(RESEARCH ARTICLE)

Analysis of spatial distribution pattern of hotels in Port Harcourt Metropolis, Rivers State, Nigeria

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Abstract

The study analysed the spatial distribution pattern of hotels in Port Harcourt Metropolis, Rivers State, Nigeria. Global positioning system was used to capture the coordinates of each hotel to generate the spatial distribution of the hotels and also the pattern was generated by nearest neighbour analysis. Both descriptive statistics were used for the data analysis. The study showed that a total of 148 hotels were found in the study area. The spatial distribution pattern of the hotels expressed in Table 2 was significantly clustered (z= -9.93; p=0.000). The directional ellipse of the distribution was East to West capturing 94 hotels while the standard distance analysis only captured 90 hotels. The mean distance among the hotels was 255.9m. The mean center of hotels is found around GRA and Rumuola. The study concluded that the hotels are concentrated in a particular location and in most of them, the distance among them is close. The study recommended that a GIS database is required for the monitoring and management of hotels with the growing tendency of Port Harcourt Metropolis. Also, more studies should be done on the relationship between the location of hotels and security; and classification of hotels into different classess based on facilities present in each hotel.

Keywords: Hotels; Distribution; Clustered; Nearest Neighbour; Pattern; Port Harcourt

1. Introduction

Hotels are establishments that provide paid lodging on a short term basis in a given place or location. Location is observed to an important conception in tourism sector analysis, given the dependence of this activity on the natural, built, cultural and social characteristics of a certain territory (Vieira& Santos, 2017). Obviously, location of tourism and recreation sites plays a critical role in the physical and mental health and contributes substantially to human well-being (Triguero-Mas et al, 2015).In actual sense, tourism involves the movement of people from one destination to another, and this has become a major catalyst that has enormously influenced the high demand of recreational resorts and facilities in most African countries (Marcoutler, 2000). Whereas, recreation is an array of activities which provides the means by which leisure experiences are achieved (Agbayekhai et al., 2019).The provision of basic accommodation in times past consisting only a room with a bed, a cupboard, a small table has been replaced by rooms with modern facilities, en-suite bathrooms, air-conditioning and even climate control in some hotels (Omogunloye and Ayeni, 2012).

Tourism is one of the vital economic activities especially in urban centres and a significant item in the global economy. As tourism becomes crucial to the growth of cities and countries, understanding tourists' behaviours provides further insight into how to increase tourists' satisfaction with their visits and gain loyal return visitors as a result (Yoon & Uysal, 2005)

According to Akinyombo (2019), hospitality industry is a large and fast growing service sector in the world, Kattara (2005) described hospitality as friendly and generally behaviour towards visitors and guest intended to make

themselves feel welcome. However, Abomeh.(2007) noted that hospitality industry is one of the most successful and thriving sector supported by a female centric work force Jones (2002) classified hospitality industry into four types: foods and beverages, lodging and accommodation, travel and tour, recreation. The foods and beverages operation hotel motorway and roadside dining, license trade food services, fast food, transport food, service, employer feeding and institution food services. The food and beverages industry, known as the food services industry consists of business that prepare food for customers, it is the largest form of hospitality industry in the United States. It is estimated that, the food services industry provides about 50% of all means eaten in the United States of America today.

Additional common features that can be found in a hotel include telephones, television sets and internet services. They may also contain a mini bar where drinks and snacks are served. Larger hotels may provide a number of additional guest facilities such as restaurants, swimming pools, childcare and some with conference and social function services (Kufoniyi, 1998).

According to Uwadiegwu (2006), the accomplishment of tourism industry in any given location depends on the level of expansion of the elements. Tourism and recreation are more often than not dependent on both environmental resources and geographic locations. It is also an occurrence which in the event of lack of planning and management is likely to erode its environmental base (Agbayekhai et al., 2019). However, one of the problems often encountered in the tourism industry is lack of data and a quick update and maintenance of available data. Hence, spatial analysis of recreational facilities and services is an important tool to visualize service-deficient areas within an urban place and inform policy to ensure equity of facilities (Eyo & Ajake, 2019). The distributional pattern of tourism attractions and institutions in tourism destination is of great importance to scholars and other tourism stakeholders. However, the spatial distribution of recreational activities is determined by many factors, and also differs between activity types. Hence, in order to succeed, investors must understand the interplay of success factors in the industry. A number of factors are responsible for the decision of investors to site hotels at particular areas; the location of the hotel, which directly affects the investing success, needs to be fulfilled as a topmost priority (Baba, 2016).

It was noted in Agbayekhai et al., (2019) that in areas with high urbanization rates, land degradation, and growing economic wealth, the demand for recreational environments is usually on the increase. Hence, assessment approaches often remain limited to the local or regional level, which might not reflect the conditions of various landscapes or represent values throughout and across societies, which could better provide information for policy and decision-making.

The cause of siting a recreation center in a given location is predetermined by various reasons and for instance, Antrop (2004) has argued that the spatial distribution of land use patterns in coastal landscape of Kefalos has been attributed to cause a decreased visibility of the tourist attraction, and landscape disintegration leading to future loss of identity (Antrop, 2004, Gkoltsiou and Terkenli, 2008). A study in India by Rengarajan et al. (2014) on geographical analysis of tourism sites in Andaman Archipelago in India using nearest neighbour analysis to comprehend the spatial distribution of tourist's attractions in Andaman region of India. Their result showed that tourist sites in the area were distributed in clusters in the three regions (Diglipur, Mayabunder and Port Blair) and they suggested the need to promote tourism in other locations of the area in order to avoid concentration of sites and population pressure in a particular area. Daniela and Adriana (2015) carried out a spatial analysis of tourism activity in Romania using spatial statistics and Geographical Information Systems. Similarly, Hang and Zhang (2016) did a study on a spatial difference of the relationship between regional tourism and economic growth and a comparative study of Guangzhou, Shenzhen and Zhuhai. Their study tried to demonstrate the relationship between economic growth and tourism development in the cities of Guangzhou, Shenzhen and Zhuhai. Nearest Neighbour Analysis had been applied in the tourism studies with regards to the hospitality industry.

Additionally, a spatial distribution of tourism facilities was done by Ebrahimzadeh and Daraei (2014) in Semnan. The study was on spatial analysis in analyzing the tourism facilities distribution in Semnan. Their study revealed that distribution of hotels and catering centers in Semnan were situated on the main roads, while spatial distribution of tourist's amenities in Semnan were away from the main city center. This means that the city of Semnan had not been attracting many tourists due to lack of proper facilities, infrastructure and tourism services. NNI has been applied in quality differentiation, Seul (2015) applied NNI in the quality differentiation and conditional spatial price competition among hotels. The spatial analysis had been equally employed in the field of archaeology, Niknami et al (2009) carried a study in Northwestern Iranwhere they did a spatial pattern of archaeological site distributions on the eastern shores of Lake Urmia. Moreover, Vasiliadis and Kobotis (1999) used nearest neighbour analysis to analyse the spatial locations of tourist locations in Macedonia; the study made a suggestion on how best to design tourism in areas surrounding Prespes, Agios, Germanos, and Psarades to have a reasonable center of tourism success. Related study by Sridhar et al. (2014) was a geographical analysis of tourism sites in Andaman Archipelago in India using nearest neighbour analysis

to anlayse clustering of tourist attractions in Andaman region, the result of the study showed that tourism sites are distributed in clusters in three regions (Port Blair, Mayabunder and Diglipur), therefore they suggested the need to promote tourism in other locations to avoid concentration of tourism sites and population pressure in a particular site.

In Nigeria, scholars have carried out different studies on spatial analysis of different phenomena. It has equally been applied in health-related studies in Nigeria (Oviasu et al, 2015); educational facilities (Aliyu et al, 2013); ecotourism (Aniah et al., 2010; Obong et al., 2015; Odum et al., 2018) while Omogunloye and Ayeni (2012) analysed the hotels in Lagos State. A few of the studies considered the use of GIS to assess the spatial distribution of recreational activities especially hotels. Thus, this study focused on analyzing the spatial distribution of hotels in Port Harcourt Metropolis, Rivers State, Nigeria with a view to using the nearest neighbour analysis and GIS as major approaches to support the study.

2. Material and methods

The study was carried out in Port Harcourt Metropolis, Rivers State, Nigeria. Port Harcourt comprises Port Harcourt City Council and Obio/Akpor Local Government Area (Figure 1). It is located on latitude 040 48' and 050 00'N of the Equator and longitude 060 55'and 070 10'E of the Greenwich Meridian. Port Harcourt Metropolis covers an area of 387.261000 (sq.km). Port Harcourt is the Capital City of Rivers State of Nigeria. The study area has a tropical monsoon climate with mean annual temperature of 28oC and annual rainfall over 2500mm. The relative humidity is very high with an annual mean of 85%. The relief is generally lowland which has an average of elevation between 20m and 30m above sea level and the geology of the area comprises basically of alluvial sedimentary basin and basement complex. The vegetation found in this area includes raffia palms, thick mangrove forest and light rain forest. The soil is usually sandy or sandy loam underlain by a layer of impervious pan and is always leached due to the heavy rainfall. The study area is well drained with both fresh and salt water. The salt water is caused by the intrusion of sea water inland, thereby making the water slightly salty.

The area is occupied by rainforest, freshwater swamp and mangrove swamp in some cases, which has been drastically modified by human activities. The vegetation is nourished with high rainfall and high temperature, which provide favourable condition for the growth of a varieties of tall and big trees like mahogany, Obeche, Afara and abundance of oil palm trees and several other species of economically valuable plants such as raffia palms, Abura, ferns and grasses (Eludoyin et al, 2013). The city is a major industrial centre as it has a large number of multinational firms as well as other industrial concerns, particularly business related to the petroleum industry (Austin, 2010).

Source: Rivers State Ministry of Regional and Town Planning (2019)

Figure 1 Port Harcourt Metropolis showing Communities

The study made use of primary data and secondary data. The primary data were collected mainly through global positioning systems (GPS) whereby all registered hotels in the study area were being captured. The secondary sources of data were taken from the archived information of the list of registered hotels with their addresses, road and administrative maps of Port Harcourt City. The coordinates were imported into the ArcGIS environment to determine their spatial distribution within the study area. Descriptive statistics involving frequencies and percentages were used for the data analysis. However, nearest neighbour analysis was used to determine the distribution pattern of hotels in Port Harcourt Metropolis.

The nearest neighbour formula is

$$Rn = \frac{\bar{D}(Obs)}{0 \cdot 5 \sqrt{\frac{a}{n}}}$$

.... Equ 1

Where:

Rn = nearest neighbour value
D (Obs) = Mean Observed nearest neighbour distance
a= Area under study
n= Total Number of Points

The nearest neighbour (Rn) provides for clustering result when Rn = 0-0.8,

For random result, when Rn = 0.8-1 and for regular result when Rn = 1.-2.15,

Furthermore, the mode of distribution of hotels was computed using the mean center, directional ellipse standard deviation and standard distance from GIS environment.

3. Results and discussion

Table 1 presents the list of hotels in Port Harcourt Metropolis and it is discovered that 148 hotels of varying strata and different location while Figure 2 presents the map showing the locations of the hotels. It is as well shown in Figure 3 that the distribution patterns of hotels in Port Harcourt Metropolis as a clustered type suggesting that the location of hotels was skewed towards a particular location or direction, thus revealing that some locations enjoy the siting of hotels more than other places. Thus, the spatial distribution pattern of the hotels expressed in Table 2 was significantly clustered (z= -9.93; p=0.000). In this case, the GRA has more hotels than others. This could be partly attributed to the state of security/safety, customers and road network of the place.

Table 1 Hotels in Port Harcourt Metropolis

Sr.No.	Name of feature	Location	coordinates	
			Y_Axis	X_Axis
1	Aldgate Hotel	#20 King Perekule Street GRA PH	4.82168	6.99791
2	Algate Hotel	Plot 308 Abacha Road GRA Phass II	4.81382	6.99111
3	Amam Hotels Ltd	2 Okomoko Stree D/Line	4.80457	7.00112
4	Amanda Hotel	Plot 317 Woji Road GRA	4.82259	6.99467
5	Amanda Hotel	plot 24 Obani street GRA	4.81135	6.99676
6	Amity City Hotel	#5 Rumuibekwe Road	4.84750	7.04781
7	Amoni Hotels and Resorts	#57 Old Refinery Road Elelenwo	4.84543	7.06485
8	Apollo Guest house	11 Peremabriri Street D/Line	4.80428	7.00227
9	Applause Hotel	Plot 30/35 Fed Houses Rumuodara	4.87644	7.00266

10	Aristo house Hotel and casino	Plot 41/42 GRA Phase III	4.82099	6.99410
11	Arriva suites	Stadium Road	4.82276	7.01994
12	Bachiever Hotel and Resorts	6ᴬ Old GRA Aba Road Rumuogba	4.83985	7.03931
13	Bella De Sophia Hotel	Plot 10 Eastern Bypass Old GRA PHC	4.77698	7.021158
14	Belnab Hotel	#1 Igbo-Etche Road Rumuokursi	4.85661	7.06639
15	Benvis Hotel	#1 Chief Elechi Street E/W Rd Rumuodara	4.86719	6.98419
16	Best Premier Hotel	Aba Expressway Opposite Intels	4.858995	7.082043
17	Best Western Hotel	Along Arochukwu Street, Port Harcourt	4.834910	7.020113
18	Best Western Hotel	Adonai Road GRA, Port Harcourt	4.817416	6.994952
19	Beverly hills Hotel	130 Woji Road GRA	4.81161	7.00065
20	Blue Ribon Hotel	#304 Aba Road Rumuokursi	4.84983	7.05672
21	Bougain villea Hotel	Plot F2B F2BB GRA III	4.81873	6.99480
22	Brooklyn White House Hotel	17 Peremabriri Street D/Line	4.80514	7.00292
23	Chenice gardens	Prince Peter Amadi close off Stadium Road	4.83426	7.01645
24	Chiasm Suites Hotel	Opp. the Body of Christ Min. Int'l Stadium Road	4.82226	7.01903
25	Chrisolik Hotel Ltd	Plot 5A, Peter Odili Road, Port Harcourt	4.798333	7.040472
26	City Crown Hotel	#58 Iwofe Road	4.82886	6.97273
27	City View	Orazi Road New Layout	4.82503	6.98402
28	Clen- Phill Hotel	#68 Iwofe Road	4.82847	6.96782
29	Coral Reef Hotel	8 Orogbom Crescent GRA	4.81469	6.99742
30	Coral reef Hotel	27 Orogbum Crescent Street GRA	4.81346	6.99800
31	Creek Garden Hotel	#21 Ohia Street Old GRA	4.79095	7.01384
32	Danic Hotel	Plot 35 Circular Road GRA	4.82413	7.0140
33	Daveange Hotel	#10 Dame Street off Psychiatric Hospital Road Rumuigbo PHC	4.84386	6.98995
34	Davi Hotel	# 21 Prod Abowey Street GRA	4.82304	6.99167
35	De Edge Hotel	Graceland Road, Off Tobia Street	4.823508	6.989583
36	De Manor Hotel	#05 Omerelu Street GRA Phase I	4.82880	7.00313
37	De Palms Hotel	Obagi Street	4.826289	6.995390
38	Denami suites and Luxury Apartments	NTA/Apara, Link Road, Rumuigbo New Layout	4.866893	6.974742
39	Diamond Villa Hotel	#33 Agip Road Mile	4.80976	6.97906
40	Dinabel Hotel Ltd	Nkpolu Rumuigbo	4.85426	6.98558
41	Dot Nova Hotel	Ikwerre Road	4.840749	6.988383
42	Dotina Hotel	#23 Achichiwon Street off Elekahia Road	4.81538	7.02473
43	Emerald Hotel	#193 Aba Road Rumuola Junction	4.83010	7.00523
44	Eunique Rosi Hotel	#11 Circular Road GRA Extension	4.82265	7.0122
45	Everrich Hotels	#32 Doeis Close Orazi	4.82691	6.99002

46	Exit Hotel	#36 Obiwali Road Rumuigbo PHC	4.85058	6.98888
47	Ferguson Hotel	#1 Elelenwo street GRA Phase II	4.82409	7.00079
48	Focal Hotel	#201 Woji Road GRA	4.81467	6.99702
49	Franklin Hotel	#42 Obagi street GRA Phase I	4.82450	6.99588
50	Gade Palace	Obiri Ikwerre Road, East West Road	4.820538	7.005674
51	Galilee Gardens Hotel	#68 Old Refinery Road Elelenwo	4.843850	7.06589
52	Genesis Hotel	Prof Ayowa Street, Off Tombia Street	4.824803	6.990676
53	Geonocyn Hotel	63 Abache Link Road GRA Phase III	4.81305	6.99534
54	George Raynold's Hotel	#16 Wellongton Close, off Farm Road Mgbuoba	4.84935	6.97219
55	Gold Finger Hotel	#223 Tombia Extension GRA	4.82405	6.99086
56	Golden Tulip	1c Ebo Road GRA II	4.81904	7.00331
57	Grand Montecito Hotel and Resorts	Road 303 off Sani Abacha Road PH GRA	4.81590	6.98917
58	Grand Venice Hotel	Cocan Estate Rumuogba	4.84467	7.03534
59	Greenfield Resorts	12 – 16 Bishop Dimieri GRA	4.81615	7.00242
60	Gusto Hotel	#11 Ihulwo Aghari Road Elelenwo	4.83928	7.07130
61	Hartford Hotel Ltd	Along Iwofe Road	4.82937	6.97697
62	Heart 2 Heart Hotel	51B Emekuku D/line	4.80646	7.00411
63	Hitona Hotel	#13 Old Refinery Road Elelenwo	4.85128	7.06298
64	Hotel 1804 Botique	#42 Owhor Close Off Stadium Road	4.81201	7.019680
65	Hotel De- Exellence	Plot 83 Omerelu Street GRA Phase I	4.82840	7.00209
66	Hotel De Mapart	NTA Road, Port Harcourt	4.869109	6.975257
67	Hotel De Sintech	#14 Igboukwu D/Line	4.79985	7.0029
68	Hotel De- Woclif	#3 Ohiamini Road Elekahia	4.81390	7.02127
69	Hotel Neben	3 Dan's Close GRA III	4.81734	7.00269
70	Ilu Gardel Hotel	#114 Elekahia Road	4.81786	7.02383
71	Iwaikwokowko Hotel	#54 Oroekpo Road Ada George	4.83200	6.96944
72	Juanita Hotels	47, Herbert Macaulay St, Amadi flat, Old GRA	4.78866	7.01281
73	Landmark Hotel	4 Worlu Street off Olu Obasenjo Road D/line	4.81297	7.00455
74	Le meridian	#45 Tombia Street GRA	4.82070	7.00277
75	Legend Hotel	6^A Obanoba Street GRA	4.81816	7.00200
76	Listan Hotel	#8 Weli Street Okporo Road Rumuodara	4.84947	7.03617
77	Londa Hotels	#124 Orazi Road New Layout	4.82744	6.98560
78	Lotus Hotel	Along Abuloma Road Trans- Amadi	04.78866	007.03452
79	Mac-Cheni Hotel	Along Ada George Road	4.83468	6.97678
80	Make-Ze Hotel	#2 Elder Road off Obiwali Rumuigbo PHC	4.8486	6.98968
81	Malvern Hotel	10 Bauchi Street Old GRA	4.78532	7.08728
82	Marrott Hotel	# 39 Tombia Street GRA Phase II PH	4.82105	7.00406

83	Mass Central Extension Hotel	Eastern Bypass Old GRA PHC	4.78206	7.02100
84	Mass Central Hotel	23 Tombia Street New GRA	4.821560	7.005865
85	Mass central hotel	# 23 Tombia Street GRA Phase II PH	4.82158	7.0059
86	Mass Central Hotel	Eastern Bypass PHC Old GRA	4.77035	7.0442
87	Max – Chief Hotel	#4 Hon. Maxwell Owabia Street off Iwofe Road	4.82811	6.97291
88	Mission Hotels	#45 Orazi Road New Layout	4.83100	6.99223
89	Miva Hotel Ltd	#25 Igbodo Street Old GRA	4.79175	7.00318
90	Muriela Hotel	#7 Wokekoro Stree Amadi Flat Old GRA	4.78709	7.00876
91	Nebutel Hotel	#5 Divine Avenue Oroekpo Road Ada George	4.83100	6.96696
92	New Embassy Hotel	#30 Obiwali Road Rumuigbo PHC	4.85076	6.98872
93	Nicon Hotels and Apartments	2 Benjamin Okpara Street GRA	4.81034	7.00042
94	Nikky Hotels	#9 Circular Road GRA Extension	4.82420	7.00760
95	North crest Hotel	#10 Grace Avenue Obiwali Road	4.86338	6.98272
96	Novotel Hotel	Stadium Road	4.83539	7.01635
97	Nuton Sofia Hotel	#7 Chief John Wobo Street off Agip Road	4.81136	6.98229
98	Ocabigue Hotel	#24 Ezimgbu Close Off Stadium Road	4.82805	7.01408
99	Palm Spring Hotel	#11 Shalom Close of Ada George	4.83531	6.97569
100	Paloma Hotel	Plot 99 Bimkol Crescent GRA Phase II PH	4.82237	6.99373
101	Park Hotels	#1 Water Walk Road Rumuola	4.83289	7.00528
102	Peace Mark Hotel	Nkpolu Road Rumuigbo	4.87024	6.98398
103	Pixy Hotel	#32 Pixy Orazi New Layout	4.83194	6.98897
104	Presidential Hotel	#1 Obagi Street GRA Phase II	4.82096	7.00382
105	Prince Georges Hotel	#28 Mbome Street D/line	4.80132	7.00533
106	Randoff Hotels and Resorts	Old GRA Aba Road Rumuogba	4.83959	7.0394
107	Roral Doamonds	Off Aba Road Rumuogba	4.84214	7.03741
108	Rosie Hotel	#32 Emeyal street Opp. Polo club GRA Phase	4.82244	7.00162
109	Royal Claridon Hotel	Aba road	4.793366	7.007113
110	Royal Paragon Hotel	Km2 Iwofe Road	4.82652	6.96184
111	Royal Residence Hotel	#44 Tombia street GRA Phase I	4.82194	7.00018
112	Royal Vintage Hotel	#206 Ameachi Street GRA	4.81841	6.98975
113	Safari Hotel Ltd	5 Rumuokoro Town, PH	4.864806	6.995083
114	Samaritan Hotel	#31 Olozu Street off Stadium Road	4.81965	7.01874
115	Sanclin Hotel	Plot 4 Eternity Close Off Eliopranwo Road	4.83509	6.97468
116	Sapphire Hotels	13 Ovunwa Street D/line	4.80999	7.00555
117	Sasun Hotel Ltd	No 9, Mabisel Avenue, Off Peter Odili Road, Trans Amadi	4.798889	7.038056
118	Shalom house Hotel	Plot F2AA F2AB GRA III	4.81985	6.99448
119	Shepherrd Hills Hotel	Okporo Road Off Aba Road Rumuodara	4.84660	7.03678

120	Sissi Hotel	Plot 46 Orominieke Road D/Line	4.80982	7.00432
121	Skills Hotel and Kitchen	#2 Eliopranwo Road	4.83351	6.97568
122	Somitel Hotel	Campbell Ave, Off Peter Odili Road PH	4.795083	7.043389
123	Southern Star Hotel	Cocan Estate Prime Close	4.84609	7.03357
124	Sovida Hotel	#24 Oju Dan Kalio Street D/line	4.80080	7.00535
125	Sparklyn Hotel	Plot 100 Bimkol Crescent GRA Phase II PH	4.82295	6.99368
126	Sparkyn Hotel	# 05 Prod Abowey Street GRA	4.82179	6.9914
127	Spheck Hotel	#10 Elder Marcus Ogbu Street off Iwofe Road	4.82884	6.96376
128	Springhills Hotel	22 Uyo street off Stadium Road Rumuomasi	4.82934	7.02123
129	Star King Hotel	#24 Tombia street GRA Phase I	4.82243	7.0037
130	Sugar Domino Hotel	#10 Refinery Road Elelenwo	4.85169	7.06318
131	Swiss International Hotel	No 9, Mabisel Avenue, Off Peter Odili Road, Trans Amadi	4.797972	7.03775
132	Tehila Hotel	#234 Woji Road GRA	4.81708	6.99676
133	The elkan terrace	GRA	4.81442	6.99527
134	The Pre-Eminene Hotels and Towers	#55/56 Old Refinery Road Elelenwo	4.84574	7.06479
135	Titie Hotels Ltd	#9 Oke off Peter Odili Road Trans-Amadi	4.79797	7.03854
136	Tokyu Grand Hotel	#38 Okwurola Street off Stadium Road	4.83114	7.0149
137	Tuscany Hotel	208 Obiwali Road, Rumuigbo	4.797972	7.03775
138	Twinkle Hotel	Plot 22 Tombia Extension GRA	4.8202	6.99513
139	Varlin Hotel	#1 Marior Close off Rumuoke by Okilton Ada George	4.84277	6.97345
140	VEE Hotels	Plot 110B off Ordinance Road Trans-Amadi	4.80059	7.036890
141	Venice Hotel	#186 Woji Road GRA	4.81797	6.9964
142	Vhelberg Imperial Hotel	Plot 112 off Peter Odili Road Trans-Amadi	4.80141	7.03665
143	Viontel Hotel	Stadium Road	4.82701	7.01550
144	Visa Karena Hotel	3 Wonodi Street GRA	4.80952	6.99990
145	Visa Karena Hotel	#3 Wonodi Street GRA	4.80952	6.9999
146	Willington Villa Hotel	#112 Stadium Road PHC	4.82076	7.01869
147	Wills Hotel	15 Okomoko Stree D/Line	4.80618	7.00045
148	Windgate Hotel	15, Ohia Mini Road, Rumuigbo	4.837514	6.994256

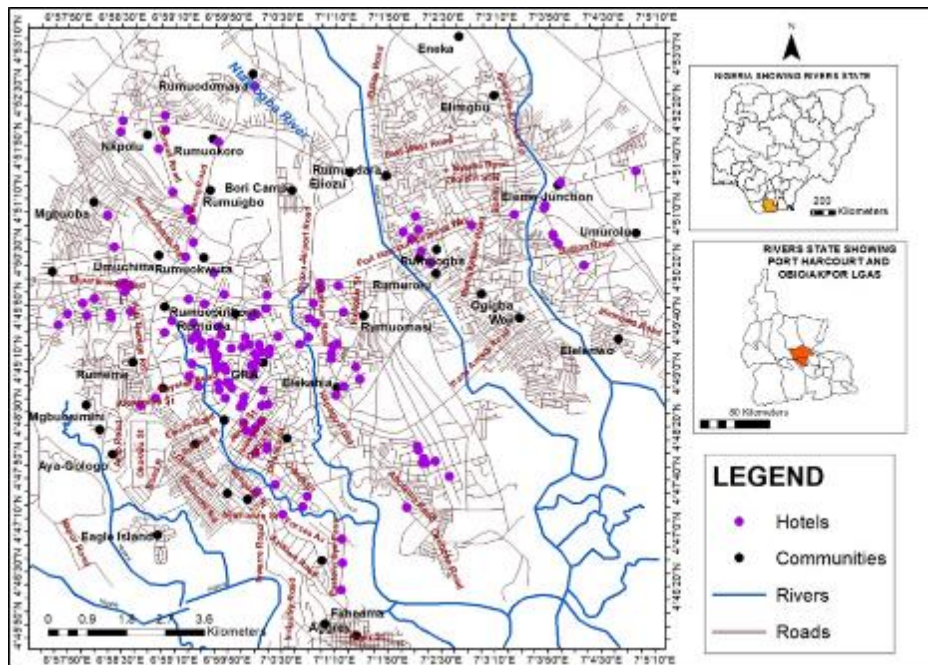Source: Author's Fieldwork, 2022

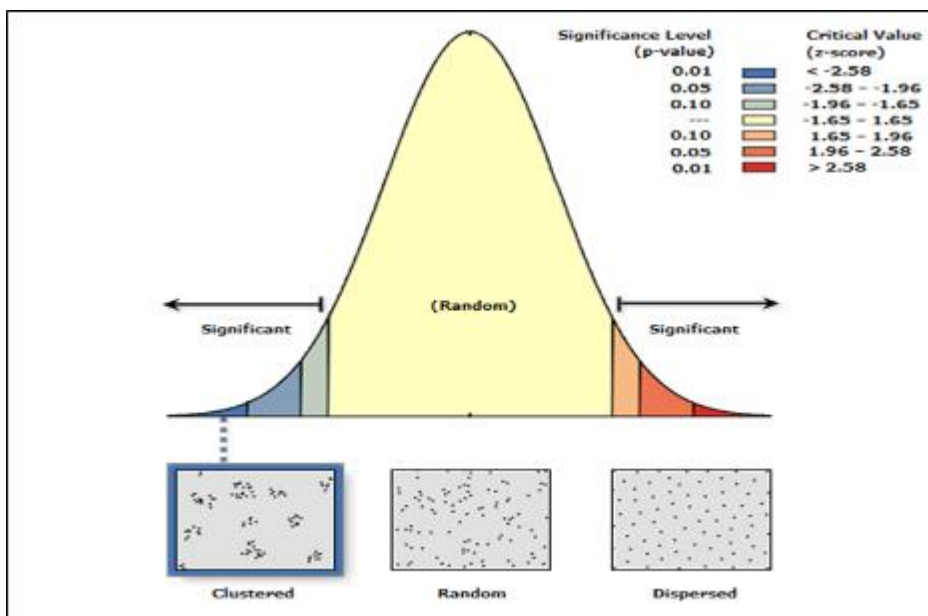**Figure 2** Distribution of Hotels in Port Hrcourt Metropolis

Figure 3 Distribution Pattern of Hotels in Port Harcourt Metropolis

Table 2 Average nearest Neighbor Summary

Observed Mean Distance	265.5855 Meters
Expected Mean Distance	463.5622 Meters
Nearest Neighbor Ratio	0.572923
z-score	-9.939575
p-value	0.000000

The directional ellipse and standard distance are presented in Figure 4. The directional ellipse runs East to West; and the ellipse captured 94 hotels (Table 3) which are found around Rumuokwuta, Rumuomasi, Rumuepirikom, Rumuola, GRA, Elekahia, Olu Obasanjo, Ogbunabali, Agip Junction, Rumeme, and Umuchitta. The Standard Distance Analysis captured 90 hotels (Table 4) and these are found around Rumuokwuta, Rumuomasi, Rumuepirikom, Rumuola, GRA, Elekahia, Olu Obasanjo, Ogbunabali, Agip Junction, Rumeme, Umuchitta, Bori Camp, and Mile 3. The mean center analysis in Figure 5 is very close to GRA. This shows that the concentrations of the hotels are around GRA and Rumuola, The analysis on the distance of hotels to each other is presented in Table 5 which shows that the minimum distance was 12.4m and the maximum distance is 832.8m. The mean distance among the hotels was 255.9m.
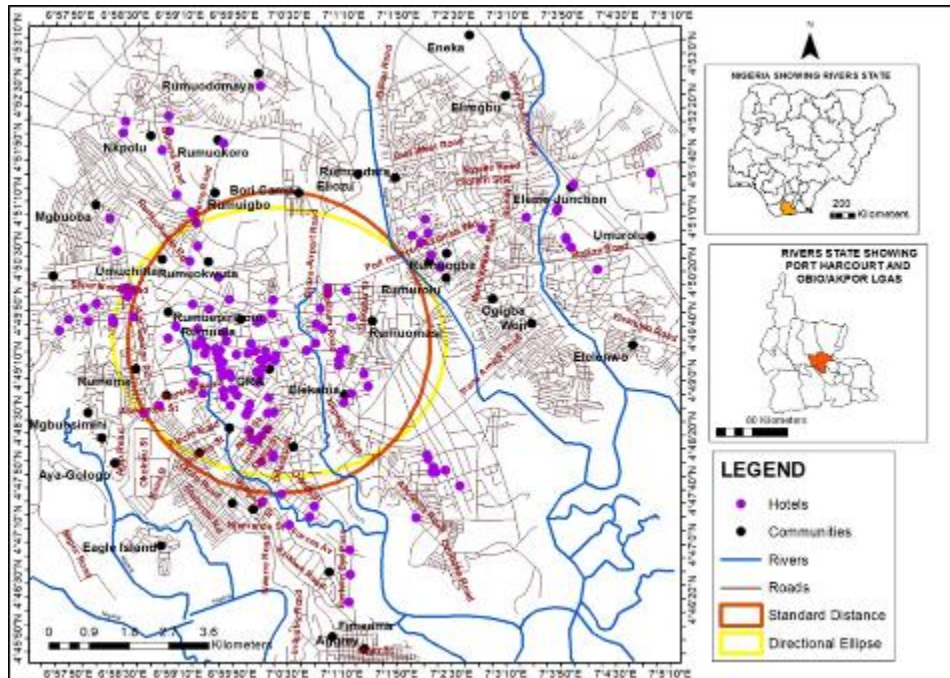

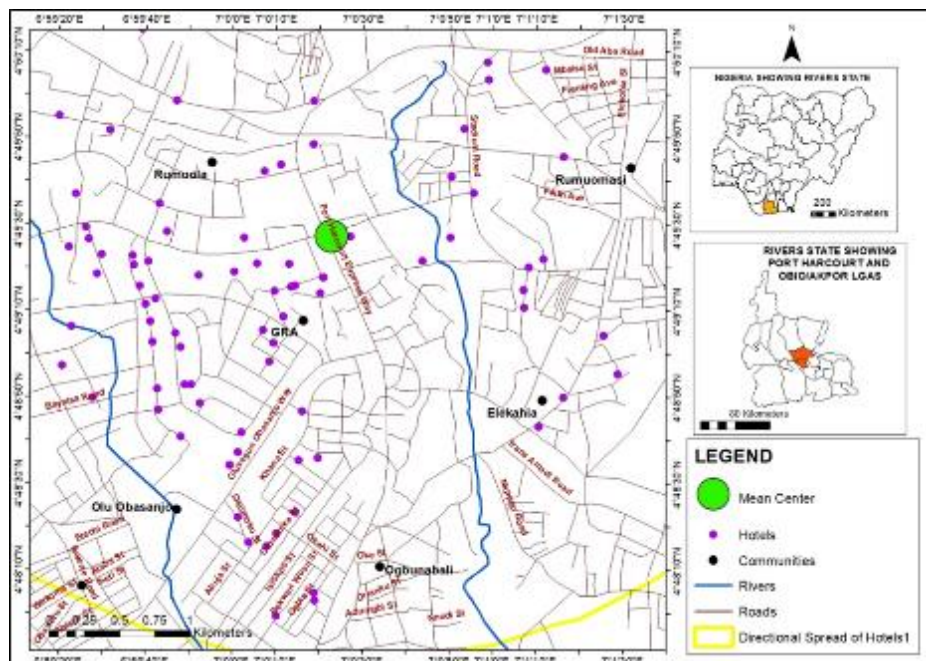**Figure 4** Directional Ellipse and Standard Distance of Hotels in Port Harcourt Metropolis

Figure 5 Mean Centre of Hotels

Table 3 Number of Hotels Affected by Directional Ellipse of Hotels

Sr.No.	Y_Axis	X_Axis	Hotels
1	4.82168	6.99791	Aldgate Hotel
2	4.81382	6.99111	Algate Hotel
3	4.80457	7.00112	Amam Hotels Ltd
4	4.82259	6.99467	Amanda Hotel
5	4.81135	6.99676	Amanda Hotel
6	4.80428	7.00227	Apollo Guest house
7	4.82099	6.99410	Aristo house Hotel and casino
8	4.82276	7.01994	Arriva suites
9	4.83491	7.02011	Best Western Hotel
10	4.81742	6.99495	Best Western Hotel
11	4.81161	7.00065	Beverly hills Hotel
12	4.81873	6.99480	Bougain villea Hotel
13	4.80514	7.00292	Brooklyn White House Hotel
14	4.83426	7.01645	Chenice gardens
15	4.82226	7.01903	Chiasm Suites Hotel
16	4.82351	6.98958	De Edge Hotel
17	4.82503	6.98402	City View
18	4.81469	6.99742	Coral Reef Hotel
19	4.81346	6.99800	Coral reef Hotel
20	4.82413	7.01400	Danic Hotel
21	4.84386	6.98995	Daveange Hotel
22	4.82629	6.99539	De Palms Hotel
23	4.82304	6.99167	Davi Hotel
24	4.82880	7.00313	De Manor Hotel
25	4.80976	6.97906	Diamond Villa Hotel
26	4.84075	6.98838	Dot Nova Hotel
27	4.81538	7.02473	Dotina Hotel
28	4.83010	7.00523	Emerald Hotel
29	4.82265	7.01220	Eunique Rosi Hotel
30	4.82691	6.99002	Everrich Hotels
31	4.82409	7.00079	Ferguson Hotel
32	4.82156	7.00587	Mass Central Hotel
33	4.81467	6.99702	Focal Hotel
34	4.82450	6.99588	Franklin Hotel
35	4.82480	6.99068	Genesis Hotel

36	4.82054	7.00567	Gade Palace
37	4.81305	6.99534	Geonocyn Hotel
38	4.82405	6.99086	Gold Finger Hotel
39	4.81904	7.00331	Golden Tulip
40	4.81590	6.98917	Grand Montecito Hotel and Resorts
41	4.81615	7.00242	Greenfield Resorts
42	4.82937	6.97697	Hartford Hotel Ltd
43	4.80646	7.00411	Heart 2 Heart Hotel
44	4.81201	7.01968	Hotel 1804 Botique
45	4.82840	7.00209	Hotel De- Exellence
46	4.79985	7.00290	Hotel De Sintech
47	4.81390	7.02127	Hotel De- Woclif
48	4.81734	7.00269	Hotel Neben
49	4.81786	7.02383	Ilu Gardel Hotel
50	4.81297	7.00455	Landmark Hotel
51	4.82070	7.00277	Le meridian
52	4.81816	7.00200	Legend Hotel
53	4.82744	6.98560	Londa Hotels
54	4.83468	6.97678	Mac-Cheni Hotel
55	4.78532	7.08728	Malvern Hotel
56	4.82105	7.00406	Marrott Hotel
57	4.82158	7.00590	Mass central hotel
58	4.82811	6.97291	Max ΓÇô Chief Hotel
59	4.83100	6.99223	Mission Hotels
60	4.81034	7.00042	Nicon Hotels and Apartments
61	4.82420	7.00760	Nikky Hotels
62	4.83539	7.01635	Novotel Hotel
63	4.81136	6.98229	Nuton Sofia Hotel
64	4.82805	7.01408	Ocabigue Hotel
65	4.83531	6.97569	Palm Spring Hotel
66	4.82237	6.99373	Paloma Hotel
67	4.83289	7.00528	Park Hotels
68	4.83194	6.98897	Pixy Hotel
69	4.82096	7.00382	Presidential Hotel
70	4.80132	7.00533	Prince Georges Hotel
71	4.82244	7.00162	Rosie Hotel
72	4.82194	7.00018	Royal Residence Hotel
73	4.81841	6.98975	Royal Vintage Hotel

74	4.81965	7.01874	Samaritan Hotel
75	4.80999	7.00555	Sapphire Hotels
76	4.81985	6.99448	Shalom house Hotel
77	4.80982	7.00432	Sissi Hotel
78	4.83351	6.97568	Skills Hotel and Kitchen
79	4.80080	7.00535	Sovida Hotel
80	4.82295	6.99368	Sparklyn Hotel
81	4.82179	6.99140	Sparkyn Hotel
82	4.82934	7.02123	Springhills Hotel
83	4.82243	7.00370	Star King Hotel
84	4.81708	6.99676	Tehila Hotel
85	4.81442	6.99527	The elkan terrace
86	4.83114	7.01490	Tokyu Grand Hotel
87	4.82020	6.99513	Twinkle Hotel
88	4.81797	6.99640	Venice Hotel
89	4.82701	7.01550	Viontel Hotel
90	4.80952	6.99990	Visa Karena Hotel
91	4.80952	6.99990	Visa Karena Hotel
92	4.82076	7.01869	Willington Villa Hotel
93	4.80618	7.00045	Wills Hotel
94	4.83751	6.99426	Windgate Hotel

Source: Author's Fieldwork, 2022

Table 4 Number of Hotels Influenced by Standard Distance

Sr.No.	Y_Axis	X_Axis	Hotels
1	4.82168	6.99791	Aldgate Hotel
2	4.81382	6.99111	Algate Hotel
3	4.80457	7.00112	Amam Hotels Ltd
4	4.82259	6.99467	Amanda Hotel
5	4.81135	6.99676	Amanda Hotel
6	4.80428	7.00227	Apollo Guest house
7	4.82099	6.9941	Aristo house Hotel and casino
8	4.82276	7.01994	Arriva suites
9	4.83491	7.020113	Best Western Hotel
10	4.817416	6.994952	Best Western Hotel
11	4.81161	7.00065	Beverly hills Hotel
12	4.81873	6.9948	Bougain villea Hotel
13	4.80514	7.00292	Brooklyn White House Hotel
14	4.83426	7.01645	Chenice gardens

15	4.82226	7.01903	Chiasm Suites Hotel
16	4.823508	6.989583	De Edge Hotel
17	4.82503	6.98402	City View
18	4.81469	6.99742	Coral Reef Hotel
19	4.81346	6.998	Coral reef Hotel
20	4.82413	7.014	Danic Hotel
21	4.84386	6.98995	Daveange Hotel
22	4.826289	6.99539	De Palms Hotel
23	4.82304	6.99167	Davi Hotel
24	4.8288	7.00313	De Manor Hotel
25	4.840749	6.988383	Dot Nova Hotel
26	4.81538	7.02473	Dotina Hotel
27	4.8301	7.00523	Emerald Hotel
28	4.82265	7.0122	Eunique Rosi Hotel
29	4.82691	6.99002	Everrich Hotels
30	4.82409	7.00079	Ferguson Hotel
31	4.82156	7.005865	Mass Central Hotel
32	4.81467	6.99702	Focal Hotel
33	4.8245	6.99588	Franklin Hotel
34	4.824803	6.990676	Genesis Hotel
35	4.820538	7.005674	Gade Palace
36	4.81305	6.99534	Geonocyn Hotel
37	4.82405	6.99086	Gold Finger Hotel
38	4.81904	7.00331	Golden Tulip
39	4.8159	6.98917	Grand Montecito Hotel and Resorts
40	4.81615	7.00242	Greenfield Resorts
41	4.82937	6.97697	Hartford Hotel Ltd
42	4.80646	7.00411	Heart 2 Heart Hotel
43	4.81201	7.01968	Hotel 1804 Botique
44	4.8284	7.00209	Hotel De- Exellence
45	4.79985	7.0029	Hotel De Sintech
46	4.8139	7.02127	Hotel De- Woclif
47	4.81734	7.00269	Hotel Neben
48	4.81786	7.02383	Ilu Gardel Hotel
49	4.81297	7.00455	Landmark Hotel
50	4.8207	7.00277	Le meridian
51	4.81816	7.002	Legend Hotel
52	4.82744	6.9856	Londa Hotels
53	4.8486	6.98968	Make-Ze Hotel
54	4.78532	7.08728	Malvern Hotel

55	4.82105	7.00406	Marrott Hotel
56	4.82158	7.0059	Mass central hotel
57	4.831	6.99223	Mission Hotels
58	4.81034	7.00042	Nicon Hotels and Apartments
59	4.8242	7.0076	Nikky Hotels
60	4.83539	7.01635	Novotel Hotel
61	4.81136	6.98229	Nuton Sofia Hotel
62	4.82805	7.01408	Ocabigue Hotel
63	4.82237	6.99373	Paloma Hotel
64	4.83289	7.00528	Park Hotels
65	4.83194	6.98897	Pixy Hotel
66	4.82096	7.00382	Presidential Hotel
67	4.80132	7.00533	Prince Georges Hotel
68	4.82244	7.00162	Rosie Hotel
69	4.82194	7.00018	Royal Residence Hotel
70	4.81841	6.98975	Royal Vintage Hotel
71	4.81965	7.01874	Samaritan Hotel
72	4.80999	7.00555	Sapphire Hotels
73	4.81985	6.99448	Shalom house Hotel
74	4.80982	7.00432	Sissi Hotel
75	4.8008	7.00535	Sovida Hotel
76	4.82295	6.99368	Sparklyn Hotel
77	4.82179	6.9914	Sparkyn Hotel
78	4.82934	7.02123	Springhills Hotel
79	4.82243	7.0037	Star King Hotel
80	4.81708	6.99676	Tehila Hotel
81	4.81442	6.99527	The elkan terrace
82	4.83114	7.0149	Tokyu Grand Hotel
83	4.8202	6.99513	Twinkle Hotel
84	4.81797	6.9964	Venice Hotel
85	4.82701	7.0155	Viontel Hotel
86	4.80952	6.9999	Visa Karena Hotel
87	4.80952	6.9999	Visa Karena Hotel
88	4.82076	7.01869	Willington Villa Hotel
89	4.80618	7.00045	Wills Hotel
90	4.837514	6.994256	Windgate Hotel

Source: Author's Analysis. 2022

4. Conclusion

The study has proven the importance of GIS in the spatial analysis of hotels and it can be concluded that the spatial distribution of hotels in Port Harcourt Metropolis is clustered whereby majority of the hotels are found around GRA and

Rumuola. In addition, the mean distance among the hotels is found to be about 250m. The study recommended that a GIS database is required for the monitoring and management of hotels with the growing tendency of Port Harcourt Metropolis. More studies should be done on the relationship between the location of hotels and security; and classification of hotels into different classess based on facilities present in each hotel.

Compliance with ethical standards

Disclosure of conflict of interest

There is no conflict of interest between the authors.

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