Journal of Posthumanism

2025
Volume: 5, No: 5, pp. 1053–1085
ISSN: 2634-3576 (Print) | ISSN 2634-3584 (Online)
posthumanism.co.uk

DOI: https://doi.org/10.63332/joph.v5i5.1428

Modeling and Spatial Analysis of Tourism Centers and Their Impact on Enhancing the Quality of Life in the City of Al-Khobar, Eastern Province

Nourah M. Alamri[1]

Abstract

Modeling and spatial analysis studies of tourist centers and facilities in Al- Khobar are fundamental pillars for the future planning of this important economic sector. Saudi Arabia aims for this sector to become a major source of national income, replacing the oil sector, in line with Vision 2030. Al -Khobar, situated on the Arabian Gulf coast in the eastern Province of Saudi Arabia, is one of the cities with the potential to be a key tourist destination in the Kingdom due to its coastal location, proximity to Gulf countries, diverse tourism assets including entertainment, sports, and cultural heritage, and its distribution of tourist accommodation facilities across its various districts.Spatial analysis using Geographic Information Systems of tourist centers and facilities in Al-Khobar revealed variations in their geographical distribution, with concentration in districts close to the beach and dispersion in some inland areas. The distribution of tourist centers and facilities had an impact on quality of life indicators for residents in the city in 2024, with some of these indicators exceeding the targets set in the Quality of Life document for the Kingdom, compared to the baseline year or the 2030 target, especially in districts where tourist centers and facilities are concentrated. The spatial modeling study of tourist centers and facilities in Al-Khobar highlighted the selection of the most suitable locations for future tourism projects based on criteria such as roads, population density, slope, and proximity to the beach. It identified four categories of spatially suitable sites for these projects, ranging from areas with very high spatial suitability, accounting for 2.9% of the city's total area, to those with low spatial suitability at 4.5%.

Keywords: *Modeling & Spatial Analysis-Tourist Centers & Facilities- Sustainable Development- Spatial Suitability- Quality of Life- Al-Khobar - Eastern Province.*

Introduction

Tourism is considered one of the promising economic activities due to the sustainable income it generates. Therefore, Saudi Arabia has focused on this economic sector to become one of its main sources of non-oil national income, contributing to achieving sustainable development goals and the targets of Vision 2030 in the Kingdom. Tourist centers and facilities have proliferated in its various cities, including Al-Khobar on the eastern coast of the Kingdom on the Arabian Gulf, because of the development of this sector. Therefore, spatial analysis and modeling studies of these tourist centers and facilities contribute to their development and monitoring their impact on quality of life indicators for residents. Spatial modeling also aids in identifying spatially suitable areas and selecting the best locations for establishing tourist centers and facilities in cities in the future.

[1] Department of Geography & GIS, College of Arts, Imam Abdulrahman Bin Faisal University, Dammam, Kingdom of Saudi Arabia, Email: noalmary@iau.edu.sa, https://orcid.org/0000-0002-8729-8975.

Research Problem

A study of tourist centers and facilities in the city of Al-Khobar in the Eastern Province of the Kingdom of Saudi Arabia using spatial modeling techniques and spatial analysis methods in Geographic Information Systems (GIS) and studying their impact on some indicators of the quality of life of residents in the city. Spatial suitability analysis will be used to select the best geographical locations for establishing tourist and recreational centers and facilities in the city's districts in the future.

Importance of the Study

The Kingdom of Saudi Arabia seeks to strengthen the non-oil national economy by diversifying its monetary resources, especially the tourism sector, which is one of the pillars of the Kingdom's Vision 2030 and has achieved a significant growth boom over the past years. The number of tourists in the Kingdom reached 60 million tourists (inside and outside the Kingdom) during the first half of 2024, with a tourism spending rate of 38 million dollars (Saudi Minister of Tourism, 18 July 2024). Therefore, the study aims to model and analyze the spatial tourist centers in Al-Khobar, study their impact on the quality of life indicators in the city, and use the spatial adaptation method with GIS programs to identify the best geographical locations for the settlement of tourist centers, especially the recreational centers that were selected as an applied model in the study.

Study Area

The city of Al-Khobar is one of the cities of the Eastern Province and its most important tourist centers, as the city is in the southeast of the Kingdom of Saudi Arabia, between latitudes 26°1'43", 26°23'15" north, and longitudes 50°5'16", 50°14'9" east. Geographically, it is bordered by the city of Dammam to the north, the Arabian Gulf to the east and south, and the city of Dhahran to the west (Figure 1). The city takes an elongated shape on a relatively flat land with a length of 39.5 km from north to south along the extension of the Arabian Gulf, with an average10

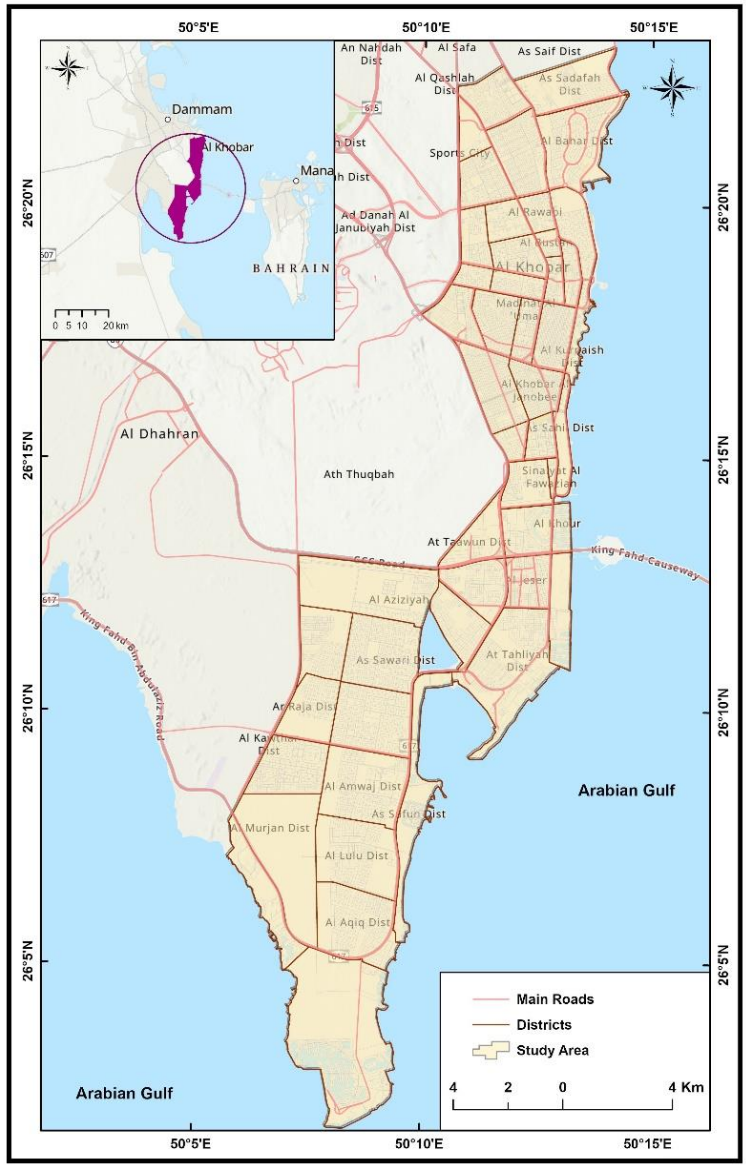


Figure No. (1) The Location of the City of Al-Khobar and its Spatial Relationships.

km, reaching an area of 199.2 km2 (calculated by the researcher). The population of the city reached 658.6 thousand people according to the latest census in 2022, representing 12.8% of the total population of the Eastern Province, which is about 5.12 million people (General Authority for Statistics, Saudi Census, 2022).

Objectives of the Study

- Classification of tourist centers and facilities according to their distinctive characteristics and the services they provide to tourists and visitors.

- Studying the geographical distribution of tourist centers and facilities using spatial analysis methods in geographic information systems in Al-Khobar.

- Spatial modeling of tourist centers and facilities in the city of Al-Khobar.

- Studying the impact of the spatial distribution and diversity of tourist centers and facilities on quality of life indicators in the city of Al-Khobar.

- Studying future planning to choose the most suitable sites for recreational tourist centers and facilities as an applied model in the districts of Al-Khobar city using the spatial adaptation method.

Approaches and Methods of Study

The study employed several methodologies to analyze its elements, including analytical, objective, and behavioral approaches. It also utilized numerous quantitative and cartographic methods to process data and create figures and maps using Geographic Information Systems (GIS) software.

Previous Studies

Tourism issues in the Kingdom of Saudi Arabia and its Province have been addressed in several geographic and non-geographic studies, but the spatial modeling of tourism centers and facilities and their role in the quality of life of residents have not been studied. Over the past two decades, the most important studies dealing with tourism in the Kingdom of Saudi Arabia and the Eastern Province, where the city of Al-Khobar is located, are as follows:

-**Al-Hajri (2000), Tourism in the Eastern Province**: This study covers the geographical distribution of the most important tourist areas in the Eastern Province, the development of tourist numbers, and the components of tourism, such as hotel apartments and hotels, and transportation.

-**Al-Thaqafi（2000),Tourism in the Kingdom of Saudi Arabia: Behavior and Patterns:** A Field Exploratory Study This study involves domestic tourism, particularly in Jeddah, Taif and Mecca in the western part of the Kingdom, and involves geographical, historical and cultural tourist attractions.

-Al-Ghunaimi（2009）,Ecosystems in Coastal Areas are the entry Point for Sustainable Tourism Development: A case study in the Eastern Province of the Kingdom of Saudi Arabia: This study involves linking sustainable tourism development in coastal areas through the protection of ecosystems and the use of natural resources such as climate and beaches to attract tourism investment within the framework of an integrated ecological balance between environmental vocabulary, nature and tourism development requirements.

-Al-Saud (2010), The Role of Heritage Resources in the Scale of the Tourism Movement, Al-Ahsa Province Case Study: This research involves studying the history of the Al-Ahsa governorate in the Eastern Province from before the Islamic era to the modern Saudi state, including its cultural heritage resources such as mosques, palaces, military castles, museums, schools, wells, etc. And the influence of these resources on the development of tourism movement in Ahsa governorate.

- **Khalaf (2010). Tourism in the Kingdom of Saudi Arabia- Research on Tourism Geography**: This study examines the development of tourism in the Kingdom of Saudi Arabia

and its most important models, especially religious tourism that attracts many domestic and foreign tourists, in addition to domestic tourism that mainly relies on geographical components. The research also covers tourism accommodation centers, tourism activity services and tourism development in the Kingdom of Saudi Arabia.

- Al-Ghamdi (2021). The Role of Student Activities in the Development of Domestic Tourism in the Eastern Province- Geographical Research of Students at Imam Abdulrahman Ben Faisal University: This research deals with student activities and their role in the development of domestic tourism, understanding student trends, and university support for student activities. It also aims to determine the influence of some variables, such as: (sexual structure, scientific specialization and education level) on students' attitudes towards students and tourism activities in Eastern Province.

- Al-Ali (2021) The Influence of Climate on Tourism Volume and Patterns in Al-Ahsa governorate- Applied Climate Research: he studied the general climatic characteristics of Al-Ahsa (one of the eastern provinces governorates - south of Al-Khobar city) during the seasons of the year, and the reflection of these characteristics, especially the influence of heat factors on the number of tourists in Al-Ahsa.

-Sheikh (2022). Tourism Activities in Al-Ahsa governorate - Kingdom of Saudi Arabia- Economic Geography Research: This research involves the study of the historical characteristics of the province and its tourism activities, because Hofuf city is one of the oldest settlement centers in Al-Ahsa, and the geographical components of tourism in the province, because it is characterized by having many of them, and through spatial analysis, the tourist attractions focus on the city of Hofuf, by studying the tourism model and its economic aspects, It shows the diversity of tourist attractions.

Study Terminology

- **Spatial Modeling:** A methodology or set of analytical procedures used to derive information about spatial relationships between geographic phenomena. (Esri GIS Dictionary)

-Spatial Analysis : A method of advanced spatial modeling that assists with terrain modeling, finding suitable locations and routes, discovering spatial patterns, and performing hydrologic and statistical analysis (Esri GIS Dictionary)

-Quality of Life: "The Quality of Life Program is one of the programs to achieve Saudi Vision 2030, and it was launched in 2018. It is a program concerned with improving the quality of life of the individual and the family by creating the appropriate environment to support and develop new options for the participation of citizens, residents and visitors in activities Cultural, recreational, sports, tourism and other appropriate patterns that contribute to Enhance the quality of life of the individual and family, generate jobs, diversify economic activity, and enhance The position of Saudi cities in the ranking of the best global cities." (Quality of Life Program Annual Report 2023, P. 12).

- Tourist centers and facilities: The tourist centers and facilities referred to in this study mean all urban facilities with distinctive geographical, historical, archaeological, cultural, recreational and sports characteristics, and the associated supporting urban facilities, which are visited by tourists and visitors to enjoy and benefit from their services.

- **Suitability analysis:** A model that weighs locations relative to each other based on given criteria. Suitability models might aid in finding a favorable location for a new facility, road, or habitat for a species of bird. (Esri GIS Dictionary).

First: Classification of Tourist Centers and Facilities in the City of Al-Khobar

Systematic classification is one of the most important stages of geographical work. After different treatments and analyses, it is the most important result. The classification process is based on similar characteristics or relationships between different phenomena. (Semple, R.K., Green, M.P., 1984, P. 55) Accordingly, tourist centers and facilities in Al-Khobar were classified into 4 main categories (Recreational tourism centers - Sports tourism centers - Tourist accommodation centers - Cultural and heritage tourism centers). Each category was classified as facilities that belong to them and provide different tourism services to tourists and visitors according to the tourism pattern and the desired goal.

The study and analysis of the geographical distribution of tourist facilities in Al-Khobar found that there were 794 tourist centers in 2024, covering four main categories (Recreational tourism centers, Sports tourism centers, Tourist accommodation centers, Cultural and heritage tourism centers). Each category includes several facilities and sub-tourist centers distributed among the districts of the city, as shown in Figure (2), which shows the following:

• The category of recreational tourism centers and facilities ranked first compared to other categories, with 576 centers, including cafes, shopping centers, malls, and parks. The availability of these facilities is one of the most important elements used to measure quality of life indicators relative to the population, as will be mentioned later.

• The category of tourist accommodation centers and facilities in Al-Khobar came in second place with 133 centers and facilities. This category includes hotels, chalets and tourist resorts, in addition to hotel apartments.

• In third place was the category of sports tourism centers and facilities with 70 sports centers and facilities that provide their services through local activities or international tournaments and events, including stadiums, sports clubs, and gyms.

• The category of cultural and heritage centers and facilities came in fourth place. It included 15 centers, which varied between cultural centers, museums, and geographical and environmental areas of tourist nature.

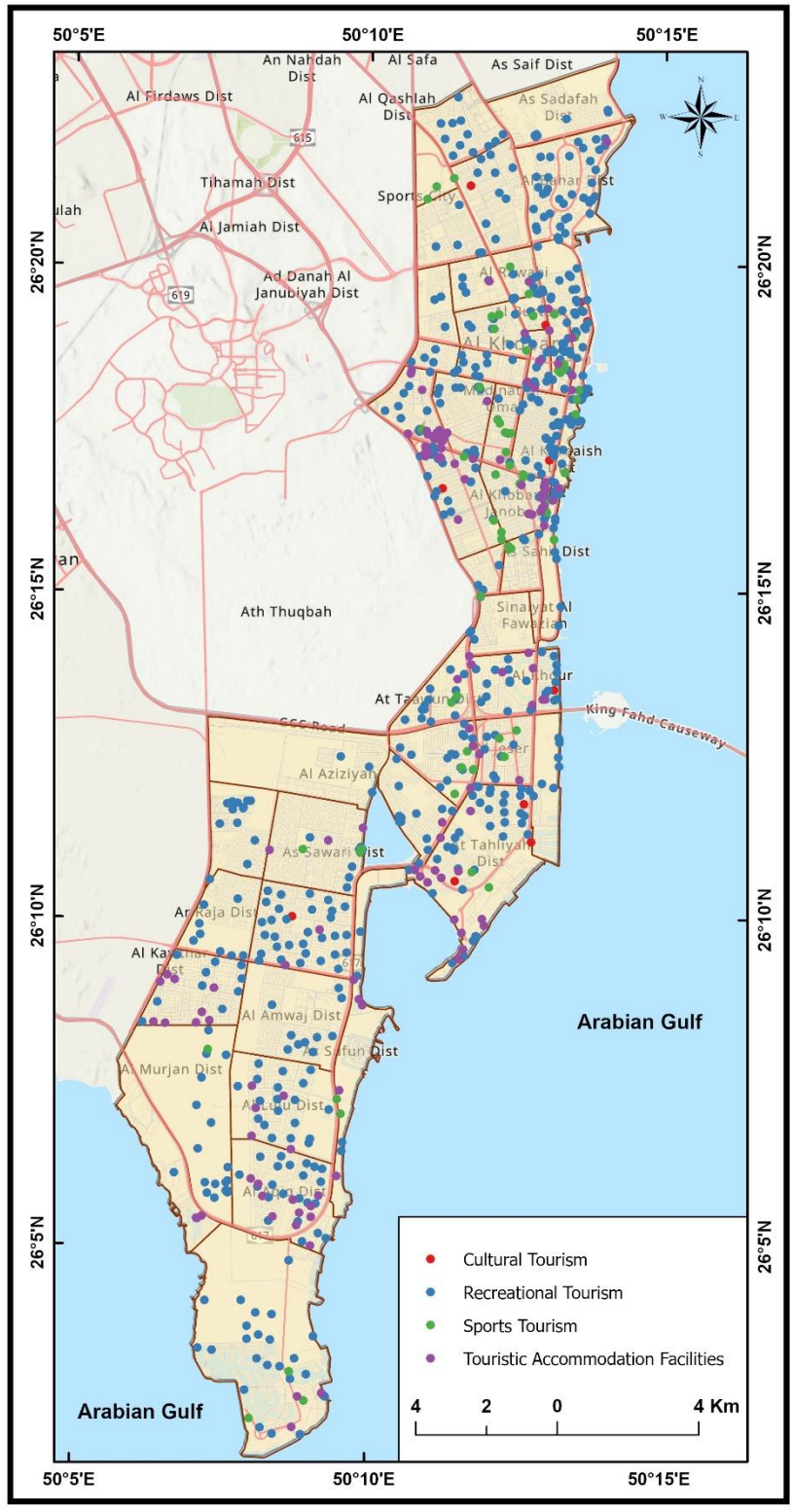

50°5'E
50°10'E
50°15'E
26°20'N
26°15'N
26°10'N
26°5'N
An Nahdah Dist
Al Safa
As Saif Dist
Al Firdaws Dist
Al Qashlah Dist
As Sadafah Dist
615
Tihamah Dist
Al Jamiah Dist
Ad Danah Al Janubiyah Dist
619
Ath Thuqbah
Sinaiyat Al Fawaziah
King Fahd Causeway
Al Aziziyah
Arabian Gulf
Arabian Gulf
Cultural Tourism
Recreational Tourism
Sports Tourism
Touristic Accommodation Facilities
4 2 0 4 Km

Figure (2) Classification and Distribution of Tourist Centers and Facilities in the City of Al-Khobar in 2024.

Secondly- Geographical Distribution of Tourist Centers and Facilities in Al-Khobar:

The geographical distribution of tourism centers and facilities indicates many geographical factors that affect their formation, such as the availability of infrastructure components such as municipal services and equipment, as well as the availability of human, geographic and tourism components. 794 tourist centers and facilities are distributed in 47 districts of Al-Khobar city, as shown in Table No. (1) and previous Figure No. (2), where the following points are noted:

• The Corniche district leads the city's districts in terms of the acquisition of tourist centers, accounting for 7.2% of all tourist centers and facilities in Al-Khobar , distributed as follows (79% of which are recreational, 8.7% are sports, 8.7% are tourist accommodation, and 3.6% are cultural and heritage). This is due to the geographical, historical and architectural assets available in the district that helped to do so because it has a large waterfront that extends over the Arabian Gulf coast.

City districts	Classification of tourist centers and facilities				Total
	Recreational	Sports	Cultural and heritage	Tourist accommodation	
Corniche	45	5	2	5	57
Al-eaqrabia	11	1	1	2	15
Ishbilia	8	-	-	-	8
Al-raka Al-janubia	9	-	1	-	10
Al Jawhara	4	-	-	1	5
Al-khabar Al-janubia	7	4	-	11	22
Al-Bustan	2	1	1	-	4
Al-Khazama	14	5	-	3	22
Al-Hada	5	-	-	-	5
Ibn Sina	2	-	-	1	3
Al-Raja	8	-	-	-	8
Al-buhayra	12	-	-	2	14
Al-hamra'	13	-	-	5	18
Olayya	11	3	1	17	32
Al-saahil	14	2	-	2	18
Al-sufun	4	2	-	5	11
Al-jisr	7	3	-	2	12
Al-kawthar	10	-	-	9	19
Al-taeawun	15	2	-	1	18

Al-hizam Al-dhahabiu	10	5	-	1	16
Al-sawari	9	3	-	3	15
Al-yarmuk	16	6	1	4	27
Qurtuba	5	-	-	-	5
Al-khur	9	-	1	3	13
Al-hizam Al'akhdar	9	-	-	-	9
Al-rawabi	9	2	-	1	12
Al-Andalus	3	-	-	-	3
Al-marjan	17	1	-	-	18
Al-tahlia	36	2	4	13	55
Madinat Aleumaal	4	5	-	2	11
Al-madinat Al-riyadia	-	3	-	-	3
Al-sheraa	31	-	1	2	34
Al-raaka Al-shamalia	12	-	-	-	12
Al-thuqbah	19	4	1	13	37
Al-bandaria	13	-	-	3	16
Shati Nisf Al-qamar	3	-	-	2	5
Al-khabar Al-shamalia	28	2	1	-	31
Al-sudfa	7	-	-	-	7
Al-dura	24	3	-	3	30
Al-aqeeq	22	-	-	11	33
Al-shifa'	4	-	-	-	4
Al-muha	13	-	-	-	13
Sinaeiat Al-thaqba	3	1	-	-	4
Al'iiskan	2	5	-	-	7
Al-bahr	38	-	-	1	39
Al-lulu	19	-	-	5	24
Al'amwaj	10	-	-	-	10
Total	576	70	15	133	794

Table No. (1) Classification and Distribution of Tourist Centers and Facilities in the Districts of Al-Khobar City In 2024.

*Prepared by the researcher through field study and land use maps in the city of Al-Khobar.

• Al-Tahlia district ranked second with 6.9% of all tourist centers and facilities in Al- Al-Khobar, followed by districts (Al-Bahr 4.9%, Al-Thuqbah 4.7%, Al-Sheraa 4.3%, Al-Aqeeq 4.2%, and Olayya 4%). Meanwhile, the percentage of recreational centers and facilities has declined to less than 1% in 12 districts of the city, such as Ibn Sina, Al-Andalus and Sports City districts.

• The number of recreational tourism centers and facilities reached 576 centers and facilities in 2024, and the distribution of recreational centers and facilities varied in the districts of Al-Khobar city, where the districts of the Corniche, Al-Bahr and Al-Tahlia topped the city's districts and settled 7.8%, 6.6%, and 6.3%, respectively, of the total entertainment centers in the city in 2024. On the other hand, the number of recreational tourism centers decreased to less than 1% of the total in 12 districts of the city, such as the districts of Al'iiskan, Al Bustan and Ibn Sina.

• The number of tourist accommodation centers and facilities reached 133 centers and facilities in 2024, distributed over 29 districts of the city, most of which were settled in 12.8% of the total in the Olaya district, followed by Tahlia and Al-Thuqbah districts with 9.8% for each district. While the percentage of these centers decreased to 0.7% in 6 districts, with a total of 4.5% of the total tourist accommodation centers and facilities in the city.

• The number of sports tourism centers and facilities reached 70 centers and facilities in 2024. Al-yarmuk district is endemic to 8.6% of the total sports centers and facilities, occupying the first place, followed by the districts of Corniche, Al Khazama and the Al-hizam Al-dhahabiu with 7.1% for each district individually. A total of 24 districts have been completely empty of sports tourism centers and facilities.

• The number of cultural and heritage tourism centers and facilities reached 15 centers and facilities in 2024, distributed in only 11 districts of the city, where 26.7% of them are in Tahlia district, and 13.3% in the Corniche district. Nine districts accounted for the rest of the cultural and heritage tourism centers and facilities, with 6.7% in each district.

Third - Spatial Analysis of Tourist Centers and Facilities in Al-Khobar City:

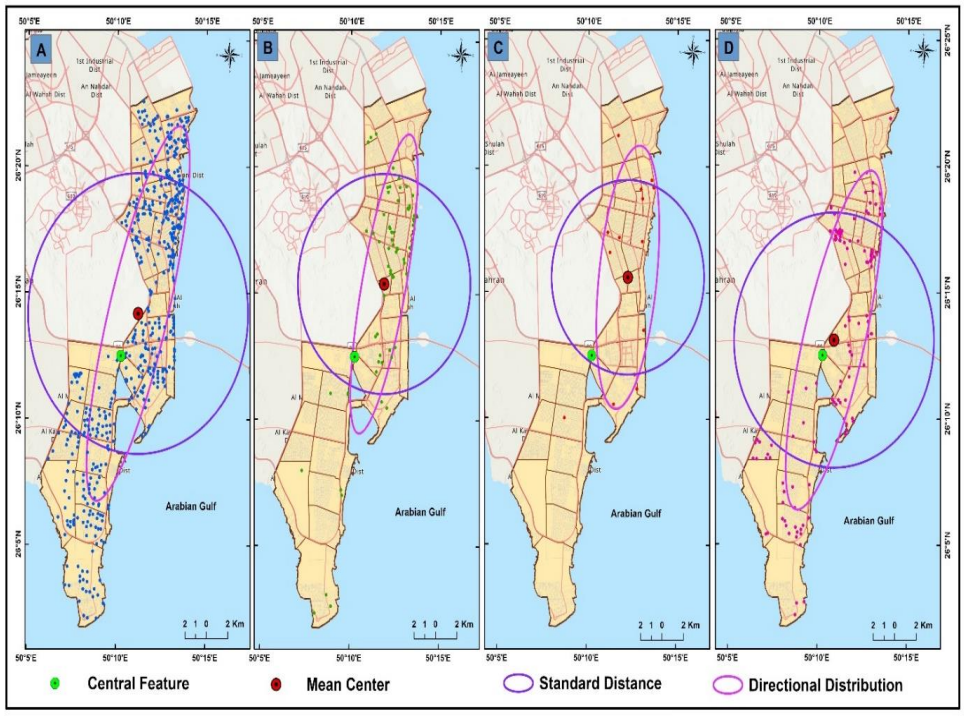
The spatial analysis tools in the GIS program, through the spatial processing they provide for the distribution of tourist centers and facilities in the city of Al-Khobar, help to understand their connections with the surrounding geographic phenomena, to determine their patterns and characteristics through spatial statistical analysis, considering several criteria such as location, shape, size and space.

Measuring Geographic Distributions

It reveals the spatial organization characteristics of tourist centers, their degree of concentration or dispersion, and their trends, so they are also called measures of dispersion and spatial propagation. The spatial analysis of tourist centers and facilities in the city of Al-Khobar has examined several methods, as shown in Figure No. (3), as follows:

A- Average Center:

The spatial average represents the hypothetical pivot point where the tourist centers and facilities of Al-Khobar are evenly distributed in all directions. The spatial average is located between two districts (Al-Thaqbah and Al-Rayyan) (Figure 3), where most of the services and population are concentrated.



(A) Tourist and recreational centers and facilities – (B) Sports tourism centers and facilities - (C) Cultural and heritage tourism centers and facilities - (D) Tourist accommodation centers and facilities.

Figure No. (3) Spatial Analysis of Tourist Centers and Facilities in the City of Al-Khobar in 2024.

B- Central Function

The spatial median is known as the central phenomenon, in which the nearest location is identified on the map as the actual tourist center relative to the spatial average. The results of applying the space medium to all the tourist centers and facilities in the city show that they are in the Al-Khuzama district. It was also noted that the spatial median of tourist centers and facilities deviated from the spatial average in the southwest direction, ranging from 1.5 km to 6.5 km (Figure 3), due to the increase in the number of tourist centers and facilities in the city center and the south.

C- Standard Distance

The density and dispersion of the distribution of tourist centers and facilities in Al- Al- Khobar city is studied by drawing a standard circle whose center is the spatial average, and its radius is the value of the extracted standard distance (Figure 3). The standard circle radius of the distribution of tourist centers and facilities (entertainment and sports) reaches 10.3 km and the distance from the spatial average is 8 km, because these tourist centers and facilities are located in districts in the city center and inhabited by 390 centers and facilities, This indicates that the geographical distribution of tourist centers and facilities tends to be concentrated, as they are denser in inner-city districts compared to suburbs.

The study of the distribution of cultural and heritage tourism centers and facilities, and tourist accommodation facilities, showed that the radius of the standard circle for their distribution was 7.1 km and 9.3 km, which indicates that there is a dispersion of their distribution in the city center districts. This is explained by the longitudinal extension of the urban development of the city of Al-Khobar from north to south, and the connection between the distribution of tourism centers and facilities along the coast of the Arabian Gulf.

D- Directional Distribution

Studying the Directional Distribution of tourist centers and facilities in the city of Al-Khobar (Table 2- Figure 3), it is found that they develop from northeast to southwest, which explains the nature of the city's vertical urban extension on the coast of the Arabian Gulf, with a total length of about 70 km.

Tourism centers & facilities	Standard distance value in the X-axis direction (km)	Standard distance value in the Y-axis direction (km)	Distribution skewness value
A	2.7	14.3	16.5
B	2	11.2	12.5
C	2.7	9.7	7.1
D	2.8	12.9	16.2
(A) Tourist and recreational centers and facilities – (B) Sports tourism centers and facilities - (C) Cultural and heritage tourism centers and facilities - (D) Tourist accommodation centers and facilities.			

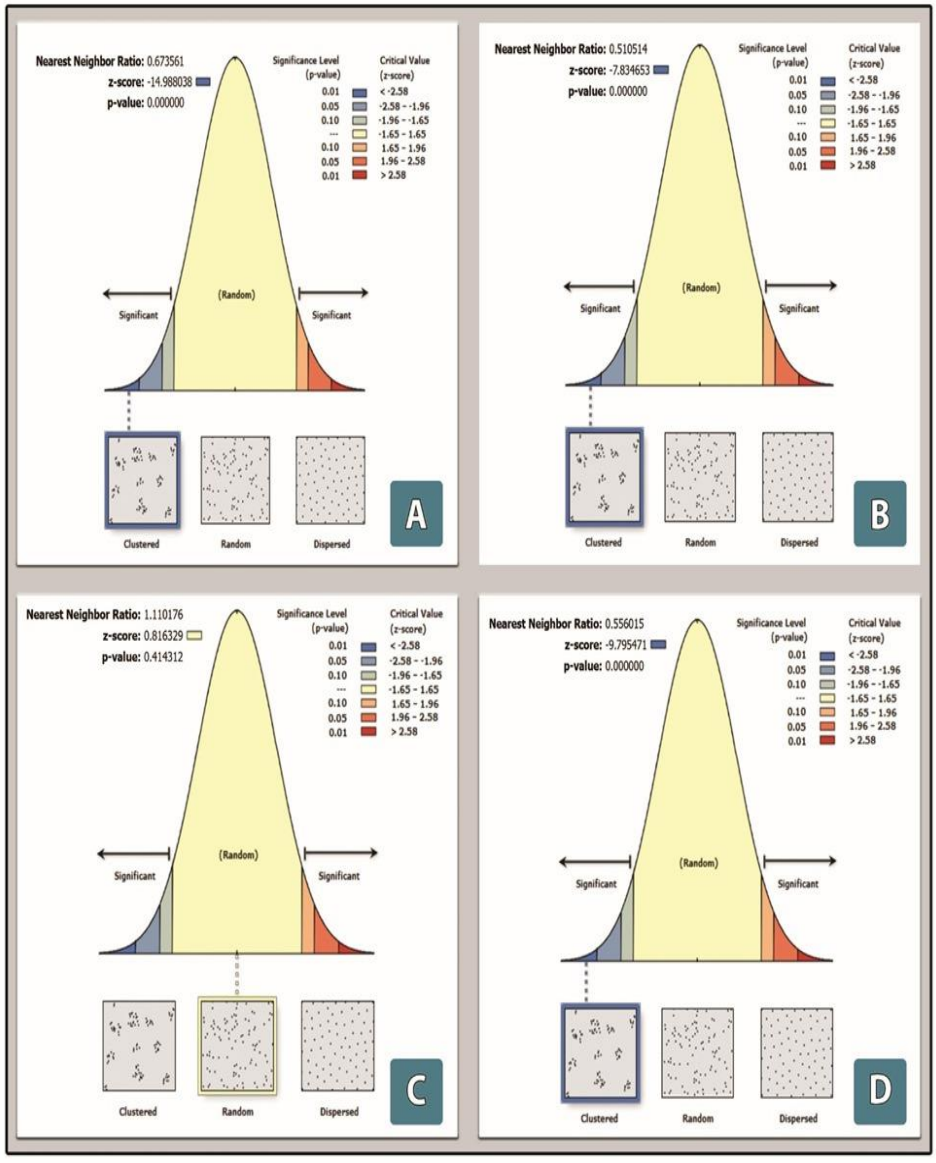
Table No. (2) The Direction of the Spatial Distribution of Tourist Centers and Facilities in the City of Al-Khobar in 2024.

E - Nearest Neighbor Analysis

It was found that the distribution of tourist centers and facilities (entertainment, sports and tourist accommodation facilities) showed a concentrated pattern (Figure 4), respectively (0.67), (0.51), (0.55), with a very high confidence level of 99%, and the probability that the distribution pattern tended to be random or regular was very low, not more than 1%. The standard values of the Z score are (14.99), (7.83), (9.79), which are below the critical value range, and the recorded probability value is (0.0000). The distribution pattern of cultural and heritage tourism centers and facilities is scattered, (1.11), the critical value is (0.82), and the probability value is (0.4). This confirms the assumption that the geographical distribution of tourist centers and facilities is concentrated in the districts of Al-Khobar city.

F-Moran Index

Moran index is a tool to study the propagation pattern of the phenomenon in space by studying the symmetry of the distribution of the elements of the phenomenon and the autocorrelation between them. This metric differs from the nearest neighbor analysis in that it relies on introducing an additional value as a standard when calculating spatial correlations (such as population). The results are analyzed by the Moran indicator value between -1 and + 1; if the value is close to -1, it indicates a scattered or divergent distribution, if it is close to + 1, it indicates a clustered or convergent distribution, but if the value is close to zero, the distribution is random (Griffith, D.A., 2019, P. 397).

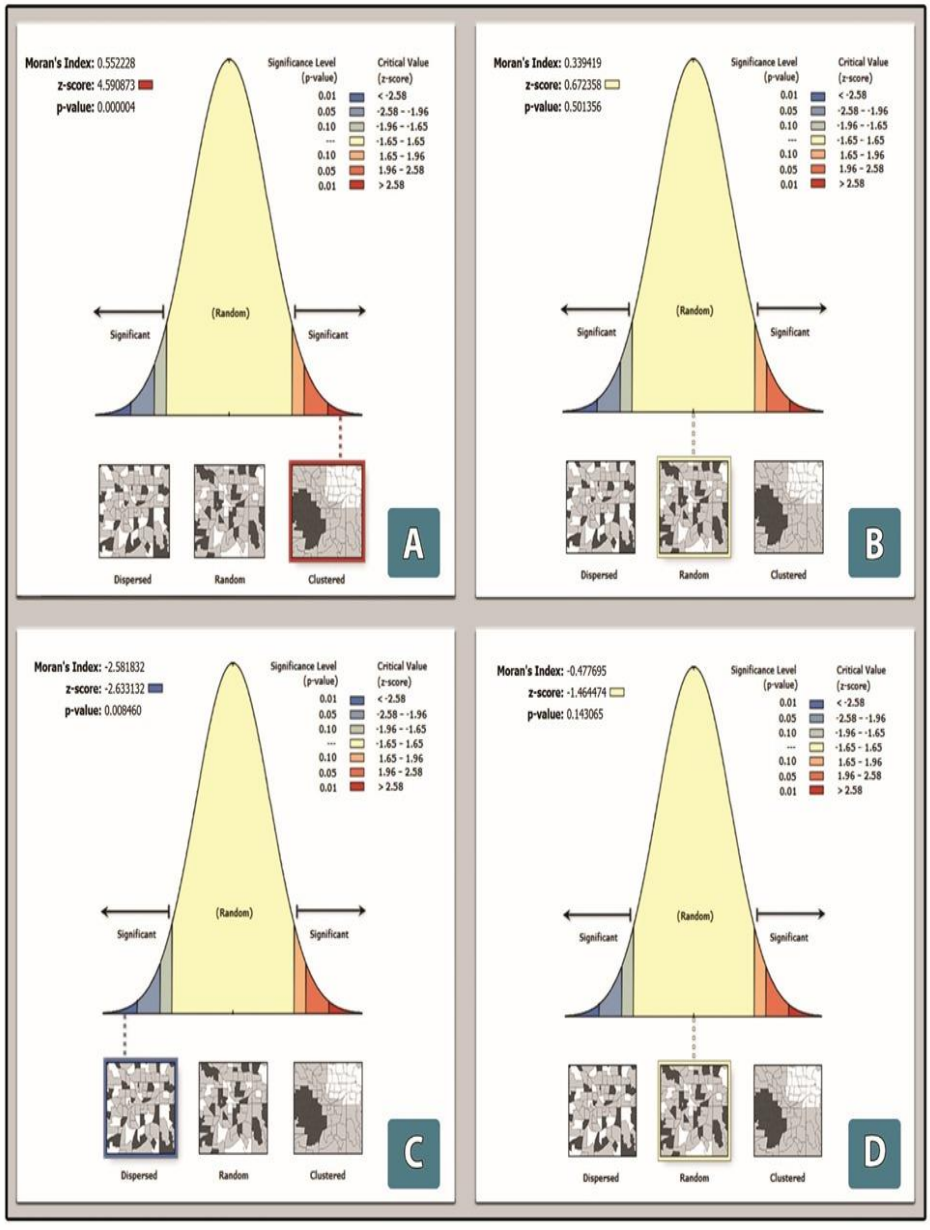


(A) Tourist and recreational centers and facilities – (B) Sports tourism centers and facilities - (C) Cultural and heritage tourism centers and facilities - (D) Tourist accommodation centers and facilities.

Figure (4) Nearest Neighbor Analysis of Tourist Centers and Facilities in the City of Al-Khobar in 2024.

Analysis of the results of the Moran Index (Figure 5) found that the distribution of tourist and recreational centers and facilities in Al-Khobar City (Fig. 5A) showed a clustered pattern with a value of (+ 0.55), which obtained the standard value Z score (4.59), which is below the critical range (-2.58, + 2.58), with a confidence level of 99%. Therefore, tourist and recreational centers and facilities are concentrated in densely populated communities, while the distribution pattern of sports tourism centers and facilities (Fig. 5B) and tourist accommodation centers and facilities

(Fig. 5C) are random (+ 0.339), (+ 0.478), where the standard value of the Z score is (0.672), (-1.46).The distribution pattern of cultural and heritage tourism centers and facilities (Fig. 5D) is distracted, the value is (-2.582), and the standard value is Z score (-2.63).



(A) Tourist and recreational centers and facilities – (B) Sports tourism centers and facilities - (C) Cultural and heritage tourism centers and facilities - (D) Tourist accommodation centers and facilities.

Figure (5) Results of Moran's Analysis of the Distribution of Tourist Centers and Facilities in the City of Al-Khobar in 2024.

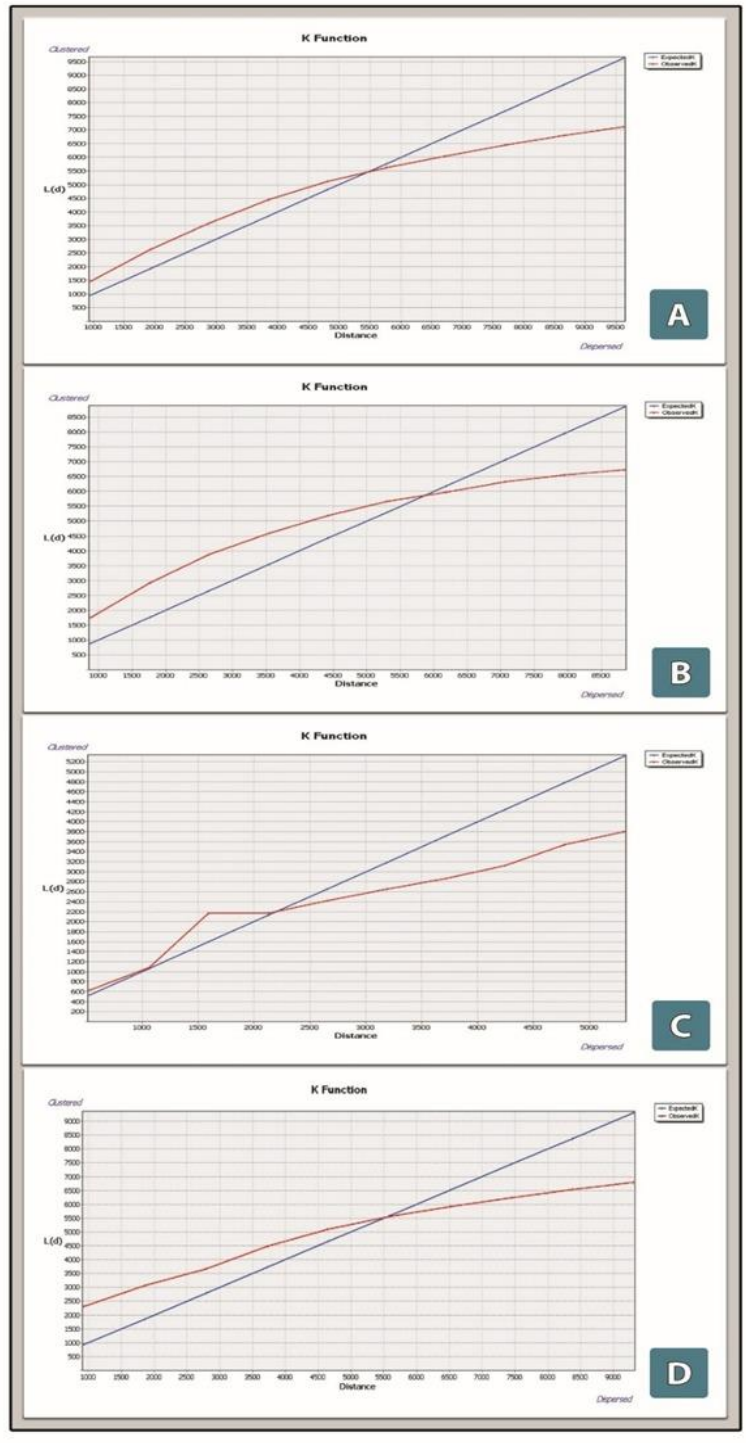
G- Multi-Distance Spatial Cluster Analysis (Ripley's K Function):

K Function is defined as a statistical tool for determining whether tourist centers and facilities are clustered or dispersed in a statistically significant manner over a series of distances because it represents the average distance between each tourist center and other tourist centers within a specified distance, and this average is compared to the expected distance in a random distribution case. The actual and predicted K functions are graphically represented on the vertical axis, while the distance value is displayed on the horizontal axis. To determine the connotation of the statistical model, a certain degree of confidence is determined when comparing the actual distribution with the theory, and the upper and lower limits of the confidence level are set to be represented graphically (Lei, 2023, P.70).

From the analysis of the K Function results of the distribution of tourist centers and facilities in Al-Khobar in 2024 (Figure 6), it is found that the theoretical "K function" value curve is higher than the actual "K function" value curve, therefore, the distribution pattern of tourist centers and facilities in Al-Khobar is in the form of clusters, with slight changes at certain distances, this result is consistent with the results of the district relationship analysis, This is due to the fact that tourist centers and facilities are often located in specific community locations, the confidence level is very high due to the very high distance between the actual "K function" curve and the confidence upper limit curve, and the curve of this function only varies between centers and facilities Cultural and heritage tourism takes a decentralized form due to the nature of tourism centers and facilities associated with unplanned historical distribution.

H- Kernel Density:

Kernel density analysis is one of the methods of density analysis, because the analysis shows a circular district relationship reflecting the density of tourist centers and facilities in Al-Khobar city in each district in 2024, because the surface trend is tourist centers and facilities determined according to geographical distribution, so it appears in areas with high density of tourist centers and facilities and subsides in areas with low density, found from the kernel density analysis (Figure 7), Areas with very high density include (35 tourist and recreational centers and facilities- A), (12 sports tourism centers and facilities- B), (6 cultural & heritage tourism centers and

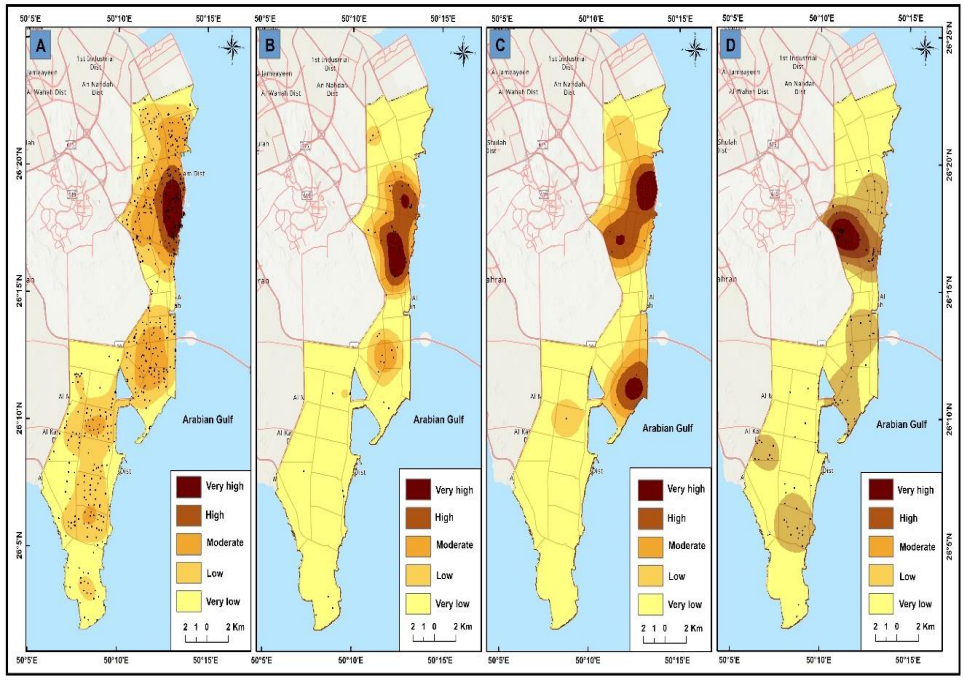


(A) Tourist and recreational centers and facilities – (B) Sports tourism centers and facilities - (C) Cultural and heritage tourism centers and facilities - (D) Tourist accommodation centers and facilities.

Figure (6) Multi-Distance Spatial Cluster Analysis (Ripley's K Function)

For Tourist Centers and Facilities in the City of Al-Khobar in 2024.

facilities- C), (27 tourism accommodation facilities- D) and Provinces at high density, the numbers of all sectors reached (20-A), (17-B) these centers and facilities in the last category (very low) decreased to record their numbers (3-A), (11-B), (8-C), (18-D) respectively.



(A) Tourist and recreational centers and facilities – (B) Sports tourism centers and facilities - (C) Cultural and heritage tourism centers and facilities - (D) Tourist accommodation centers and facilities.

Figure (7) Results of Kernel Density Analysis for the Distribution of Tourist Centers and Facilities in the City of Al-Khobar in 2024.

I-Zone Multiple Buffer Analysis

Zone Multiple Buffer analysis is a crucial proximity analysis method. It involves drawing several concentric circles equidistant from a specific point. This study used five concentric circles, each 5 km apart, centered on the average location of tourist centers and facilities in the city of Al-Khobar in 2024. Analysis of (Table 3) and (Figure 8) reveals that most recreational tourist centers and facilities (486, or 84.4% of the total) are located within the first three circles. This concentration is due to the city's north-south longitudinal shape, indicating a geographical clustering of these facilities in downtown and eastern districts along the Arabian Gulf coast.

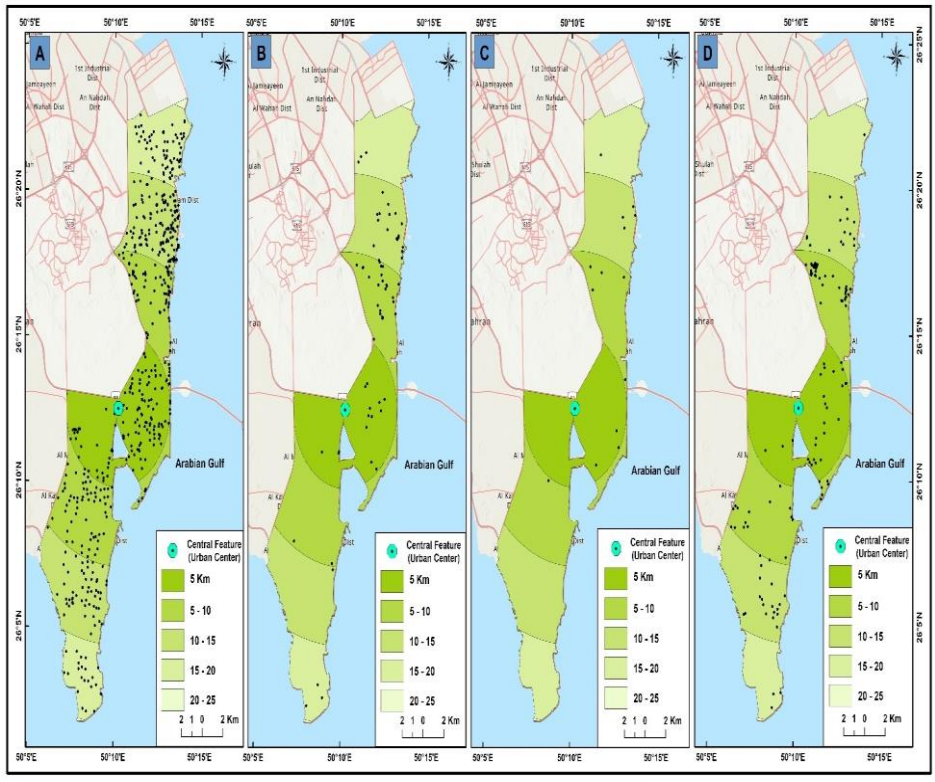
The distribution of sports facilities shows a different pattern. The number of sports facilities increases as the distance from downtown (average location) increases, reaching a peak (92% of the total) in the third zone (15 km from the center). This is attributed to a higher concentration

of sports facilities in districts like Al Khazama, Altaeawun, Alhamra' and Aljisr, areas with higher population densities. This concentration quickly diminishes in the fourth and fifth zones.

Buffer Km	Tourism centers & facilities										Total	
	Area		recreational tourist		sports		Cultural and heritage		Tourist accommodation			
	Km^2	%	No.	%	No.	%	No.	%	No.	%	No.	%
5	51.2	25.7	131	22.7	15	21.4	4	26.7	26	19.5	176	22.2
10	54.7	27.5	153	26.6	28	40.0	6	40.0	67	50.4	254	32.0
15	55.0	27.6	202	35.1	21	30.0	4	26.7	36	27.1	263	33.1
20	37.8	19.0	90	15.6	6	8.6	1	6.7	4	3.0	101	12.7
25	0.5	0.2	0	0	0	0	0	0	0	0	0	0
Total	199.2	100	576	100	70	100	15	100	133	100	794	100

Table No. (3) Distribution of Tourist Centers and Facilities According to Zone Multiple Buffer in the City Of AI-Khobar in 2024

*Prepared by the researcher through field study and land use maps in the city of Al-Khobar.



(A) Tourist and recreational centers and facilities – (B) Sports tourism centers and facilities - (C) Cultural and heritage tourism centers and facilities - (D) Tourist accommodation centers and facilities.

Figure (8) Distribution of Tourist Centers and Facilities According to Zone Multiple Buffer in the City Of AI-Khobar in 20**24.**

Cultural and heritage facilities exhibit a distribution pattern like sports facilities, showing a trend of increasing distance from downtown. The second zone (10 km) contains half of the city's tourist accommodation (hotels, chalets, resorts). This number continues to decrease in the third zone (15 km), representing approximately 27.1% of the total tourist facilities.

Fourth- The impact of the spatial distribution of tourist centers and facilities on quality of life indicators in the city of Al-Khobar in 2024:

There are many indicators of quality of life associated with tourism, as it is an economic activity on the one hand, and a field of entertainment and recreation on the other hand, and the Quality of Life Document for the Kingdom of Saudi Arabia has been relied upon (Quality of Life Program Annual Report 2023). To determine the indicators most closely related to tourism activity and its various facilities to study its impact on quality of life indicators in the city of Al-Khobar, because the work of an individual or a member of his family in tourism represents an economic opportunity that is reflected in the quality of his life in parallel with the government administration's availability of services and facilities, and it has been proven that tourism has a positive and negative impact on Quality of life in some tourist cities (Biagi & Others, 2019, PP 8 – 18). To study the relationship between tourism and quality of life in the city of Al-Khobar

with this study, the most important indicators related to tourism were limited to each sector, whether it was entertainment, sports, cultural and heritage, or related to tourist accommodation facilities.

Spatial analysis using geographic information systems tools showed that 794 tourist centers and facilities were concentrated in the 47 districts of the city of Al-Khobar in 2024, and based on quality of life indicators related to tourism, three maps were created to evaluate the reflection of the distribution of tourism centers and facilities on the city's quality of life indicators based on the values Digital quality of life indicators in the Kingdom of Saudi Arabia and its current Provinces, and target values until 2030 in connection with the Kingdom's vision 2030. This resulted in the classification of the districts of the city of Al-Khobar into three categories. The first category had lower quality of life indicators than the values currently recorded in the Kingdom. The second category is equal to the values currently recorded in the Kingdom. In the third category, its quality of life indicators exceeded the values currently recorded in the Kingdom, and even exceeded the target until 2030. In addition, there are districts that do not represent the phenomenon, and this has been taken into consideration for future planning.

1- The Impact of the Recreational Tourism Sector on Quality of Life Indicators:

The overall average criterion for the number of recreational tourist centers per million people in the Kingdom of Saudi Arabia according to the Quality of Life document was (4.8 recreational tourist centers/million people) (Quality of Life Document, 2020, P.70). By comparing the values of this standard, which represents the base year and the target year until 2030 (15.6 recreational tourist centers/one million people) with its counterpart in the districts of Al-Khobar city as shown in (Figure 9), it was found that districts (except Al-madinat Al-riyadia district because there are no recreational tourism centers and facilities in it) are classified as follows:

Districts That Are Less Than the Value of the Base Year:

This category included nine residential districts accounting for 19.1% of all districts in the city, which recorded lower values than the target year compared to the base year and the target in 2030, although two districts (Alshifa', Al-khabar Alshamalia) recorded a value very close to the base year standard (4.7, 4.2 tourist and recreational centers/one million people).

Districts Equal to the Base Year Value Criterion:

This category included 23 districts in the city, accounting for 48.9% of their total. The value of the standard was equal to its counterpart in the Kingdom in the base year in 19 districts .

The value of the standard was higher than the target in 2030 (15.6 recreational tourist centers/one million people) in 4 districts, (Albandaria, Alsudfa, Aldura, Al'amwaj) with values of 14.8, 14.6, 14.5 and 14.4 recreational tourist centers per million people respectively.

-Districts have exceeded the value of the base year standard, which is aimed at 2030:

This category included 14 districts that exceeded the value of the standard in the base year and the target year 2030. The maximum was in the Corniche district with a value of (108 centers/one million people). This is due to its location on the waterfront, which provides areas for walking and recreational tourism activities in the city.

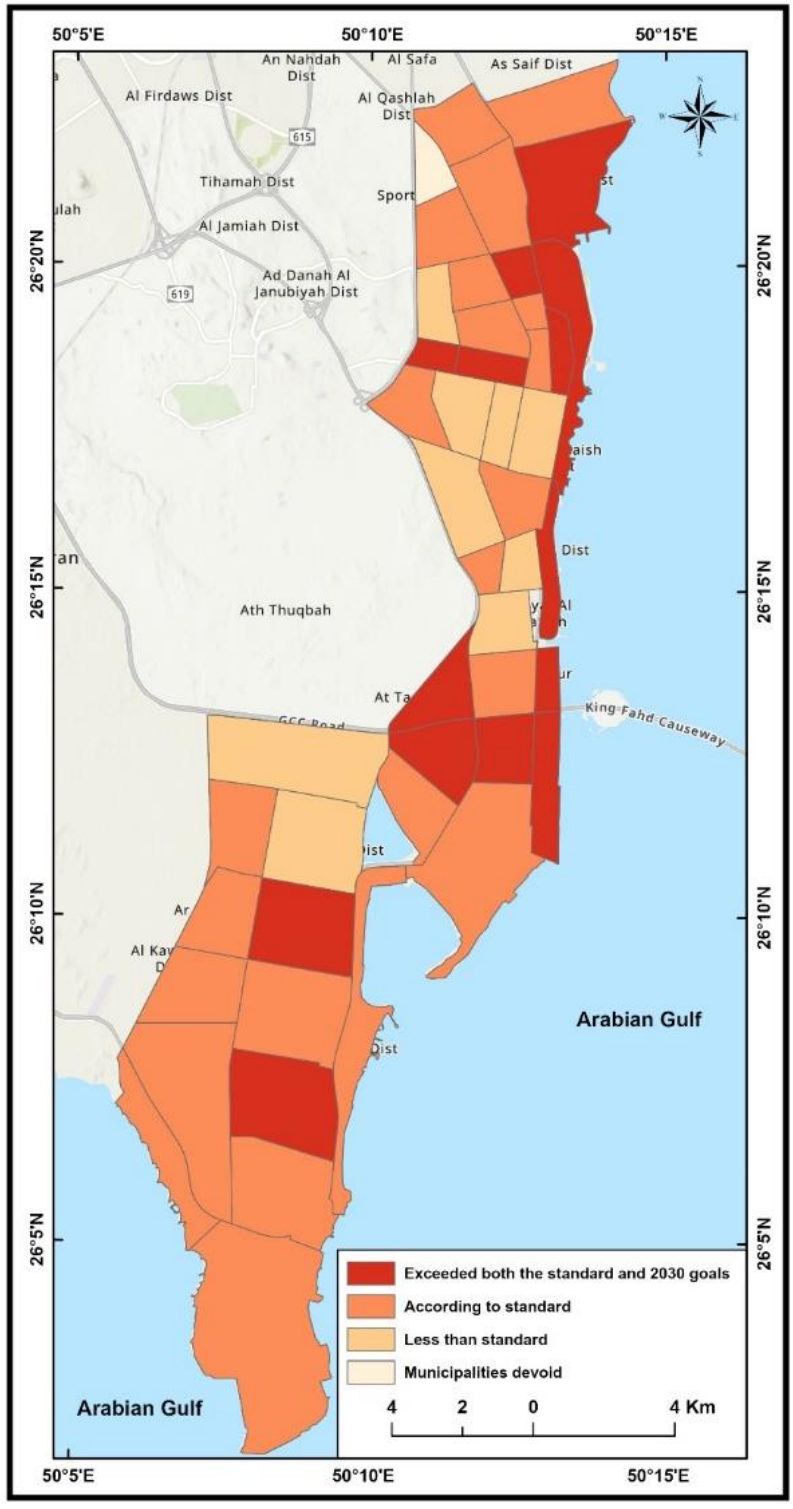

50°5'E
50°10'E
50°15'E
26°20'N
26°15'N
26°10'N
26°5'N
An Nahdah Dist
Al Safa
As Saif Dist
Al Firdaws Dist
Al Qashlah Dist
615
Tihamah Dist
Sport
Al Jamiah Dist
Ad Danah Al Janubiyah Dist
619
Ath Thuqbah
King Fahd Causeway
Arabian Gulf
Arabian Gulf
Exceeded both the standard and 2030 goals
According to standard
Less than standard
Municipalities devoid
4 2 0 4 Km

Figure (9) Classification of Districts in the City of Al-Khobar According to the Index of the Number of Recreational Tourist Centers According to the Quality of Life Document in the Kingdom of Saudi Arabia In 2024.

The Impact of the Sports Sector on the Quality of Life:

Analyzing Figure (10) showed that nearly half of the districts of Al-Khobar city are completely devoid of sports centers. The remaining districts were divided into categories based on the base year standard (42 sports centers / million people), and the target until 2030 (258 sports centers / million people) according to the Saudi Quality of Life Document as follows:

Districts Below the Base Year Value

This category included four residential districts (Althaqba, Almarjan, Alkhabar Alshamalia, Aleaqrabia) with an index of 40, 31, 30, and 21 sports centers per million people.

Districts Equal to the Base Year Value Standard

This category was like the previous one, as it included four districts (Aldura, Madinat Aleumaal, Alsawari, Altahlia) with an index of 183, 178, 149, and 65 sports centers per million people.

Districts That Exceeded the Base Year Standard Value, and the Target Year 2030:

This category included about 15 districts, where Almadinat Alriyadia district came at the forefront of districts with a rate of 1966 centers per million people, followed by districts (Alyarmuk , Al Khazama, Corniche, Alsaahil, Aljisr) with an index of 1419, 1451, 1203, 1157, and 1082 sports centers per million people, respectively**.**

3- The Impact of the Cultural and Heritage Sector on Quality of Life:

Analyzing Figure (11) showed that approximately 75% of the city's districts are completely devoid of cultural and heritage centers. The remaining districts were divided into categories based on the status criterion for the base year of the Quality of Life Document (4.9 cultural centers / million people), and the target until 2030 (46.8 cultural centers / million people) as follows:

Districts Below the Base Year Value:

This category included three districts (Aleaqrabia, Alkhabar Alshamalia, Althaqba) with an index of 2.1, 1.5, and 1 cultural center per million people.

Districts equal to the base year value criterion:

This category included four districts (Alshirae, Al Bustan, Alkhur, Alyarmuk)

with an index of 5, 44, 27.3, and 23.7 cultural centers per million people.

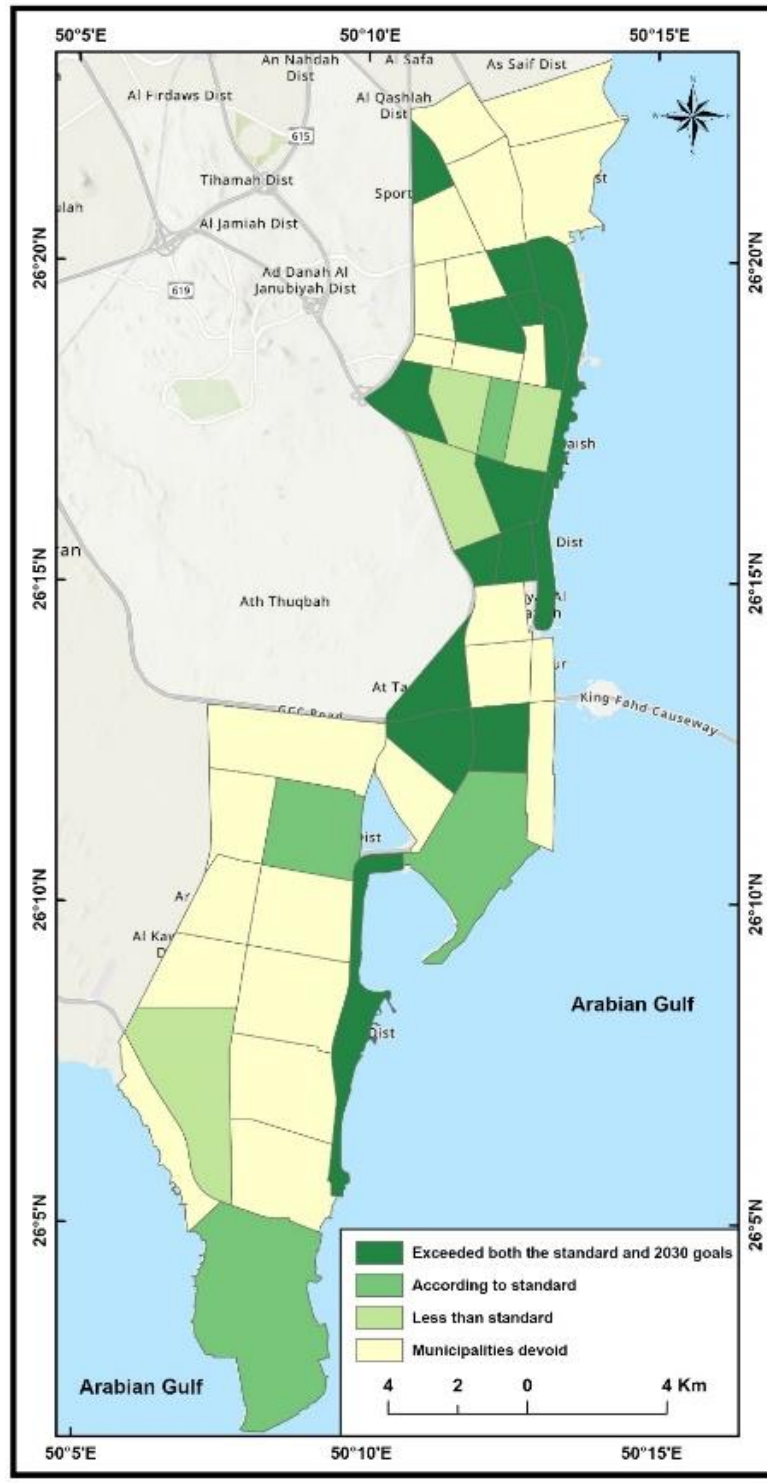


Figure (10) Classification of Districts in the City of Al-Khobar According to the Number of Sports Centers Index, According to the Quality of Life Document in the Kingdom of Saudi Arabia in 2024.

Districts That Exceeded the Base Year Standard Value, and the Target Year 2030:

The index recorded in the Corniche district reached 48.1 cultural centers per million people compared to other districts in the city, thus exceeding the current standard and the target year 2030.

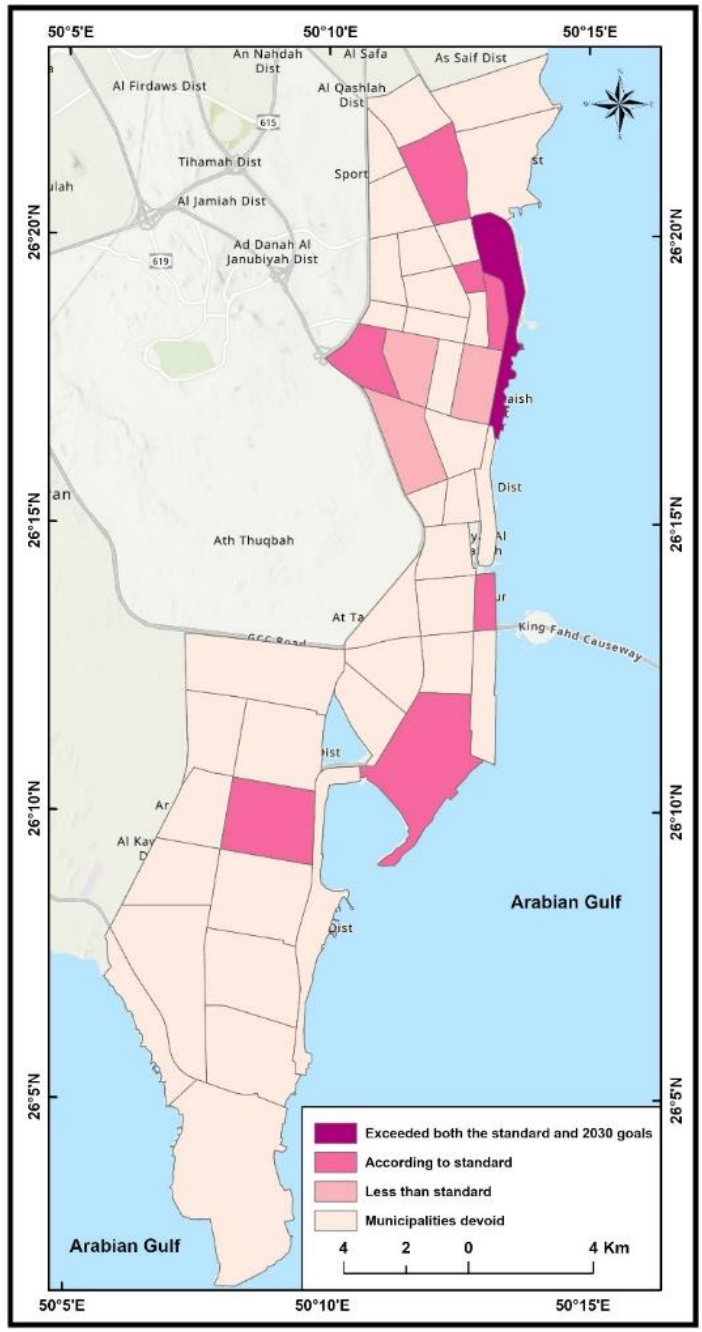


Figure (11) Classification of Districts in the City of Al-Khobar According to the Index of the Number of Cultural and Heritage Centers According to the Quality Of Life Document in the Kingdom of Saudi Arabia In 2024.

***Fifth: Spatial suitability for selecting the best tourist center areas in the city of Al-Khobar "tourist centers and entertainment facilities as a model":**

Cartographic modeling is one of the most important types of spatial modeling due to two main reasons. Firstly, it enhances geographical insight through the produced model that demonstrates the interrelation between variables and spatial characteristics in a way that contributes to understanding the reality of the phenomenon, as well as reliably analyzing its spatial variations (Gotlib, D. et al., 2017, p. 4). Secondly, it has recently been associated with Cellular Automata automation (Jiangfu Liao, et al., 2019, p. 4).

The spatial analysis methodology aims to enhance the efficiency of selecting the most suitable locations by studying influencing factors and spatially analyzing the impact of these factors through a spatial model that aims to transform the distribution of the studied phenomenon into raster spatial maps with a uniform pixel size. Subsequently, analyzing the spatial relationship between them and other factors (Genene, A. et al., 2021, p. 19).

Spatial Suitability Analysis is defined as the selection of a suitable location for a specific economic activity or service, or for evaluating an existing site within a certain area based on several required criteria that can be achieved at this spatial location. Determining the criteria and conditions of spatial suitability is considered the most important and challenging from both a scientific and practical standpoint, and spatial suitability for tourist centers in Al-Khobar has been implemented. This was based on the relationship between the distribution of current recreational areas and each factor associated with or affecting them, with the relative weights calculated for all factors in terms of their impact on the spatial suitability process.

1-Stages of Implementing the Spatial Suitability Model:

A-Identifying Factors Influencing the Proposal of Tourist and Recreational Centers in the City:

Factors influencing the proposal of tourist and recreational centers vary from one city to another, and their relative importance also varies according to their location and nature. In this stage, a set of factors has been identified, which is an important condition for achieving the results of the model correctly. These factors include:

- Tourist and recreational sites should be close to urban areas, where a layer containing urban areas has been built as part of the land cover layers in the study area derived from satellite images. Additionally, these sites should be near vegetative covers to enhance their beauty and scenery.
- Tourist and recreational sites should be on flat land. A layer containing a digital elevation model has been prepared, from which slope values have been derived.
- Proximity to main roads. A map of the road network in the study area has been prepared.
- Tourist and recreational sites should be close to the Gulf coast as the city possesses a distinctive maritime coast that contributes to the tourism development process.
- Considering the distribution of population density since the aim of proposing tourist centers is to serve the population.

B- Determining the Relative Weights of Layers:

Six criteria were represented in the form of six Raster cell layers classified with a color gradient ranging from least suitability to highest suitability. These layers were included to analyze the spatial suitability of tourist and recreational centers in Al-Khobar city, to present and manage them independently, as each criterion has distinct attributes.

It becomes apparent that the interpretation of the values defining the ranges of influence differs between criteria, depending on the importance of distance and proximity for each criterion.

For instance, when assessing the criterion of proximity to urban clusters, areas close to the clusters were represented with a different color value than distant areas, according to the nature of each criterion in terms of attraction or repulsion. The following is a review of the six criteria after converting them into classified cell layers on the same scale, as shown in Figures (12 - 13) Based on the results of merging the cell maps of the six criteria, the final spatial suitability map was produced.

Finally, the six layers were weighted according to regarding the degree of impact of each layer on proposing new recreational centers, with the land cover layer at 20%, the proximity to main roads layer at 20%, the distance from current recreational areas layer at 15%, the proximity to high population density areas layer at 20%, the proximity to the coastline layer at 15%, and lastly, the slope layer at 10%.

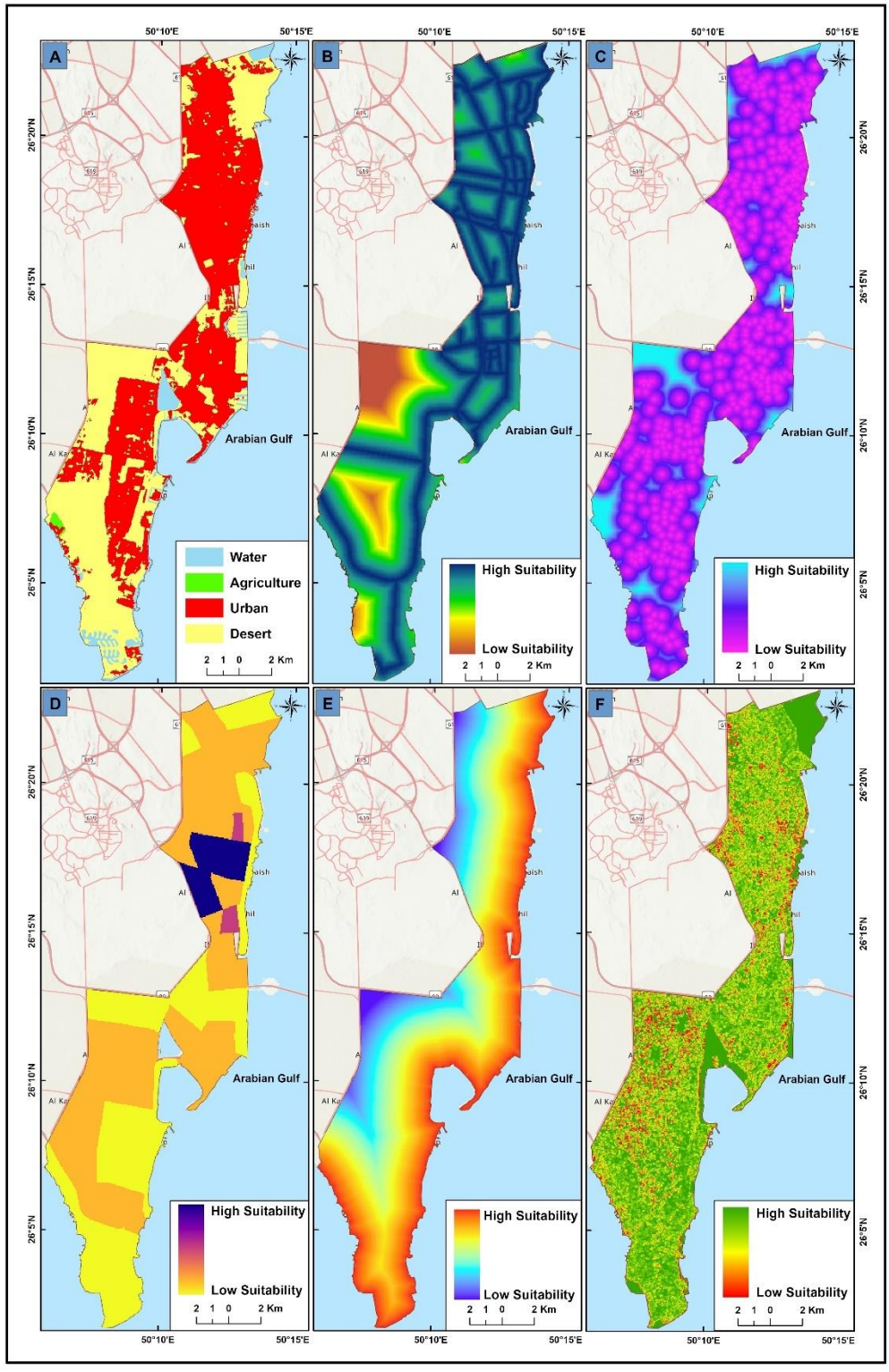

A
B
C
D
E
F
50°10'E
50°15'E
26°20'N
26°15'N
26°10'N
26°5'N
Arabian Gulf
Water
Agriculture
Urban
Desert
High Suitability
Low Suitability
2 1 0 2 Km

Figure (12) The Criteria Used in Building the Spatial Suitability Model For Identifying Suitable Locations for Tourists and Recreational Centers And Facilities In Al-Khobar In 2024.

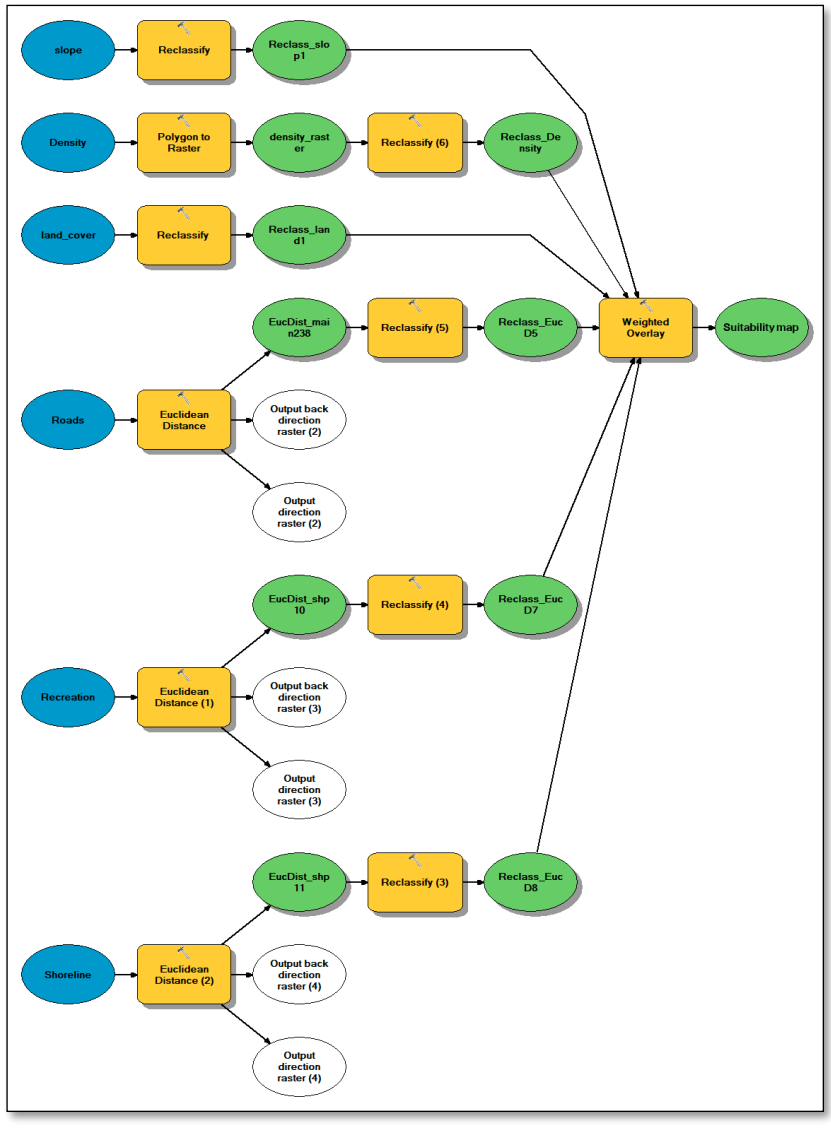


Figure (13) The Structural Diagram of the Spatial Suitability Model for Tourist and Recreational Centers and Facilities in Al-Khobar in 2024.

C- Determining the Spatial Suitability Ratings for Proposed Tourist and Recreational Centers:

The previous steps revealed variations in the impact of each factor influencing the suitability of the land for establishing tourist and recreational centers in the city. Through these preceding steps, a spatial suitability map for these centers was inferred based on the relative importance of each factor, which involves assigning weights to these factors.

In this phase, an overlay was created for the maps of all criteria after assigning them weights through a Weighted Sum based on the degree of importance of each criterion for the spatial suitability of tourist and recreational sites. This process was aimed at assigning these sites to the final output (the spatial suitability map of all combined criteria) and classifying the sites according to their suitability level for all criteria.

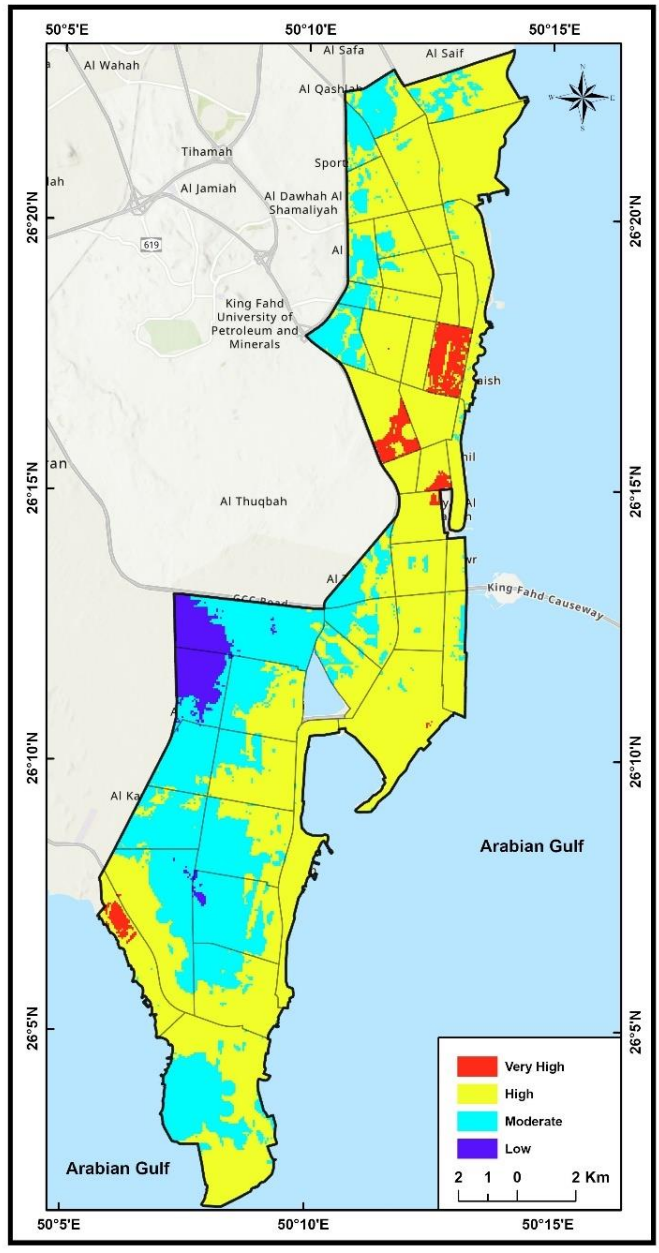


Figure (14) The Spatial Suitability Map with Its Levels for Tourist and Recreational Centers and Facilities in Al-Khobar in 2024.

During this stage (the stage of assigning weights to criteria), the researcher relied on several studies that helped her determine the relative impact of each criterion on the final output. Consequently, the existence of four types of land patterns was deducted from the map: areas with very high suitability, areas with moderate suitability, and areas with low suitability, as depicted in Table (4) and Figures (14 ,15).

Category	**Area**	
	%	**(km2)**
very high	2.9	5.7
high	63	125.5
moderate	29.6	59.1
low	4.5	8.9
Total	100	199.2

Table (4) Degrees of Spatial Suitability for Tourist and Recreational Centers and Facilities in Al-Khobar in 2024

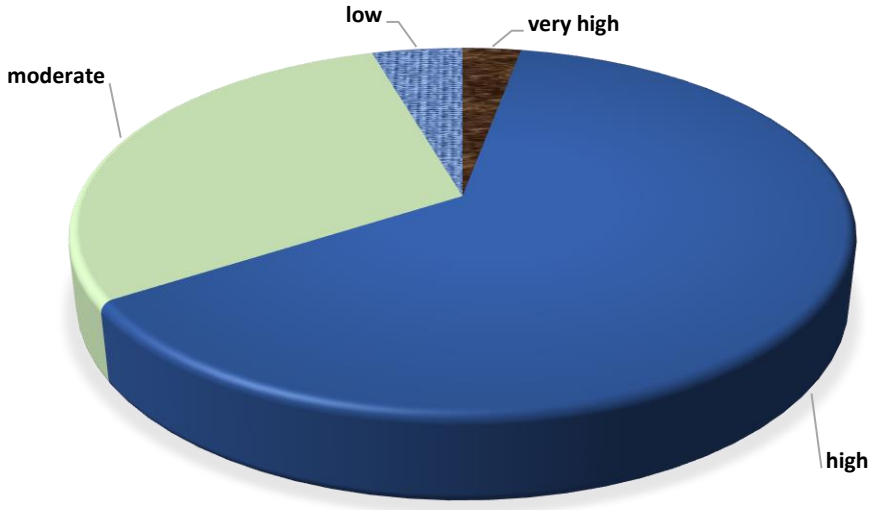


Figure (15) The Relative Distribution of the Degrees of Spatial Suitability for Tourist and Recreational Centers and Facilities in Al-Khobar in 2024.

The analysis of Table (4) and Figures (14, 15) reveals that the areas suitable for tourist and recreational centers are distributed across four levels of spatial suitability as follows:

- **Areas with Very High Spatial Suitability:** These areas covered an area of 5.7 km², accounting for 2.9% of the total spatial suitability area in the city. These areas were concentrated in five districts, primarily in the Althaqba district, followed by Alkhabar Alshamalia. Al'iiskan, Shati Nisf Alqamar, and limited areas of Tahlia and Ibn Sina districts.

- **Areas with High Spatial Suitability:** These areas accounted for 63% of the total spatial suitability area in the city and were widely distributed alongside urban areas in most districts of the city.

- **Areas with Moderate Spatial Suitability:** Covering an area of 59.1 km², these areas accounted for 29.6% of the total spatial suitability area in the city. They were concentrated in the western and southern districts of Al Khobar.

- **Areas with Low Spatial Suitability:** These areas were distributed in the western districts of Al -Khobar, including (Alshifa', Almuha, Allulu), covering 4.5% of the total spatial suitability area in the city.

Based on the above, areas with very high spatial suitability are deemed most suitable for establishing tourist and recreational centers in Al Khobar. It is noteworthy that their distribution across districts differs from the current distribution of existing tourist and recreational facilities concerning population density and total area of the city. This shift is expected to enhance urban life quality indicators in Al-Khobar and align with the Kingdom's Vision 2030.

Results

- The city of Al-Khobar, east of the Kingdom of Saudi Arabia, has a variety of tourist potential, as the number of tourist centers and facilities has reached 794 tourist centers distributed in four types (Tourist and recreational, Sports, Cultural and heritage, Tourist accommodation).

- Tourist and recreational centers and facilities came in first place in the city with 72.5%, followed by tourist accommodation facilities with 16.8%, sports centers with 8.8%, and finally cultural heritage centers and facilities with 1.9%.

- The distribution of tourist centers and facilities varied in the districts of Al-Khobar city, where most of them were concentrated in the Corniche district by 7.2%, followed by Altahlia district by 6.9%, while its percentage decreased by 1% in 12 districts.

- The study of spatial analysis of tourist centers and facilities using geographic information systems showed that they are characterized by concentration, especially in the districts located east of the city, and that their geographical distribution was affected by the longitudinal extension of the construction of the city of AL-Khobar from north to south on the coast of the Arabian Gulf.

-The concentration of tourist centers and facilities in some districts of the city has led to an increase in the value of quality of life indicators for the population in those districts, and some of them even exceeded the target according to the quality of life document in the Kingdom of Saudi Arabia compared to the base year or target for 2030.

- The sites of spatial suitability suitable for the establishment of tourism projects in the city of Al-Khobar in the future were classified into four categories, the first of which are sites with a very high degree of spatial suitability by 2.9% of the total area of the city, followed by sites with a high degree of suitability by 63%, then sites with a degree of medium suitability by 29.6%, and finally sites with a low degree of suitability by 4.5%.

Recommendations

-Reallocate some tourist centers and facilities across districts in Al-Khobar based on the analysis of spatial suitability levels in the city.

-Increase international tourism events in Al-Khobar and capitalize on its tourism potentials, placing these events on the agenda of global tourism to attract more tourists and consequently increase the expected income from this sector.

-Establish a specialized tourism authority to promote tourist centers and facilities in Al-Khobar specifically and in the Eastern Province generally, targeting tourists from geographically close countries to Al- Khobar such as Qatar, Bahrain, the UAE, Kuwait, and Oman.

-Provide attractive investment incentives for businessmen from within and outside Saudi Arabia to establish tourism projects in Al-Khobar, including facilitation related to land grants, facility price reductions, and other services to support the advancement of this sector.

References

(Studies in the Arabic language):

Abdul Hamid, Ghada Mohamed Khirat. (2010). Coordination between tourism activity and cultural heritage management: from the perspective of sustainable tourism development, the case study of Egypt. Journal of Tourism and Archaeology, M1, p. 1, 1-13.

Al-Ali, Abdulrahman bin Mubarak bin Hussein (2021). The impact of climate on tourism volume and patterns in Al-Hasa governorate: a study in applied climate. Journal of Human and Literary Studies, p. 25, 718-764.

Al-Ghamdi, Misra bent Saleh Muhammad. (2021). The Role of Student Activities in the Development of Interior Tourism in the Eastern Region: A Geographical Study on Imam Abdulrahman bin Faisal University Students. Journal of Humanities and Social Sciences, p 63, 230-171.

Al-Ghanimi, Islam Hamdi, and Al-Dardiri, Dalia Hussein. (2009). The coastal area ecosystem is an entry for sustainable tourism development: study the case of the Eastern Region of Saudi Arabia. Journal of Gulf and Arabian Studies, S35, p. 132, 95 -159

Al-Hajri, Faryal bent Mohamed Mubarak. (2000). Tourism in the eastern region. Ageas, 16, 31,32, 249-273.

Al-Hajri, Faryal bent Mohamed Mubarak. (2002). Economic development in the eastern region of Saudi Arabia: a geographical study. Journal of Gulf and Arabian Studies, S28, p. 104, 301-320

Al-Harbi, Sabah Bint Breek, Al-Daghairi, Mohammed Ibrahim (2022), Spatial Modeling for Evaluating Tourist Accommodation Facilities in Jeddah Using Geographic Information Systems, Journal of Arab Sciences, Electronic Volume 1, Issue 2, Qassim University (p. 771:840).

Al-Owaidi, Tahani bint Saud (2024), Spatial modeling for the analysis of health services sites in Hail using geographic information systems and remote sensing, Journal of the Future of Social Sciences. p. 17, c. (3) p. 3-30.

Al-Saud, Anbarah bent Khamis bin Bilal (2010). The role of heritage resources in the volume of tourism traffic: a case study in Al-Hasa governorate. Journal of Tourism and Antiquities, Vol. 22, p. 1, 1-43.

Al-Shubwan, Ahmed bin Muhammad bin Abdullah. (2007). Tourism in the southern region of Saudi Arabia: a future vision. Geographic messages, message 325, 3-50.

Al-Thaqafi, Sultan Ahmad Sultan, and Ibn Muhammad, Muhammad. (2000). Tourism in Saudi Arabia: Behavior and Patterns: Field reconnaissance study. Ageas, just 16, 31,32, 371-372.

Amer, Gilali. (2014). Environmental tourism is the other face of sustainable development. Journal of Human Rights and Humanities, a special number, 6-21.

Blah, Haifa Bint Yahya, Ali, Muhammad Abdul Jawad (2008.) Tourism in Yanbu Governorate: A Geographical Study (Unpublished Master's thesis). Taibah University, Medina.

Khadra, Jalal Badr, and Johnny, Rahaf Jaber (2022). The spatial suitability of tourist sites in the Lattakia region: a comparison between Kasab and Mashkita sites. Tishreen University Journal for Research

and Scientific Studies - Arts and Humanities Series, Vol. 44, p. 4, 325 - 346
Khalaf, Maryam Khairallah. (2010). Tourism in the Kingdom of Saudi Arabia: a study in touristic geography. Gulf Economic Journal, p. 20, 242-285.
Malouki, Omar, and Yousfi, Mohammed. (2020). The role of tourism in sustainable development. Journal of Administrative and Financial Sciences, Vol. 4, p. 1, 96-112.
Ministry of Municipal and Rural Affairs, Comprehensive Urban Vision Report for Dammam, Ministry of Municipal and Rural Affairs, Riyadh, 1440 A.H.
Mohammad, Sheikh Mohammed Ezzat (2022). Tourist activity in Al-Ahsa governorate-Saudi Arabia: A study in economic geography. Journal of the Faculty of Arts, Qena, 56-745-826.
Qaddoumi, Hassan Ahmed (2020). Using GIS technology to analyze tourist and archaeological sites in Hebron. Journal of Historical and Social Studies, p. 42, 151-168.
:(Studies in English)-
Alshehri, A., Almana, L. (2021) Khobar City Plan and the New Public Space in Saudi Arabia, The Journal of Public Space, 6(1), 215-234. DOI 10.32891/jps. v6i1.1323
Bianca Biagi, Maria Gabriela Ladu, Marta Meleddu, Vicente Royuela (2020), Tourism and the city: the impact on residents' quality of life, International Journal of Tourism Research: Volume 22, Issue 2 March/April, Pages 168-181. https://doi.org/10.1002/jtr.2326
Genene, A., & Meten, M. (2021). Landslide Susceptibility Mapping Using GIS-based Information Value and Frequency Ratio Methods in Gindeberet area, West Shewa Zone, Oromia Province, Ethiopia. https://doi.org/10.21203/rs.3.rs-219331/v1
Gotlib, D., & Olszewski, R. (2017). conceptual modeling to a map. International Cartographic Association ICA https://doi.org/10.5194/ica-proc-1-49-2017
Griffith, D. A. (2019). Negative spatial autocorrelation: One of the most neglected concepts in spatial statistics. MDPI Journal. Vol.2-Issu3, 2, Basel, Switzerland. https://doi.org/10.3390/stats2030027
Jiangfu Liao, et al.,(2019). Urban sprawl scenario simulations based on cellular automata and ordered weighted averaging ecological constraints, Ecological Indicators, Vol. 17. https://doi.org/10.1016/j.ecolind.2022.108538
Lei, C. A. O., Yiqun, H. A. N., & Zixuan, L. I. (2023). Spatial Pattern Construction of the Grand Canal National Cultural Park in Tianjin from the Perspective of Narrative Space. Landscape Architecture, 30(2), 65-72. https://doi.org/10.12409/j.fjyl.202208030464
MOMRAH. (2022). Kingdom of Saudi Arabia's Report on the Implementation of the New Urban Agenda. Ministry of Municipal, Rural Affairs & Housing. Kingdom of Saudi Arabia.
Seifolddini-Faranak, M. Shabani Fard and Hosseini Ali (2009), Distribution and Determining of Tourist Attractions and Modeling of Tourist Cities for the City of Isfahan-Iran, American Journal of Economics and Business Administration 1 (2): 160-166.
Semple, R.K., Green, M.B. (1984). Classification in Human Geography. In: Gaile, G.L., Willmott, C.J. (eds) Spatial Statistics and Models. Theory and Decision Library, vol 40. Springer, Dordrecht. https://doi.org/10.1007/978-94-017-3048-8_4
Stéphanie Truchet, Virginie Piguet, Francis Aubert, Jean-Marc Callois. (2016) Spatial influence of attractions on tourism development. Tourism Geographies, 18 (5), pp.539-560.