cycling) Width of the promenade for pedestrian flow Offer of circulation spaces for PRM (Persons with Reduced Mobility) Mobilityefficiency Link to the surrounding tissue and emergency evacuation Nearby public transport stops	9.9/9.9 6.6/19.8 4.95/14.85 2.25/2.25 6.75/6.75 9/9 1.5/3 3.9/11.7 2.6/7.8	VI.S4= 26.4/49.5 6.6 VI.S5= 19.5/21 4.9	
Safety and security Value of the indice Mobility Value of the indice Accessibility	Presence of a various people from different origins Presence of appropriate lighting at night Existence of surveillance systems Security of movements Unineterruptedmovement Homogeneity between the different soft modes (walking, cycling) Width of the promenade for pedestrian flow Offer of circulation spaces for PRM (Persons with Reduced Mobility) Mobilityefficiency Link to the surrounding tissue and emergency evacuation Nearby public transport stops Access points to the promenade	9.9/9.9 6.6/19.8 4.95/14.85 2.25/2.25 6.75/6.75 9/9 1.5/3 3.9/11.7 2.6/7.8 3.9/11.7	VI.S4= 26.4/49.5 6.6 VI.S5= 19.5/21 4.9	

Table 2.	Evaluation	of indicators	and indices	(source : Autho	ors 2022)
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Value of the indice	Access efficiency		4.55	
Urbanambiences	Quality of natural and artificial lighting	12.6/12.6	VI.S7= 23.1/31.5	
	Biodiversity and greening in the promenade	6.3/9.45		
	Quality of landsidefrontage	2.1/6.3		
	Management of noise pollution	2.1/3.15		
Value of the indice	Sensorial comfort		5.78	
	Visibility conditions/ urban composition rules	7.2/7.2		
Urban composition	Harmony of the facilities	2.4/3.6		
Urban composition	Existence of urban dominants and landmarks	5.4/5.4		
	Readability of the promenade	1.8/1.8		
Value of the indice	Landscapequality		4.2	
	Arrangement of seating places	7.2/10.8		
Arrangements	Arrangement of public lighting equipment	ement of public lighting nent 2.4/3.6		
	Presence of signallingtools	4.8/14.4	VI.S9= 19,2/36	
	Treatment of curbs and gutters	4.8/7.2		
Value of the indice	Comfort of use		4,8	
Environmental quality	Presence of protection against wind, rain, and sun	6.3/9.45		
	Choice of coatings for soil permeability	2.1/3.15		
	Collection and treatment of surface rainwater	6.3/9.45		
	Management of healthrisks	3.15/9.45		
Value of the indice	Climate and sanitarycomfort		4.46	





DISCUSSION OF EVALUATION RESULTS

The values of the indices were compared with the maximum value (VI max=7) and a performance threshold (PT) defined as 2/3 of this maximum value (PT=5).

The first index, cost-effectiveness of the amenities, is related to the criterion of economy of use, obtained a value equal to 1.6 far from the performance threshold (PT=5), though the indicator of economic efficiency has an optimal value

with important revenues resulting from the different commercial and leisure activities present in the promenade. The main indicators responsible for the poor score of this criterion are the use of renewable energies in the public lighting, the flexibility of arrangements, and the use of recyclable and sustainable materials, which indicate that the reduction of space and energy consumption is not taken into consideration in the design of this project, hence the performance of this criterion can be improved by several strategies including: the use of renewable energies such as sun, water, wind, moving in lanterns and bollards lights, changing the design arrangement according to the season to better adapt to users' needs and to reduce the consumption of non-renewable materials.

The second index, offer of management resources, related to the management criterion, had a value equal to 5.25 which slightly exceeds the performance threshold (PT=5). Its indicators represent 2/3 of the maximum values, because there are public establishments of industrial and commercial nature responsible for the maintenance of planted green spaces and waste management, according to a program, but their interventions have not yet reached the desired efficiency because their efforts are limited to basic maintenance work (cleaning, sweeping, weeding, grass cutting, watering). Therefore, some strategies can improve the performance of this criterion: expand maintenance interventions by also including maintenance of paving, benches, boardwalk tables, avoid placing garbage cans directly next to seats, as it is unpleasant to sit next to them, adapt circular guards around trunks to avoid damage to trees.

Similarly, the third index of functional attractiveness had a value equal to 5.5, which is slightly above the performance threshold. This is due to the availability of various services, the presence of recreational areas such as picnic areas, playgrounds, and sports areas, and the programming of events throughout the year, but the last indicator relating to the availability of ICT (Information and communications technologies) has a very low value due to its absence, so we recommend installing informative signs and interactive screens to promote user interaction with the promenade space, which will further improve its attractiveness.

The security of movements index is equal to 6.6, which is almost the maximum value (VI max=7), this is due to the optimal values of the first two indicators related to the quality of openness and presence of people from different origins which give the feeling of safety to the users of the promenade, but the other two indicators related to adequate lighting at night and the existence of surveillance systems represent 2/3 of the maximum values, hence the maximum performance can be achieved by adding certain strategies such as the installation of emergency call points, stations equipped with video surveillance cameras linked to the centralized control post, and the improvement of the night lighting.

The value of the fifth index, mobility efficiency, was 4.9, which is below the performance threshold, although its first three indicators have optimal values related to uninterrupted movement, homogeneity between the different soft modes (walking, cycling) and the width of the promenade for pedestrian flow. The last indicator, availability of circulation spaces for PRM (Persons with Reduced Mobility), has a very low value due to a lack of facilities for PRMs, exceptionally of some slopes between stairs, resulting in a lower index value. We therefore recommend the creation of a pathway or specialized pavement for visually impaired persons, sound signaling traffic lights, warning strips, lowering of curbs, pathways and parking for persons in wheelchairs.

The sixth index of access efficiency related to the accessibility criterion, had a value of 4.55, and it is below the performance threshold due to the low values obtained by its three indicators related to the link to surrounding tissue environment and emergency evacuation, nearby public transit stops, and access points to the promenade. Because of the enclosure of the promenade by nearby infrastructures such as highway 11, the railroad, industrial and administrative facilities, this results in a poor connection of the promenade to its immediate environment and difficulty of access especially for the non-motorized population, except that the last indicator relating to availability of parking spaces, has an optimal value compared to the others. The performance of this criterion can be improved by constructing alleys and penetrators connecting the promenade to the surrounding neighbourhoods, as well as improving public transportation in the area, and adapting more entrances especially in the central part.

The seventh index of sensorial comfort relating to the criterion of urban ambiences is slightly above the performance threshold with a value of 5.78. Its first indicator of natural and artificial lighting has an optimal value due to the pleasant light atmosphere provided by the amount of solar radiation received, ensuring good visual comfort. The values of indicators relating to biodiversity, greening in the promenade and management of noise pollution represent 2/3 of the maximum values, as the promenade has 8 hectares of grassy areas along its entire length with the planting of various types of trees (palms, Ficus, false banana, chamaerops, olive, laurel, etc.) which serve the role of an anti-noise screen, while the indicator quality of landside frontage has a very low value because the promenade is bordered only by roads to the south.

The eighth index, landscape quality, for the urban composition criterion did not fully reach the performance threshold with a value of 4.2 because the indicator harmony of facilities does not conform to installation requirements of the target benchmark. This may be improved by making the positioning of the various amenities consistent by separating the promenade into sectors so that each user can engage in their activity without being interrupted by other users, and improving the design by using forms that reflect the richness of the context and using colours that are harmonious with each other and with the landscape.

The comfort of use index, which is related to the arrangements criterion, and the climate and sanitary comfort index, which is related to the environmental quality criterion, have index values of 4.8 and 4.46, respectively, and are below the performance threshold, demonstrating the failures in the development of such a coastal promenade due to a lack of seating options and their inconsistent positioning. We recommend that a variety of alternative seating options, such as swivel chairs, sculptural loungers, and undulating wood-covered seating walls, be provided to improve the promenade's design. Relatively close seating spacing encourages lingering and makes the promenade more welcoming for seniors and people with limited mobility.

To promote environmental quality in the promenade, we propose the creation of occultation adapted to coastal promenades, which can be opened and/or closed according to the needs of protection. For example, the planting of a large number of trees that provide shade, to protect against the sun in the summer and against rain in the winter, the foresight of waste collection by aspiration, and the adaptation of rainwater recovery systems.

CONCLUSION

Urban waterfront promenades are a type of public space that has expanded throughout all coastal cities around the world due to their essential and rising significance, as well as their impacts on individual life quality, city planning, and the economy, In contrast to other public spaces that have been evaluated in several studies, waterfront promenades have never been evaluated, because of their distinctive shape and function, necessitating the identification of indicators that contribute to their high quality.

This study evaluated the quality of the Sablettes promenade using the contextualized QUEP method, which includes a grid of 10 criteria and 40 indicators, as well as additional indicators specific to waterfront promenades. The results of their application clearly demonstrate that the sablettes promenade does not perform well in the majority of quality criteria, especially in the economy of use, which showed the lowest value, followed by urban composition, environmental quality, arrangements, accessibility, and mobility, which are below the performance threshold, while the other criteria of management, attractiveness, safety, and urban ambience exceeded the performance threshold.

The evaluation of the Sablettes promenade by this contextualized method helps in identifying the failing indicators, suggesting strategies to improve their performance, and consolidating the successful indicators, in order to generalize this approach in other similar situations promoting the quality of waterfront promenades in all coastal Algerian cities given their strong maritime heritage.

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Competing Interests

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