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Application of the USEC Framework for Assessing Potential Linkages of Al-Khobar City to its Waterfront

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Abstract

The sustainability of urban environments is linked to their inhabitants' lifestyles quality. Number of variables including accessibility, imageability, permeability, and green space per capita are used as indicators in measuring lifestyle quality. Al-Khobar is the first planned city in the Kingdom of Saudi Arabia that adopted a grid system pattern in the late 1940s for planning the oldest neighborhood (Northern Al-Khobar). This revealed very limited green open spaces, which the waterfront to the east recently offered it. This study was initiated to explore the potentialities of linking the city to its opposite waterfront, as the arterial road (Princes Turki Street) separates the two identities. It applied Uses and users, Space, Environment, and Circulation (USEC) framework—based on developed criteria—to assess the potentialities of 28 west-east local streets directly positioned to the waterfront for linkage of the two identities. The study found that eight streets offer such potential linkages; five of them are of good Connectivity Indicator (CI) while the other three are of acceptable CI.

Keywords: *Potential linkage, USEC, Waterfront, Green open space, Connectivity indicator*

1. Introduction

Quality of life or lifestyle quality is measured based on several indicators including green open space per capita and accessibility to open spaces. The World Health Organization (WHO) has adopted 9 m^2 of green space per capita as the minimum area that can satisfy individual needs and requirements (Maryanti *et al*., 2016). The figure varies from more than 560 m^2 per capita for inhabitants of Ljubljana, the capital of Slovenia in 2016 (Russo and Cirella, 2018), to less than 1 m^2 per capita for inhabitants of most Arab cities (Almayouf, 2013; Khalil, 2014). Figures for Saudi cities—except Jubail, Yanbu, and the cities of high mountainous regions—are ashamed where green space per capita in Riyadh and Jeddah are 0.86 m^2 and 0.90 m^2 respectively (Almayouf, 2013). Francis defined successful open spaces and parks as those that are lively and well-used by people, or in other words, those that satisfy the amenities and experiences users seek in enjoying public open spaces (Francis, 2003). He and others proposed three broad dimensions of good open spaces: needs, rights, and meanings; as the response to the needs of their users, provide equal accessibility to all, and are meaningful to a great deal of the community and society.

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Public spaces, in general, are essential for the well-being of urban residents (El-Kholei and Yassein, 2022). During the worldwide Covid-19 pandemic, public spaces have been identified as critical urban facilities moderating residents' outdoor activities and securing their health and wellbeing (Chen *et al*., 2020). Gabr indicated that negative social consequences could arise when users are unable to access a vital public resource (2014). For example, the Nile River was historically the heart of Cairo; and due to its recent growth in the last decades, many private projects have arisen along the riversides obstructing the citizens' accessibility to the riverbanks (Kondolf *et al*., 2011).

Kabisch and Haase (2014) argued urban population growth and re-densification planning strategies can derive conversion of Urban Green Space (UGS) into residential uses which, in turn, results in an unequal distribution of UGS in a city. Luck and / or unequal distribution of UGS has several implications on the urban environments and their inhabitants as well. Jim and Chin (2008), Gill *et al.* (2007) and Bowler *et al.* (2010) highlighted the environmental benefits of UGS including purification and cooling of ambient air, and mitigation of the effects of urban heat islands. Others have argued the role of UGS in reducing overall energy consumption (Simpson, 2002); minimizing noise effects (Yuehan *et al*., 2017; Perini, 2016). Also, UGS has positive effects on rainwater infiltration and the reduction of surface run-off (Bolund and Hunhammer, 1999). Furthermore, UGS performs great social benefits to urban inhabitants including improvements in mental and physical health such as relaxation and stress release (Annerstedt *et al*., 2013). In hot weather and during hot seasons, UGS can reduce local temperatures which alleviates the effects of heat on people (Breuste *et al*., 2013); provide recreational functions that help improve life quality (Kabisch and Haase, 2014), and act as meeting places that support social interactions residents and contribute environmental and functional sustainability of urban systems (Martin *et al*., 2004).

The sustainability of urban systems is more effective when initiated at the neighborhood level. Gibberd (2013) argued that interventions for addressing sustainability should be developed at a neighborhood level to enable day-to-day living patterns and move to be sustainable over time. Such a concept calls for the availability of all facilities and services that satisfy the needs and desires of inhabitants, which most of the 1940s Arabian Gulf settlements are not offered due to their compactness and lack of reasonable sizes of open spaces. Neighborhood planning and design can play a noticeable role in sustainability, especially at the social level. It promotes walkability and social interaction. Wells and Yang (2008) proved a relationship between crowdedness (highly dense neighborhood) and walking and socialization habits; where more grid-like street-network patterns are associated with increased walking which was proved by a previous study by Greenwald and Boarnet (2001). Similarly, Kazmierczak (2013) considered neighborhood open spaces (particularly green spaces) as opportunities for social interactions that may help the residents to develop relationships and establish recognition. Boschetto *et al.* (2022) viewed accessibility to common goods as one of the sustainability principles at the neighborhood level that structured the new urban challenges to urban design and architecture commitments. Also, Al-Ali *et al*. (2020) concluded that accessibility to destinations, quality of the perceived environment, and neighborhood context influence the residents' satisfaction in a community.

Recently, some studies had highlighted several factors contributing to the improvement of life quality and livability at a neighborhood level, among them ''street connectivity''. Street connectivity is defined as the directness of links and how the connection of one street to another and the density of intersections (Mecredy *et al*., 2011; 2012). Ustaoglu *et al*. (2018) believed that street connectivity and other elements include the density of mixed uses, the distance between destinations promote active travel and improve environmental conditions for physical activities of the neighborhood residents and promote social interactions between them (Ustaoglu *et al*., 2016; 2017). Al-Saaidy and Alobaydi (2021) concluded that interactions and transactions of a high number of people are taking place around areas with mixed land use as part of daily urban life during different periods. Also, Burton *et al*. (2011) have appointed street connectivity as one of the leading factors affecting public transportation, health, and physical activities of the residents. In the same way, Hajna *et al.* (2015) have identified street connectivity as one of the three factors affecting a neighborhood's residents' health and physical activities; the others are mixed land use and residential density. In addition, Shareef and Altan (2021) proved in their study on neighborhoods of Dubai city that the livability level of the community was increased by the enhancement of the land use diversity, accessibility, and walkability to major facilities, building height diversity, and the quality of green areas. However, Oliver *et al*. (2015) have highlighted street connectivity as an effective factor in the physical activities of residents, while Koohsari *et al.* (2016a; 2016b) have considered street connectivity as one of the indicators of "neighborhood walkability".

Northern Al-Khobar (see historical background section) is the oldest neighborhood of Al-Khobar city and lacks UGS within its compacted urban setting. However, the 84 hectares of Prince Faisal bin Fahd Coastal Park (PFFCP) and its associated leisure infrastructure offers the neighborhood large green space and recreational facilities. The problem is that: this great green space has been isolated from the urban mass by high traffic volume on the major street (Prince Turki Street) which made it difficult to cross to the waterfront park. However, the neighborhood has a good opportunity for street connectivity as its 28 east-west streets intersect with the other 21 north-south streets at more than 550 points; and at the same time facilitate linkage of the neighborhood to its waterfront park.

Since the PFFCP is located to the east of the neighborhood, this study tried to explore the potentialities of certain east-west streets to attract residents of the Northern Al-Khobar neighborhood to the waterfront and suggested safe passage crossing Prince Turki Street to the waterfront park to the east. The shared street concept which is designed to reduce the dominance of vehicles and share road space between vulnerable users and vehicles with an ultimate priority given to pedestrians (Setyowati, 2018) seems to be applicable for qualified streets. Lee and Kim (2019) viewed streets and their designs as essential elements of walkability in urban settings. And walkability, as defined by Lewis and Adhikari (2017) is "the ability to make routine trips in an acceptable travel time without having to park a personal car next to the home and without having to routinely drive long distances".

The aim of the shared street concept is the self-regulation of various users who interact in a space without physical segregation, traffic regulations, or control devices (Hamilton-Baillie, 2008). Shared spaces are carefully designed to improve pedestrians' safety and mobility through the elimination of vehicles' dominance and reducing their speed (Kaparias *et al.*, 2012).

2. Statement of the Problem

After the inauguration of the PFFCP in 2007, the residents of Al-Khobar have been offered great leisure and recreational opportunities. However, they have faced the challenge of crossing the 80 m—wide Prince Turki arterial road which separates the waterfront from its adjacent urban context. Safe and easy-crossing points are required in the presence of 28 streets linked to Prince Turki Street and crossing the neighborhood from east to west. These crossing points must be limited and at almost an equal distance.

3. Study Area's Historical Background

Al-Khobar city locates on the western coast of the Arabian Gulf 20 km to the south of Ad-Dammam City: the administrative capital of the Eastern Province of the Kingdom of Saudi Arabia. Al-Khobar city—like most of the Arabian Gulf cities with a maritime-based economy—had emerged as a small fishermen's village consisting of fishermen and pearls divers (Daghistani, 1993). Its origin dates to 1923 when a group of men from the Ad-Dawasir tribe came from Bahrain and settled along the western coast of the Arabian Gulf. At that time, Al-Khobar had appeared as a small village constituted of wooly tents and shanty huts (Daghistani, 1993; Dammam Municipality, 1993; 2005).

Al-Khobar together with Ad-Dammam and Adh-Dharan (the three cities that constitute what is known today as the Dammam Metropolitan Area (DMA)) were not mentioned before the discovery and commercial production of oil in 1937. In 1938 Al-Khobar was selected to accommodate the pier for importation and exportation processes linked to the oil industry due to its closeness to the oil production center in Adh-Dhahran; its closeness to Bahraini seaports (which were more suitable for navigation at that time); and the suitability and stability of its coastline (Fancy, 1994; Al-Khedheiri, 2002).

As a result of accelerated urban growth and expansion of the three cities; in 1947, the governor of the Eastern Province was inspired to request a collaboration between the oil company (ARAMCO) and the Municipality to control the growth and develop a master plan for the two cities of Al-Khobar and Ad-Dammam based on what had been adopted for the planning of Adh-Dhahran city (AMCDE, 2005). The output of this collaboration was land subdivision plans for the two cities. The plan of Al-Khobar included the area between King Abdul-Aziz Road, Prince Turki Street, Prince Faisal bin Fahd Street, and the Custodian of the Two Holy Mosques Road which is known as Northern Al-Khobar (Figure 1) which was known later as "the Northern Al-Khobar". And later, due to steady population growth, the area to the south was subdivided on the same grid planning system.

Due to its economic importance, Al-Khobar has attracted internal and external immigrants and consequently experienced two periods of unprecedented growth: between 1934 and 1956; and between 1973 and 1982 as shown in Table 1 below (General Authority for Statistics, 2012). However, the cities of the DMA have witnessed

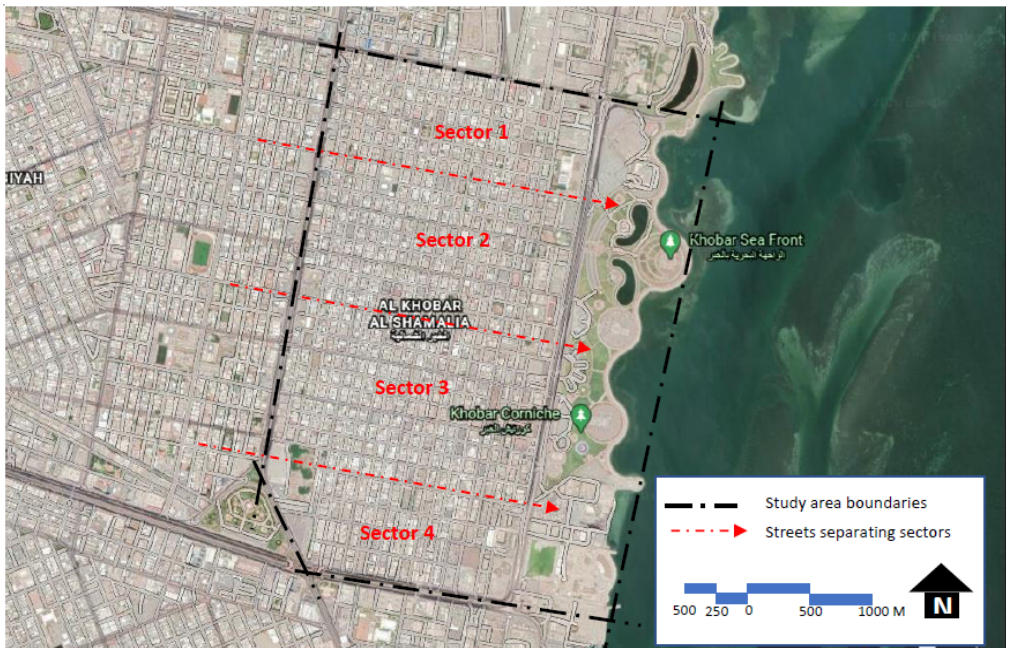


Figure 1: Al-Khobar Ash-Shamaliyah (Northern Al-Khobar) is Divided into Four Sectors for Inventory and Data Collection by Student Groups

Source: Google Maps, 2020

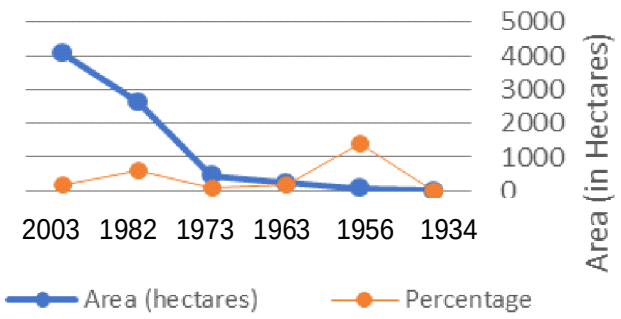
steady population growth due to the attractiveness offered by the oil and other industrial sectors. The population of the three cities reached 320.000 in 1982 (Daghistani, 1993) and continuously increased to more than 1.5 million in 2011; about 460.000 of them were in Al-Khobar (Abd Elrahman and Assad, 2021).

The Northern Al-Khobar or Al-Khobar Ash-Shamaliyah (as known in Arabic) is about 300 hectares surrounded by four major roads: Prince Faisal bin Fahd Street from the north, the Custodian of the Two Holy Mosques' Road from the south, Prince Turki Street from the east, and King Abdulaziz Road from the west.

Table 1: Physical Expansion of Al-Khobar City 1934-2003

Period	Change of Built-up Area	
	Area (hectares)	Percentage
1934	5.45	0
1956	76.15	1397
1963	224.45	195
1973	453.85	102
1982	2626.95	579
2003	4061	155

Source: AMCDE (2005)



Prince Turki Street separates the neighborhood from its 350 m wide waterfront park known as Prince Faisal bin Fahd Seafront Park (PFFSP).

The neighborhood follows the grid system planning pattern whereas between Prince Faisal bin Fahad Street to the north and the Custodian of the Two Holy Mosques' Road to the south, 28 west-east parallel streets intersect with 22 north-south streets. The neighborhood is compact with limited open spaces between the building blocks of low-rise three to four stories. The streets' width is not more than 15 m and buildings of mixed uses appear on both sides, generating a 1:1 space ratio along most of the streets. The compactness of the neighborhood and limitation of spaces resulted in high-density populated areas of different ethnic groups.

4. Methodology

This research applied data collection, observation, and analysis methods. It is based on the first semester of the academic year 2019/2020 students' work during LARCH 401: Urban Landscape Design Studio 7, which aimed to study and analyze the streets of the Northern Al-Khobar neighborhood for potential linkages with the waterfront. During the data collection phase, Uses and users, Space, Environment, and Circulation (USEC) framework was developed to organize the data collection and analyze urban settings for different purposes based on several elements and criteria.

The USEC Framework facilitates holistic analysis of the collected data, by looking at several interrelated elements and factors at the same time. Thus, causes and consequences and mutual relationships can be easily identified and lead decision-makers toward a comprehensive solution to the problem. In other words, without using the USEC framework solutions might be partial (dealing with factors individually) and contradict each other (Figure 2).

The students were divided into four groups to accomplish data collection of four sectors to which the northern Al-Khobar Neighborhood was divided (Figure 1). Each east-west street was investigated against the criteria listed in Table 2 and assigned a score on a scale of 1-5, it scored 5 when the issue is of positive

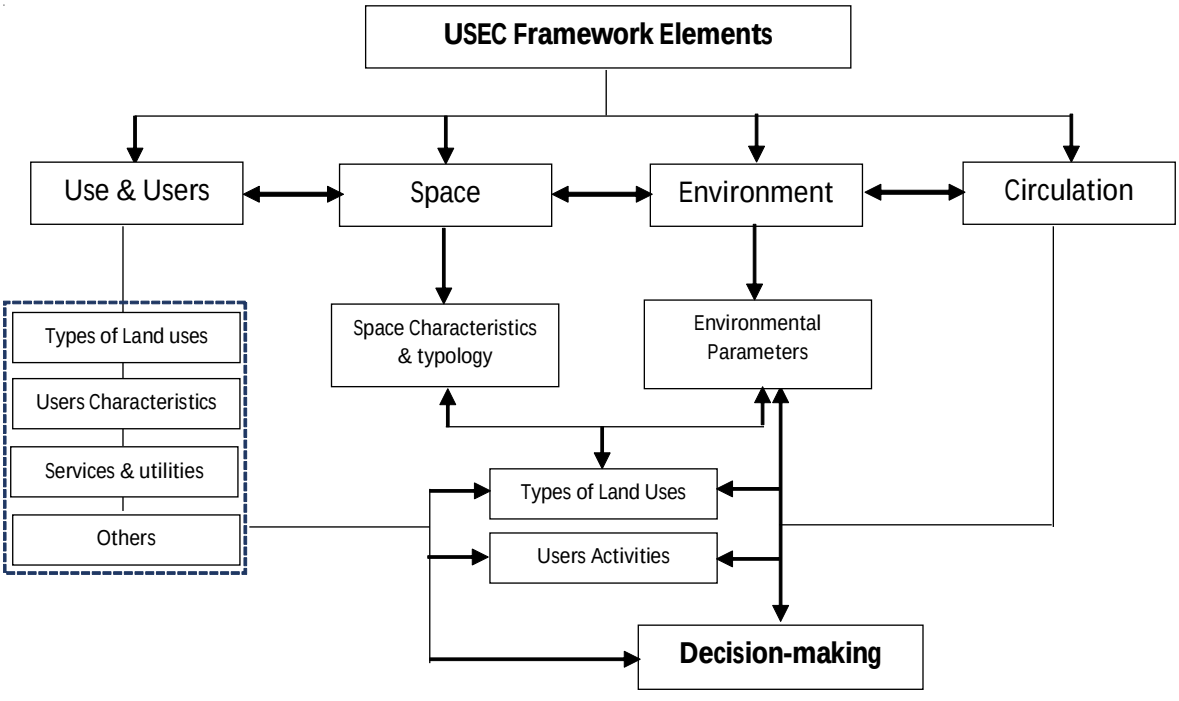


Figure 2: The USEC Framework Elements Show Interrelation Correlation of Collected Data Toward Decision Making

contribution to the goal of connectivity, and vice versa. Five criteria are considered positive if they scored 1 point: safety hazards to users; exposure to direct sun, reflection, and radiation; wind effects; the level of pollution; and vehicular traffic volume and congestion possibilities. The other 19 criteria are positive when scored 5 points, which makes the total maximum score of the ideal situation 100 points. By dividing the total

scores of each street by 100, the possibility of the streets' Connectivity Indicators (CI) is obtained for each street. If the street's CI is equal to 7.0 or above, it is considered good possible connectivity.

5. Data Analysis and Results

Collected data according to the USEC framework categories (Figure 2) including land uses and users, space, environment, and circulation were analyzed based on 24 criteria: (7 on uses and users, 8 on space, 4 on environment, and 5 on circulation) was documented for each street (Table 2). Figure 3 presents examples of the students' data collection, inventory, and analysis which are being used to evaluate street connectivity indicators.

A summary of the analyzed data of each of the 28 east-west crossing streets is presented in Table 2 as scores out of five showing the street contribution toward the connectivity of the neighborhood and its waterfront against the criteria listed to the left. Street connectivity indicator (the division of accumulated score of each

Table 2: Scores Against Criteria and Connectivity Indicators of the East-West Crossing Streets of Northern Al-Khobar Neighborhood

	Criteria	Northern Al-Khobar Neighbourhood's East-West Oriented Streets																									
		A	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th	21st	22nd	23rd	24th	25th	26th	27th
Uses and Users	Percentage of resedential land uses	2	2	3	3	3	2	1	2	2	1	3	2	2	3	3	2	3	3	2	4	3	3	3	2	2	3	2	3
	Availability of services (recreation, Education, relegious, ..	1	1	2	3	3	2	2	1	2	2	4	1	1	3	2	2	2	1	3	4	3	3	2	2	2	3	2	2
	Availability of facilities (Resturents, Cafes, ...	1	3	3	3	3	1	1	3	1	2	4	3	2	4	2	4	2	2	2	4	3	1	2	2	2	3	3	3
	Special areas of intensive use	3	3	3	4	3	1	3	1	3	2	4	3	1	3	2	3	2	2	3	4	4	2	2	2	3	3	2	2
	Users groups characteristics and density	3	3	3	4	3	2	2	2	3	2	4	3	2	4	2	2	3	2	2	4	3	2	2	2	2	3	3	3
	Users behavior, activities and conflicts	1	2	2	3	2	2	2	2	2	3	3	2	3	2	2	2	3	2	2	2	2	2	2	3	2	2	2	2
	Safety hazards to users	3	3	3	3	3	3	2	3	2	2	2	3	3	2	2	3	2	3	3	3	2	2	2	2	3	2	3	2
Space	Space Ratio and proportion	2	2	2	3	3	2	2	2	2	2	3	2	4	3	3	3	2	3	2	3	2	2	2	2	2	3	3	3
	Space shape and geometery	3	3	3	3	3	2	2	3	2	3	3	3	4	3	2	2	2	3	2	2	3	2	2	3	3	3	3	3
	Space enclosure (open, eclosed, semi-enclosed)	2	2	3	4	3	3	3	3	3	3	3	2	3	3	3	3	3	2	3	4	3	3	3	3	3	3	3	3
	Space quality (materials, dimentions, furnshing and feelings)	1	1	1	3	3	1	1	1	2	1	4	1	1	4	2	2	3	2	3	3	3	2	2	2	3	3	3	3
	Views and Vistas	1	1	1	3	3	1	2	3	3	3	3	1	2	4	3	2	3	2	3	3	3	1	3	2	2	2	1	1
	Maintenace level of outdoor spaces	2	2	2	3	3	1	1	2	1	2	3	2	2	3	2	2	2	2	3	4	3	2	2	2	3	3	3	2
	Architectural characteristics	1	1	1	3	3	1	1	2	1	2	2	1	1	3	2	2	2	2	2	4	3	2	2	2	2	4	3	3
	Points of interests (Land marks, nodes, ..)	1	2	2	4	4	1	1	3	3	2	4	2	2	3	2	3	2	2	3	4	3	2	2	3	3	4	2	3
Environment	Avialability of vegetation and Functional uses	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	2	1	2	2	2	2	3	3	1	1	3	1	1
	Exposure to direct sun	2	2	2	1	2	1	1	1	1	2	1	2	2	2	2	3	1	2	1	2	2	1	1	2	1	3	2	2
	Wind effects, reflection and re-radiation	3	3	3	3	2	3	2	2	3	2	2	3	3	2	3	3	3	2	3	2	3	2	3	2	3	2	2	1
	Level of pollution	3	4	3	3	4	3	3	3	3	4	4	3	4	3	3	3	3	3	3	4	3	3	3	2	2	3	2	2
Circulation	Street right of way (ROW)	4	4	4	4	4	4	4	4	3	4	4	4	4	4	4	4	4	3	3	4	4	4	4	3	3	4	4	4
	Vehicular traffic volume and Congestion possibilities	4	4	4	3	5	4	4	3	4	4	2	4	4	4	4	4	4	4	3	5	4	3	4	3	3	3	4	4
	Avialabilty of parking	2	3	3	3	1	2	2	3	2	2	3	3	3	2	1	1	2	4	2	1	1	3	3	2	3	3	2	2
	Pedestrian facilities	1	1	1	2	2	1	1	1	1	2	3	1	1	3	3	2	2	2	2	3	2	2	2	2	2	3	2	2
	Accessability and crossing	2	2	2	2	1	2	2	2	2	2	3	2	2	2	2	2	3	3	2	2	2	2	2	3	2	2	2	2
	Total Scores	49	55	57	71	67	47	47	53	52	55	72	54	57	70	57	61	59	58	59	77	66	54	58	54	57	70	59	58
	Conectivity Indicator	4.9	5.5	5.7	7.1	6.7	4.7	4.7	5.3	5.2	5.5	7.2	5.4	5.7	7.0	5.7	6.1	5.9	5.8	5.9	7.7	6.6	5.4	5.8	5.4	5.7	7.0	5.9	5.8

Source: Compiled by Author

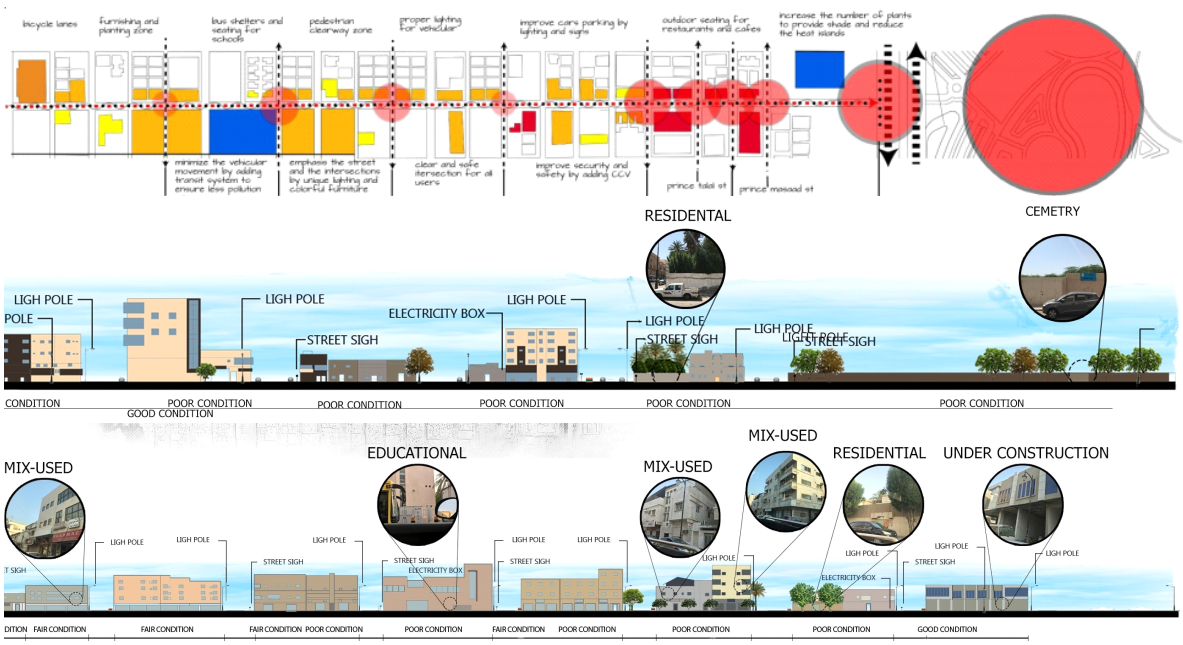


Figure 3: Examples of the Students' Work on Data Collection, Inventory, and Analysis of the Streets of the Northern Al-Khobar Neighborhood

Source: Submitted work on LAD 7, 2020

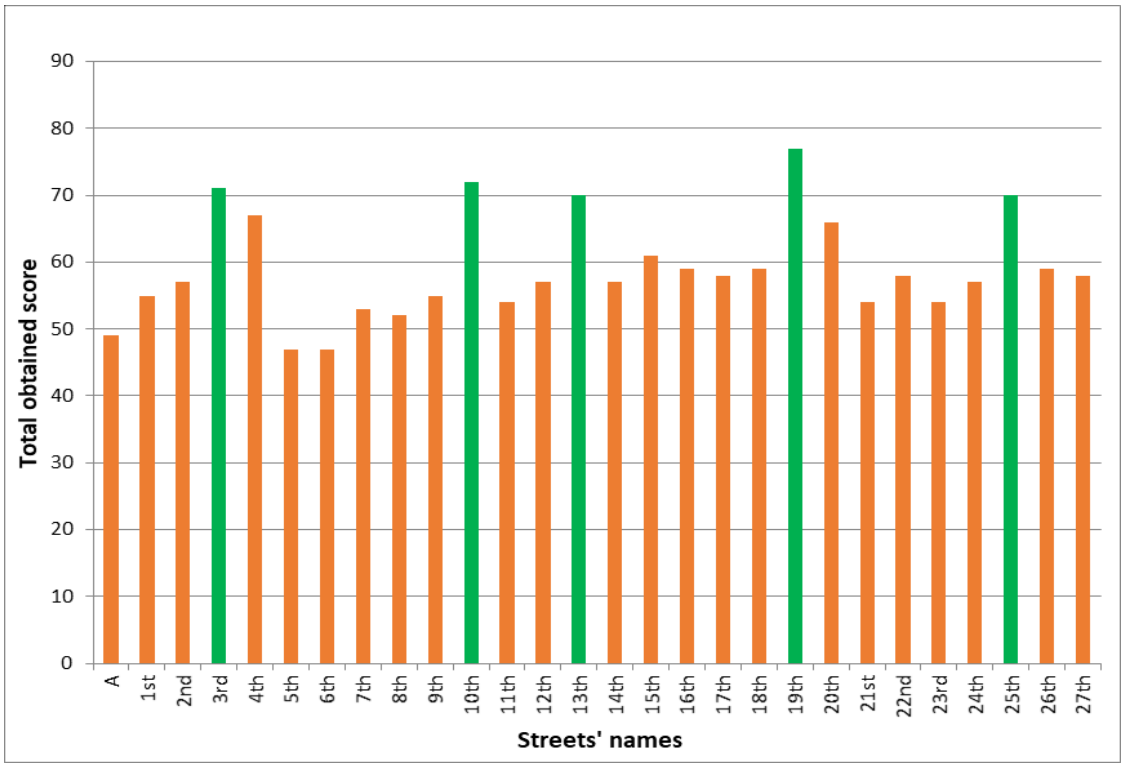


Figure 4: Connectivity Indicators of the East-West Crossing Streets of Northern Al-Khobar Neighborhood as a Result of Dividing the Total Obtained Score by 100

Source: Compiled by Author

street by 100) showed that 3RD, 10TH, 13TH, 19TH, and 25TH streets are good connectivity indicators varying between 7.0 to 7.7. However, there are three other streets of CI above 6.0 (4TH, 15TH, and 20TH) considered fair connectivity (Figure 4) but due to their closeness to and competitiveness with those of good CI, the decision was to develop the five streets of good CI as connections between the neighborhood and the waterfront.

Development proposals for the five streets of good CI suggested shared space, partially shared space, pedestrianized with minimal vehicular crossing concepts. And when it comes to crossing Prince Turki Street other design solutions were developed to separate vehicular traffic from vulnerable users using bridges and tunnels (Figures 5, 6 and 7); or maximize the safety level for crossing vulnerable users using Speed Calming Measures (SCM).

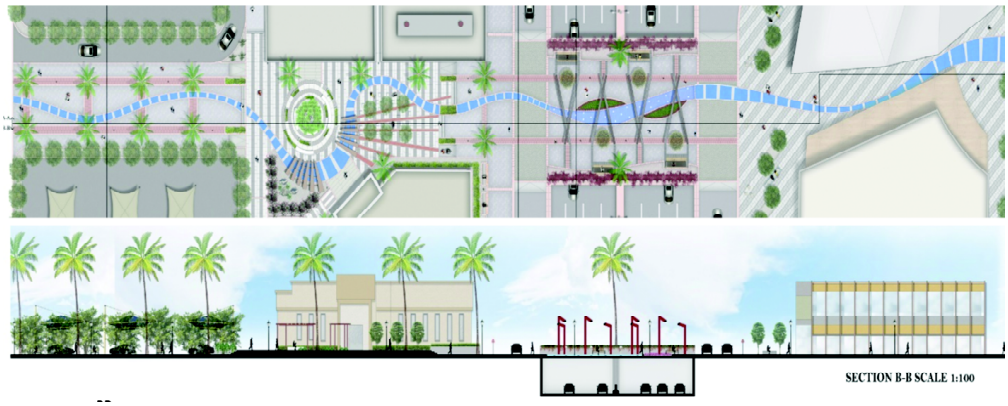


Figure 5: 3rd Street Crossing Prince Turki Street At Ground Level Where Vehicular Circulation is Separated Using an Underground Tunnel

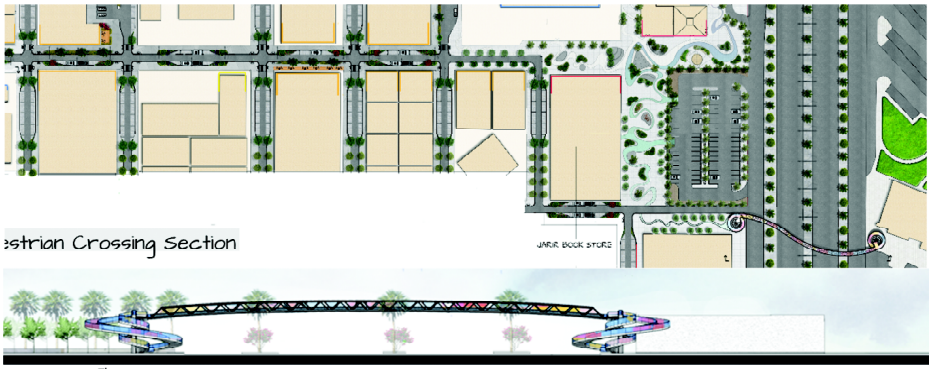


Figure 6: 14th Street Crossing Prince Turki Street where Pedestrian Circulation is Elevated Using a Bridge

Figure 7: 25th Street Crossing Prince Turki Street At Ground Level Where Vehicular Circulation is Separated Using an Underground Tunnel

6. Discussion

Urban design projects are a complicated task that requires a comprehensive overview of the USEC four categories at the same time and an analytical understanding of their interrelated interactions and consequences. It has been witnessed that several urban design projects were modified during implementation or left incomplete (Moor, 2006; Ramlee *et al.*, 2015). The uncertainty of urban design's relationship with other disciplines such as architecture and planning, in addition to the criticism of its constituting elements (definitions, objectives, stakeholders, processes, and flow) requires deep and critical analysis to understand the causes and consequences of results (Moor, 2006).

The USEC framework proved to be a very effective tool that can handle a large amount of data of complex interrelated dependent variables. During site inventory and data collection, it was a helpful tool for collecting, sorting, and organizing the information regarding land uses, built environment features and characteristics, demographic information of users; space features and characteristics as well as environmental issues affecting the built environment; and circulation of both vehicles and pedestrian and its related issues. The USEC framework also facilitated the organization and categorization of collected data under the four broad categories (Uses and users, Space, Environment, and Circulation) which in turn, maximize their benefits in analyzing the situation and effectively supporting the decision-making process.

There is no doubt that connecting the old part of a city with a recently developed one is a challenging effort, especially in the presence of strong obstacles such as major roads with high traffic densities. The possible connection of the Northern al-Khobar neighborhood to its seafront park via those five streets of good CI crossing Prince Turki Street will provide valuable recreational opportunities with variation in choices for the residents of such a high-density compacted neighborhood and positively enhance their quality of life.

The PFFSP with its location in front of the old part of the city; and being the middle part of the Al-Khobar waterfront has offered large variations of active and passive recreational opportunities. It connects the northern and the southern parts of the city's waterfront where a variety of activities are possibly practiced. By crossing Prince Turki Street, residents can walk, cycle and enjoy other activities along with various parts of the waterfront.

The contradictory old, compacted, grid pattern layout of the northern Al-Khobar neighborhood and the contemporary seafront park on the opposite side is an opportunity for urban revitalization. Such juxtaposition might help and facilitate gradual transformation and integration of urban fabric and serves obvious functional and visual links between the neighborhood and its surroundings. Revitalization programs usually aim to create a sustainable urban context through the conservation of urban identity, culture, and traditions; the enhancement of the local economy by creating jobs and preserving natural resources; and the satisfaction of users' needs and requirements through the provision of suitable and accessible urban services, amenities, and facilities (Vileniske and Urbonas, 2014; Ramlee *et al.*, 2015). The function of urban public spaces as symbols of any contemporary city (Okolo and Okolie, 2010), the PFFSP should act to regenerate the identity of the Northern Al-Khobar neighborhood and reflect its citizens' social life and interactions.

7. Conclusion

The five streets of good CI at their intersections with Prince Turki Street can create attractive nodes on both sides. However, the recent modification of the layout of Prince Turki Street at the intersections with Prince Faisal bin Fahd Street and the Custodian of the Two Holy Mosques Road facilitates the crossing between the two sides. This development minimizes the through traffic where the northern entry is diverted to Prince Faisal bin Fahd Street and the southern entry has been diverted to Corniche Road. Also, U-turns and Speed Calming Measures (SCM) created along this segment between Prince Faisal bin Fahd Street and the Custodian of the Two Holy Mosques Road have controlled the vehicles' speed and facilitated safe crossing at the five selected crossing nodes.

In addition, the western side of Prince Turki Street experienced a recreational trend development to compete with the other side. Such development of recreational facilities and food and beverages services attract residents and visitors of the Northern Al-Khobar neighbourhood and goers of the PFFSP across the street.

This study's contribution is the assessment of the Northern Al-Khobar neighborhood for possible linkages with its opposite waterfront and the application of the USEC framework as a tool for organizing and analyzing large quantities of data that have complex interrelated dependent variables. The use of the USEC framework also can be a supportive tool for decision-makers in the fields of urban design.

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