Deriving Urban Design Principles for Jeddah Corniche Developments: User-Preferences Approach

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Abstract. Today, many recreational waterfront developments are only superficially pleasant as they lack significant design qualities needed by users. Notions on waterfront qualities create communication gaps between a designer vision and end-user perception. Designers might formulate objectives and ideas on waterfront qualities without adequately understanding the true needs and preferences of users, which encompass aspects deeper than merely visual features. This study evaluated the design quality of the recent development of Jeddah north Corniche. It aimed to analyse the relationship between physical patterns and users activity patterns, which will assert in understanding how seafronts physical pattern produces different social interactions; and how these activity–physical pattern relationships make this public realm work or not. This research employs questionnaires data collection method to interpret the activity patterns that appear to relate with particular use of design features. Analysing this relationship will conclude seafront socio-physical design principles, which take into account users preferences and the unique characteristics of Jeddah location and its Islamic culture, and encourage excellence in the design quality of urban waterfronts; focusing on creating prosperous, sustainable and liveable social environments. In addition, it will add insights and complement the application of urban design theories and practices, which could lead to further studies aiming to improve recreational seafronts design quality.

1. Introduction
Dong [1] defined the word waterfront as "the part of a town or city adjoining a river, lake, harbour, etc.". The waterfront is defined generally as the area of interaction between an urban development and the water. The urban waterfront could include any urban area that overlooks or adjacent to a river, sea, lake, canal or an artificial water body. At the city or macro level, the waterfront is the window reflecting the quality of the city [2]. The waterfront contributes to the formation of the city’s image and identity. Many cities are well known for their scenic waterfront landscapes. Some of these are very traditional, such as London, Paris, and Venice, while some are modern, such as Boston, Sydney, and Hong Kong. Recently, many waterfront cities have tried to implement measures by which to stimulate economic growth, improve environmental condition, and enhance competitiveness and vitality by taking advantage of their unique waterfronts and utilizing their respective cultural and historical resources [3].

Identifying the physical form of waterfronts is essential in finding out whether designed places are adaptable and able to accommodate people's activities [4][5][6]. According to Rasouli [2], investigating the physical dimension will lead to understand whether designed spaces are determined by the types of activities. Nonetheless, the local officials and urban designers lack of appropriate knowledge about the strong integration of social activities and public spaces use with the quality of physical design features.
in the process of designing quality waterfronts. The importance of such appropriate knowledge proved by argument of many scholars [6][7][8][9].

Designers and end-users may have different notions on waterfront qualities, and communication gaps possibly exist between the two groups. Designers might formulate objectives and ideas on waterfront qualities without adequately understanding the true needs and preferences of users, which encompass aspects deeper than merely visual features. Hence, perceptions on waterfront physical and social attributes need to be analysed. The designers should create more human-oriented waterfronts by gaining a better understanding of real user needs. User's perceptions regarding waterfront and the key aspects associated with those perceptions should be studied. Therefore, the main objective of this research is to explore an alternative approach to waterfront design through the eyes of users. Four key attributes of successful places: accessibility, comfort, socialization, and activity are accepted as quality indicators of today's urban spaces and they became an outline for the study methodology.

2. Methodology
The chosen waterfront to be studied is Jeddah’s Corniche. In year 2012, Jeddah’s Corniche project was awarded the best urban planning award in the Middle East. Thus, it was of great interest to evaluate this development. Furthermore, The Corniche has been indicated as the most popular public recreational site in the city due to the amount of open space it offers and because of its location on the Red Sea. Due to that, visitors come from various areas and nearby cities. Hence, their opinions reflect, to some extent, that of the total population of Saudi Arabia. Since the Corniche is very wide, this study has been narrowed down to the northern part of the Corniche only as shown in Figure 1. This selected site presents a typical example of various public recreational areas all over different parts of Saudi Arabia. Various social and physical problems had been noted by the author such as privacy intrusion, behavioural conflicts, harassment faced by the female visitors, social tension and conflicts between visitors and automobiles, between pedestrians and those sitting on the pavements.

![Map of Jeddah Corniche](image.png)

**Figure 1.** Study site (North side of Jeddah Corniche)

The data for this study is gathered using questionnaire whereby the 100 participant samples are randomly selected. The design of the questionnaire is intended to assess user's perception, which is associated with
how users form a mental image of their socio-physical experience and accordingly prefer a specific place rather than another. These perceptions sometimes affect the cultural background and social profile of the user. The questionnaire aims to explore the relationship between users’ satisfaction and the seafront recreational provision in order to investigate how that might influence or determine the Corniche public realm design. Moreover, it focuses on finding out how people behave in relation to the leisure site.

3. Results and Discussion

3.1 Parking
To ease congestions and avoid disturbance of parking lots, a question was asked to test how far people are willing to walk if their cars were parked far away from the Corniche. Results were positive with 29% of people willing to walk 10-50 meters, 26% did not mind walking 50-100 meters while 36% preferred not to walk at all (Figure 2). Li et al. reported that tourist like to choose cheaper and more convenient parking solution [10]. Nonetheless, they are willing to spend more time and money on the journey with scenic roadway and recreational characteristics. In addition, Wang et al stated that parking space availability, parking charge, and walking distance have significant effects on holiday parking choice of visitors[11].

![Figure 2. Walkability distance from parking lots to corniche](image1.png)

3.2 Visiting Frequency
The majority of responses confirmed that peaks on the Corniche happen in weekends and vacations with 45% of respondents; 25% go every month and 20% go every week (Figure 3). As for the time of these visits during the day, 57% usually go at night, 33% in the morning while only 10% go in the afternoon (Figure 4). During these visits, 48% would spend 1-2 hours and 38% would spend 3-4 hours.

![Figure 3. Frequency of visiting Corniche](image2.png)  ![Figure 4. Preference of visiting time in a day](image3.png)

3.3 Reasons for Attraction or Leaving
When the respondents were given options on attraction to the Corniche, the top five preferences (refer Figure 5) were to see the sea and the natural view (98 votes), relaxation and meditation (81 votes), to meet other family members or friends (61 votes), spaces for family and children to play (59 votes), lastly casual trip (47 votes). Others highlighted reasons like walking, eating, nearby house and the only place
to go to. Figure 6 presented the outcome of the answers on why do most of the visitors decide to leave Corniche. 88 of them stated that the place is being overcrowded, 69 mentioned that the location is very sunny and hot, and 33 of the respondents stated that they left to find a better place. These were the three main factors selected whereas cleanliness, poor lighting at night, not designed for different age groups, lack of services and no comfort while sitting and the poor mixing between activities without proper definition were some of the highlighted reasons as well.

3.4 Perception and Satisfaction of Physical Features
Aspects such as thermal, noise and lighting, along with functionality need to be considered in order to obtain global comfort of visitors [12]. Four critical design features were questioned. 94% of respondents stated that the number of seats is not enough. 87% stressed on the importance of having shaded areas. 76% complained from noise on the Corniche. As for the lighting at night, 31% were satisfied, 65% said to add more lighting as it is not enough at night (Figure 7).

3.5 Patterns of Use
Several questions were asked to investigate levels of comfort in relation to the physical feature. Figure 8 showed the responses obtained regarding the seating comfort at the Corniche. As for seats, results were almost equal since 30% preferred to sit on the grass, 25% use available seating’s while 31% would rather bring their own seats. With reference to Figure 9, for safety, 90% of respondents were unhappy to be away from their children while they are playing. To measure accessibility (Figure 11), 54% of
respondents were familiar with main entrances while 46% did not recognize it. Similarly, 78% of respondents did not notice handicapped access as figure 12. As for signage and way finding, 61% stated that they need more signage that is clearly distributed around the Corniche while 25% highlighted that they could not find clear directional signage (Figure 10).

Figure 8. Comfort in seating

Figure 10. Locating places at Corniche

Figure 9. Worriment of children’s safety

Figure 11. Ease in finding main entrances to an area in Corniche

Figure 12. Handicap special parking areas and ramped entrances provided

3.6 User’s Preferences

There are many activities carried out around the Corniche area. In Figure 13, the question intends to classify the top five activities according to user’s preferences. 91% prefer sitting and relaxing, 69% prefer eating, 68% like walking and exercising, 61% prefer barbeque and finally 48% like taking photos. Whereas activity such as fishing and swimming were the least done with only 22% and 6% of the population respectively. Deenihan et al [13] found that a tourist is willing to increase their cycling time by approximately 100% in order to cycle upon a fully segregated from traffic cycling facility rather than along a road without cycling infrastructure. While they are willing to increase their time by 40–50% to be able to cycle along a road with a cycle lane rather than a road without cycling facilities. Silva [14]
suggested that a comfortable microclimate for the pedestrian could be achieved through urban planning and design, considering street orientation and aspect ratio.

In terms of spatial functions (Figure 14), 87% of respondents preferred shaded areas and green open spaces as their number one favourite space. Second, 57% needed to have clean toilets. Third, 50% required easy and adjacent car parking areas. Fourth, 47% preferred safe children playgrounds. Fifth, 41% would like to have designated BBQ areas.

Figure 13. Activities frequently done

Figure 14. Preferred facilities at Corniche

4. Conclusion
Waterfronts play a vital role in the revitalization of cities economically, environmentally and socially. Waterfront design qualities are an important topic have and continue to be research until today. Some of these studies aim to fill the gap between urban designers and users perception of waterfront developments. Therefore, involving users in the creation and management of their built and natural environment will provide insights about their needs and preferences. This "Participatory Design" approach is a well-known trend these days as it helps in involving citizens in the planning and decision-making, which consequently improve the quality of designed projects. Following the application of the methodology, design principles for Jeddah Cornish development are concluded. These principles consider the two main variables of this study: 1) spatial "physical" principles and 2) social "activity" principles in order to improve Jeddah Cornish design quality. Results from the questionnaire revealed that the development of waterfronts depends on the existence of social interaction. Therefore, waterfront design should increase sense of community in users which is able satisfy the needs of comfort, relaxation, passive and active engagement. Some of the recommendations provided by the respondents are as follow:

1. Provide well-defined, wide and welcoming accesses: physical, visual and symbolic, with special accommodations for the disable.
2. Provide enough parking areas with special consideration for disable: nearby compact parking areas or located within 10-50m walking distance.
3. Create a variety of climate environments to facilitate activity in different seasons and weather conditions: include sunny, wind-protected areas for winter and shaded zones for summer.
4. Provide lights on sidewalks and activity areas to extend opportunities for activity into the evening.
5. Create multi-functional and mixed uses on the waterfront.
6. Regulate activities according to the dependency on water: water dependent activities should be located near the water. However, co-locating activities is recommended between sitting and walking.
7. Facilities and services should be within a reasonable price and support the waterfront activities like shaded chairs rental shops, local foods markets, outdoor gym equipment's, and a variety of affordable to high-end restaurants.
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