UTILISATION OF GIS TECHNOLOGY FOR TOURISM MANAGEMENT IN VICTORIA ISLAND LAGOS

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Abstract

This study covers tourism destinations which include beach, Museums, Parks and resorts, hotels, restaurants, clubs, bars, cinemas and fitness centres, as well as complementing tourism destination Services which includes police post, clinics and hospital in Victoria Island Lagos and how the utilisation of GIS technology can be use to improved tourism management. Also to model accessibility to these points of interest mentioned above using Geographic information system analytical tools and functions. Geographic coordinates of the location of all bars, clubs, restaurants, cinema, fitness centre, hospital, clinic, police post and various tourists destination have been picked with their corresponding attributes to build a database using Arc Map 9.3 software package Geo database. Analyses to aid decision for management and future planning was carried out using the spatial statistical tools in the GIS application used for this study. The analysis included central Feature analysis which was used to model area central to Tourism Facilities, Tourism services and Tourisms Destinations in Victoria Island.

Keywords: Gis, Tourism, Planning, Management

Introduction

The basic Geographic information system investigation question of location is of utmost importance for any decision to be made. Location of services of interest in urban centres is equally important in making choices for residents and visitors. Many a time choice making can be difficult because of standard and preference individuals have. Noting the

dynamic nature, taste, preference and set standards urban dwellers posses, it is important to apply newer technologies in meeting such needs. In general when visitors are visiting tourism sites information about the location and of related services is important during and before such trips are made. when a visitor is on his way to a destination, he may want to know the shortest route to reach the destination of interest and also check for nearest facility within a specified distance or time to his or her current location.

Victoria Island falls within UTM coordinates easting's 544508.976 and northing's 711902.649 at the first corner, easting's 549937.305 and northing's 711449.416 at the second corner, easting's 549768.483 and northing's 709816.022 at the third corner and easting's 545674.062 and nothing's 709763.115 metres. It was originally surrounded by water bordered by the Atlantic Ocean on the South, the mouth of the Lagos Lagoon on the West, and the Five Cowries, town and Island lie within the boundaries of Eti-Osa Local Government area of Lagos state.

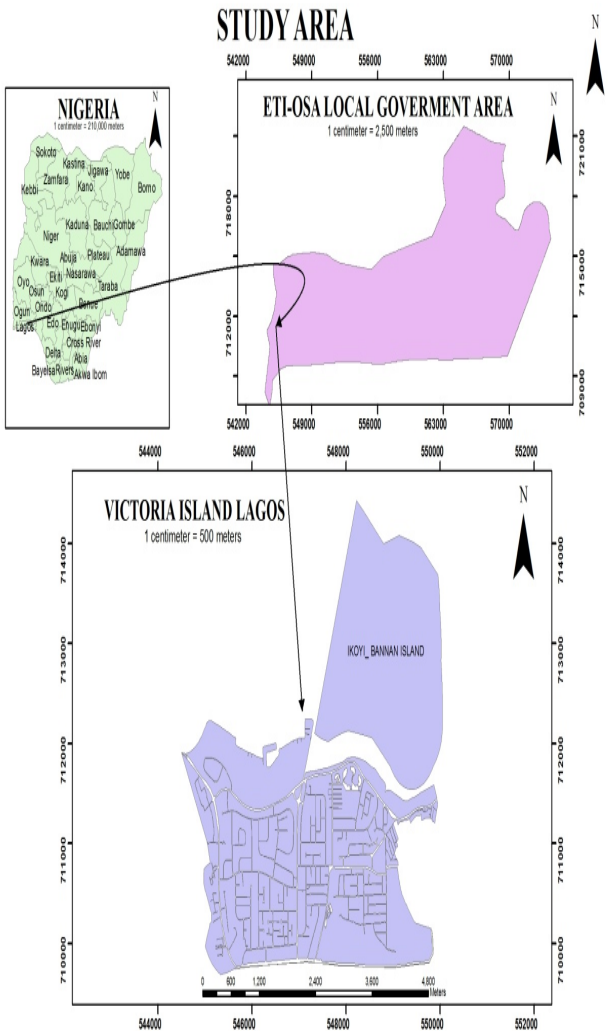


Fig 1: Diagram showing the location of the Study Area

Research questions

The following research questions guided the study:

1. How can tourist or resident access the location of places of interest saving cost, and travel time?
2. What is the distribution pattern of places of interest in the study area?
3. How can GIS technology be used to enhance tourism management?
4. What are the benefits of the use of GIS in tourism management?

Literature Review

The "organized collection of computer hardware, software, geographic data and personnel design to efficiently capture, store, update, manipulate, analyse, and display all forms of geographically referenced information" is called Geographic Information System (ESRI, 1990). With its capabilities for business mapping, geospatial analysis and its contribution to decision making, GIS is a valuable tool applicable in the discipline of tourism. Geographic Information Systems (GIS) and tourism share a common characteristic that is, both cut cross the boundaries of disciplines and application areas. GIS has been applied in many disciplines including geography, forestry, urban planning, and environmental studies. Similarly, tourism has been a subject of interests to geographers, economists, business, environmental planners, anthropologists, and archaeologists. As such, the potential for GIS applications in tourism is significant. GIS operates on two data elements, which are spatial and attribute data. Spatial data or geographic data refers to a known location on the earth surface which is defined by coordinates and the attribute by place names, address and post codes (Jovanic, 2008).

GIS is now recognized widely as a valuable tool for managing, analysing, and displaying large volumes of diverse data pertinent to many local and regional planning activities. Its use in tourism planning and management becomes imperative. Tourism is all about the activities of persons away from their familiar environments of the home and work place for a while and the facilities and services provided to enable them meet their felt needs both in transit and at the destination area. (Dantata, 2005). Tourism is also defined by United Nation in 1988 as a form of recreation which implies leaving home for another place, whether near or far. To buttress these definitions, Tourism can be defined as the temporary movement from home to unusual place for business, recreate, sightsee, visit or points of interest whether near or far. The place of interest can vary from person to person. A hotel, a night club, a restaurant a park can be a place of interest to a person and to another it may be historic sites, conservation sites and other outdoor places within a city or urban centre.

Tourism is an activity highly dependent on environmental resources. It is also a phenomenon, which in the event of a lack of planning and management will erode its environmental base. Tourism management can be enhanced by GIS technology. GIS provide a toolbox of techniques and technologies of wide applicability for the achievement of sustainable tourism management. Attribute information on the various tourism facilities collected from different sources can be linked to their respective spatial features. According to (Caldera de Ugarte et al, 1997) they identified that GIS can be applied in two aspects, firstly for the public and secondly for the management. The public focuses on the tourist or visitors to new cities while management focuses on Tourism management process. The public can access tourism information through the use of web based interactive map where tourist can have access to view location of tourism site, roads networks, and other ancillary tourism facilities like hospital, police station etc before visiting, here the interactive map shows road network, street names and places of interest within the city for tourists. The second aspect focuses on management needs for forecasting, planning and mitigating impacts caused by tourist activities in areas where these activities are concentrated especially around residential neighbourhoods and other centres.

Methodology

The case study approach was used in this study to gain in-depth understanding of the subject; the case study approach is employed when the researcher has little control over events or when the focus is on phenomenon within a real life context (Osuala, 2005). Since this study sought to thorough investigate, rich in details about the utilization of GIS technology in tourism management in Victoria Island a case study research design was considered the most appropriate. Therefore a case study research design was used for this study because as Omale (2012) suggests, a case study is an intensive study geared towards a thorough understanding of a given phenomenon, that provide a thorough, in-depth, comprehensive and well ordered information and this is what this study intended to achieve. Spatial database is the central force of GIS technology. Kufoniyi (1998) described GIS data modelling as process by which the real world entities and their interrelationship are analyzed and modelled in such a way that maximum benefit are derived while utilizing a minimum number of data.Reality refers to phenomena as they actually exist, including all aspects which may or may not be perceived by individuals. The view of reality is the mental abstraction of reality for a particular application (user requirements) or group of applications (Kufoniyi, 1998).

Database Design

Information Users and Their Information Needs: The information users are the categories of people within the public that will need to access the database that will be designed and implemented. For this study the following users have been identified and their needs:

- The tourists and residents or public.
- The government agency in charge of Tourism.
- Emergency service providers.
- Law enforcement agencies.

The user's requirement here guided on the type of information needed to build the database.

Conceptual Design

This involves defining the entities which are the view of reality relevant to the study.

- The road networks are represented as line features.
- The Tourists Destinations in Victoria Island which included Beaches, Museums, Art Gallery, Parks and Tourist Resorts are represented as points.
- The Tourists Facilities in Victoria Island which included hotels, restaurants, bars, cinemas, clubs and fitness centres are represented as points.
- The Services Victoria Island which include hospitals, clinic and police post are represented as points.

Logical Design

It involves transmitting or translation of the conceptual schema into logical schema. It also involves selecting implementation software. Here the entities identified become relations with attributes.

Table 1.0: Facilities Entity and its Attributes

FIELD	DESCRIPTION
F_ID	Facility identifier.
F_NAME	Facility name.
F_TYPE	Facility type.
F_STREET	Facility street location.
F_ADDRESS	Facility full address.
F_PRODUCT	Facility products.

Hardware

The hardware used for this study included a Scanner, Printer, Desktops personal computer, and GPS device. The scanner was used to convert the analogue map of Victoria Island into digital, the printer was used to print out hard copies of maps and technical reports, the personal computer was used to drive various software applications used and the GPS device was used to capture point coordinates.

Software

The software used in executing this study included ESRI ArcGIS 9.3 with extensions including, Network analyst and spatial statistic analyst. All the extensions were used to perform analysis. Other software application used included, Microsoft excel, and Microsoft word

Data Acquisition

The data used for this project were acquired primarily and secondarily. The primary data were acquired through field survey using GPS devices to acquire point data in terms of coordinates of points where Hotels, Clubs, Restaurant, Bars, Museums, Art Gallery, Parks, Beaches, Cinemas, Resorts, Hospitals, clinics, police posts and Fitness Centres are located in Victoria Island. The data captured where grouped into different categories which included Facilities, Services, and Tourists Destinations. Then each facility, services, and tourist's destination were given different unique identifiers. The secondary data used for this project was an existing road map of Victoria Island which was converted to digital form and Geo referenced using coordinate's of known points. The reference system used is "UTM" Universal Traverse Mercator and a Projection of Zone 31N.

Physical Design

The software used to execute and drive the database is ESRI ArcGIS9.3 desktop Geo database.

Database Creation

The point coordinates of hotels, hospitals, clinics, bars, clubs, restaurants, museums beach, art gallery, police post and resorts were collected using GPS device, the data were downloaded into excel spread sheet and were sorted respectively. The point coordinates is grouped as Facilities, Services, and Tourism destinations and a feature class each and their corresponding attribute fields is created in the ArcGIS 9.3 Geo database using the Arc Catalog, to store the point data and their corresponding attributes. In inputting, the point data into ArcGis 9.3 software application Geo database, the edit mode is turned on and the feature class attribute table is opened. Each point is selected using the select tool and its corresponding attribute is added into the Database. The hotels, restaurant, clubs, bars, cinemas and fitness centres were grouped as Facilities because they compliment Tourists destinations and given different unique identifiers in the Facilities feature class. The process is also applied to the Services feature class and the Tourists Destination feature class. For the purpose of analysis, the Facility feature class is broken down into separate feature class or layer in the Geo database.

Table 1.2: Unique identifiers for Facility relation

FACILITY	UNIQUE IDENTIFIER(F_ID)
Hotel	0205
Restaurants	0206
Bars	0207
Club	0208
Cinemas	0209
Fitness centre	0204

The beach, parks, resorts, art gallery, and museums were group as Tourists destination because they are the Tourists attraction in Victoria Island and given different unique identifiers to normalize the database. The feature class was also broken into different layer while still retaining the properties of the tourists' destination feature class. They were all stored in the Geo database.

Table 1.3: Unique identifier Tourists destinations

TOURISTS DESTINATIONS	UNIQUE IDENTIFIER(TD_ID)
Beach	0305
Parks	0306
Resorts	0307
Art gallery	0308
Museum	0309

The police post, clinics and hospital were grouped as Services because they provide services to the Facilities and Tourists Destinations in Victoria Island and were given different unique identifiers in the Geo database. For analysis purpose they were also separated into different layers but still retained the properties of the service feature class in the Geo database. The reason for doing this is to use thematic layers to run analysis instead of using a whole group called Facilities. The group theme of Facilities will function effectively in database queries.

Table 1.4: unique identifiers for Services

SERVICES	UNIQUE IDENTIFIER(S_ID)
Clinic	0405
Hospital	0406
Police post	0407

For analysis, address locators is used to Geo code the addresses of all features identified for this project. The address locator is created in the Geo database using the US street reference system which made use of house number to left, house number from left, house number from right, and house number to right. All this additional field were attached to each feature class. Also the street type and full address were also attached to the feature class. The address locator created will enable address to be queried in the database. Therefore for each point data acquired the opposite house number was taking into consideration and their addresses were collected.

Data Security

In a verge to properly manage the database created various security measures were put in place to ensure the security of the information the database stores. On these note backups has been created. This will ensure for data recovery should in case of unforeseen occurrence with the database management system. Also various security measures such as authorization and authentication will be given to users of the database to curb unauthorised users.

Data Integrity

This was done to ensure that the data value existing in the database base is accurate. Therefore key integrity entailed that to any given relation there should be a Unique identifier, entity integrity, domain integrity entailed that to every given attribute of a relation there is a set of allowable permissible values and referential integrity were ensured and maintained for the proper running of the database.

Analysis And Information Presentation

Network Analysis

Achieving the objectives of this study network analysis is carried out to determine the routes from points on the network to Tourist's destinations, Facilities and Services. The network analysis tool is a vital component of ESRI ArcGIS 9.3 geographic information system software employed in this project. It is used in analysing transportation line to determine shortest and fastest routes within a network. A simulation of route was carried out on how tourists can move from Hotels to Tourists destinations and Restaurants in Victoria Island. The first analysis here is to simulate the optimal route a Tourist will take when moving within a network. The criteria's used in building this network included additional attribute fields such as "road length in METERS, SPEEDLIMIT and DRIVETIME". The drive time calculated by dividing the road length in meters by the speed limit and by 60 which represents minutes. This attributes were incorporated to the network that was built for this project.

Drive Time = length in meters / speed limits / 60.

In simulating a route for Tourists, possible places in which a tourist may want to visit were added has network location, for example it is evident that Tourists will want to move from their hotel rooms to restaurants or to the tourist destination and also visit various point of interest within Victoria Island. For easy data loading to the various points on the network where Facilities exists, Tourist destinations exist and Services existed, those points were Geo coded using address locator in the Geo database using US Street referencing system.

In simulating the route, the network analyst tool is initialized and new route is selected. Then various stops where selected to simulate the tourist's movement around the Victoria Island. The stops are loaded using the address locator.

In the figure below a stop at Ajose Adeogun is selected and added has a network location, this stop is the location of "MR BIGGS" restaurant on the network. Using the address locator another location is added to the network depicting a hotel facility named "ORIENTALS", where tourists can decide to go within the network.

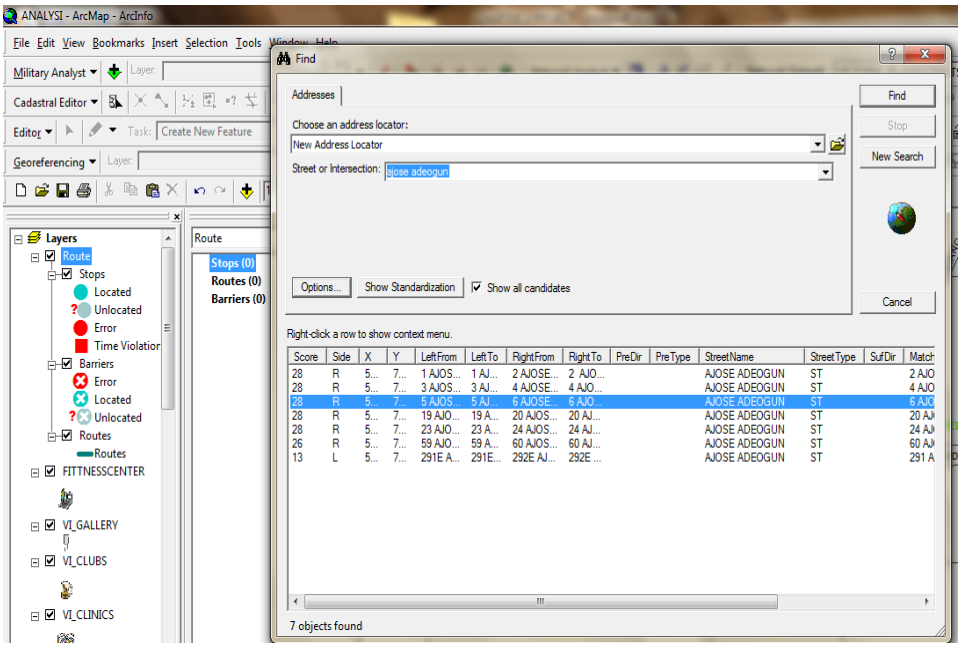


FIG. 2.0: Address locator used to add stops on the network

Two other locations within the network are also added using the address locator making the number of stops within the network to be four. The first stop is a "RESTAURANT" at Ajose Adeogun Street, the second stop is a "HOTEL" at Ozumba Mbadiwe Avenue, the third stop is a "HOTEL" at Tony Anegbode Street and the last location is a "CLUB" at Adetokunbo Ademola Street.

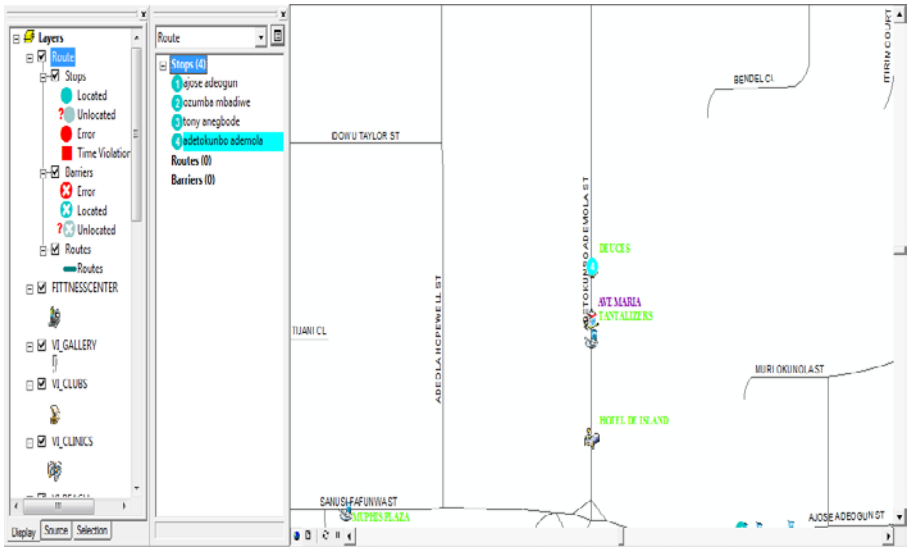


FIG. 3: All stops for best route analysis

When all the locations were added, it is necessary to right click on the Route layer on the table of content and select, " properties" to make adjustment to the desired setting needed to run the analysis, afterwards the solve button is clicked for the system to run the route analysis. The result displayed will show directions, distance and time it will take tourists to move around points of interest within the network. For the purpose of this analysis, the setting used is as follows: impedance used were minutes attributes, direction distance units were kilometres.

Table 2.0: Criteria used for route analysis

CRITERION	UNIT
Impedance	Minutes
Direction distance unit	Kilometres

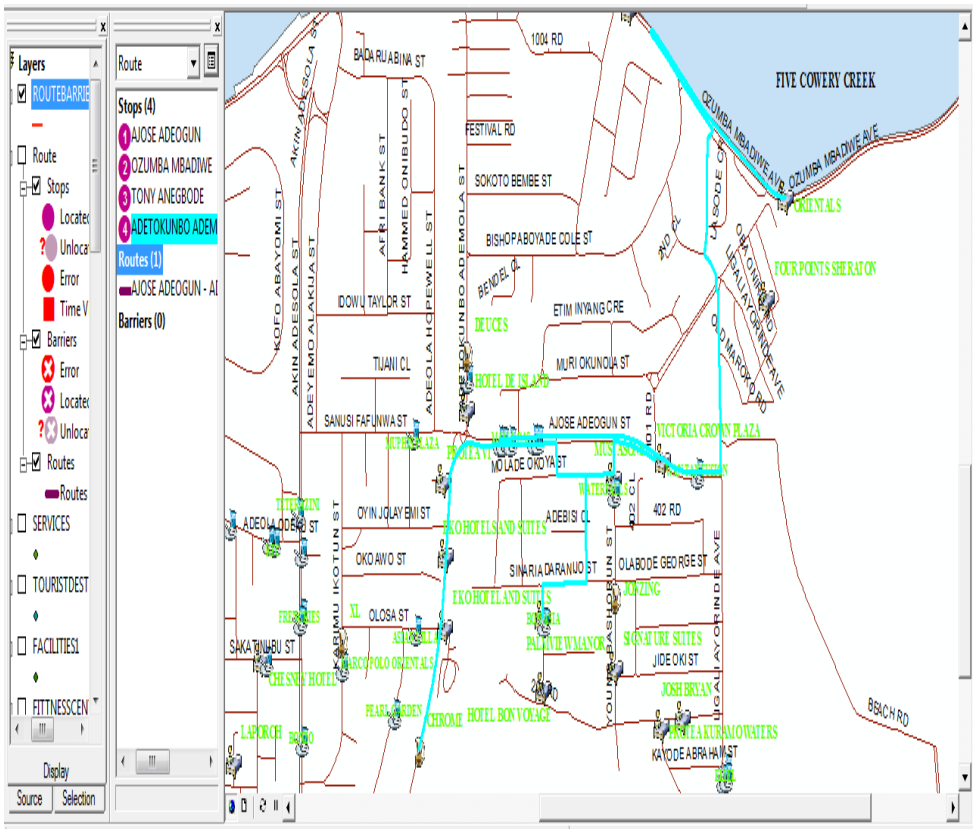


FIG. 4: Result alternative route analysis Ajose Adeogun to Adetokunbo Ademola

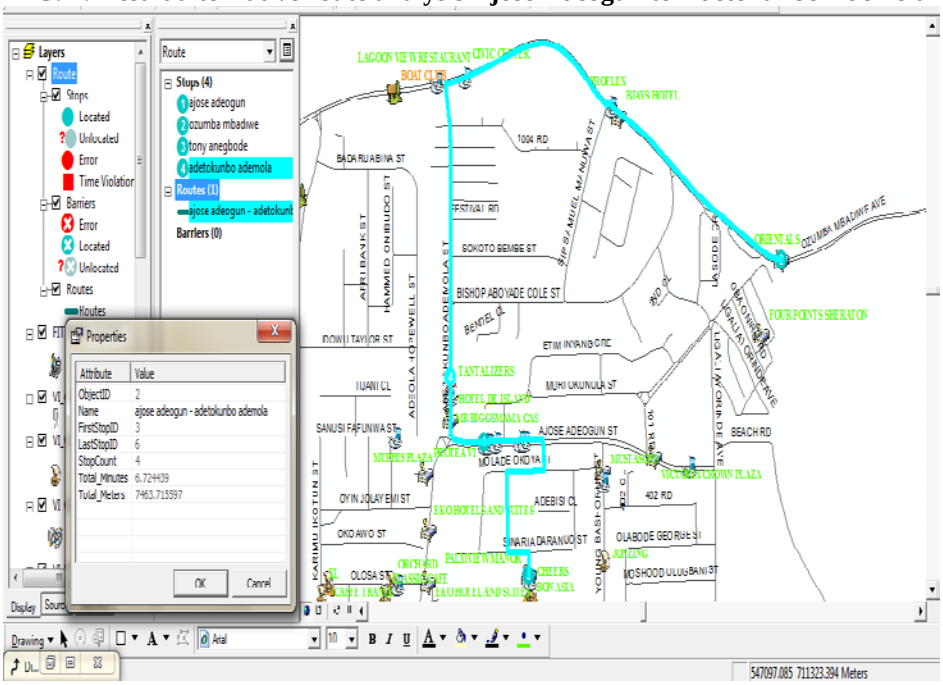


FIG.5: Route analysis Ajose Adeogun to Adetokunbo Ademola

The result displayed shows that to move along all the four locations selected on this network which is between Ajose Adegoun and Adetokunbo Ademola, it will take Tourists 6.724439 minutes which has been approximated to 7 minutes to cover a distance of 7.5 kilometers while driving assuming no traffic on the road. The same route is selected to simulate and compare the route when there is a barrier at different point on the network.

Table 3: Result of Route Analysis

ROUTES	DISTANCE	DRIVE TIME	Difference in distance	Difference in drivetime
Ajose Adeogun to adetokunbo Ademola(Best Route)	7.5 kilometres	7 minutes	3 kilometres	3 minutes
Ajose Adeogun to Adetokunbo Ademola (alternative Route)	10.5 kilometres	10 minutes		
Ajose Adeogun to Bishop Oluwole (Best Route)	5.8 kilometres	7 minutes	2.5 kilometres	Same Drive time
Ajose Adeogun to Bishop Oluwole (alternative Route)	8.3 kilometres	7 minutes		
Kofo Abayomi to Ahmadu Bello (Best Route)	4.1 kilometres	3 minutes	3.4 kilometres	1 Minute
Kofo Abayomi to Ahmadu Bello (alternative Route)	7.5 kilometres	4 minutes		

The analysis shows that the route, if there is barrier it is longer while without barrier it is shorter. The alternative route is longer. It means the barriers made the route 3 minute longer than the usual to reach the same destination. But for Ajose Adeogun to Bishop Oluwole, the analysis shows that the alternative route has the same drive time as the best route but with a longer Distance. This was due to the speed limit assigned to the route which is 50/kmh. Also Kofo Abayomi route shows that the best route is one minute faster than the alternative.

The second analysis performed using ArcGIS 9.3 network analyst is the Service area analysis. This is used to determine coverage area a particular Service or Facility within the study area can serve by specifying parameters which can be in terms of Time or Meters attribute created as impedance while the network was built. To set additional properties, the Service area layer on the table of content is right clicked on and the properties layer is selected and necessary parameters will be set, For the purpose of this analysis, the impedance unit used is “the Minute attributes and the impedance minutes specified is 5 minutes”. For the direction, “away from facility is selected” and the accumulation attributes used are Meters and Minutes. The location of the Service facility was added using the address locator. The Service used is a Hospital named Reddignton and it is located at Kofo Abayomi Street, Victoria Island. The hospital location is used to analyse coverage area it can serve within the network should in case of emergencies arising within Facilities and Tourists Destinations within the network.

The result shows that the Hospital can serve various Facilities such as hotel, restaurant, night clubs, cinemas, bars, and Tourists Destinations within the network at an impedance of 5 minutes and 5 minutes drive time specified except for areas around Eleke Crescent, Tony Anegbode drive, and Akin Ogunlewe Street.

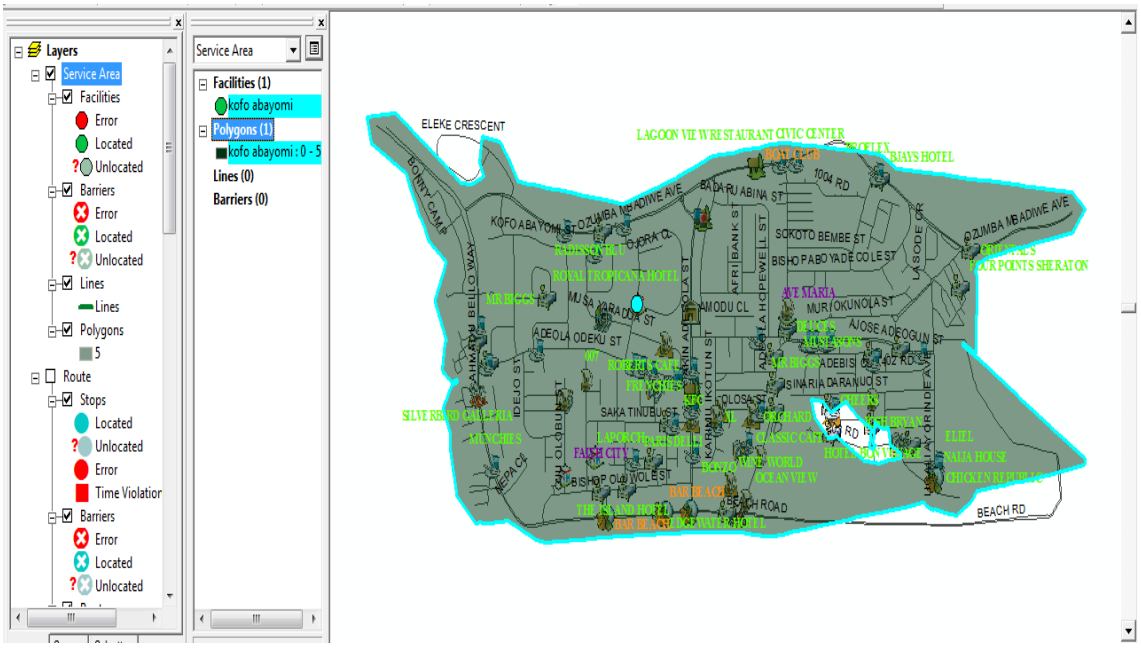


FIG.6: Result of Service Area analysis

The third analysis performed using ArcGIS 9.3 network analyst is the closest facility analysis. Here the closest facility around Tourists destinations is modelled using facilities and incidence points. For the purpose of this analysis various parameters were set. Here the location of restaurants is used as Facilities and selected location of a hotel is used as the incidence point where Tourists can be. For the selected incidence Chesney hotel Saka Tinubu Street in Victoria Island is used and locations of restaurants within the study area were loaded to view.

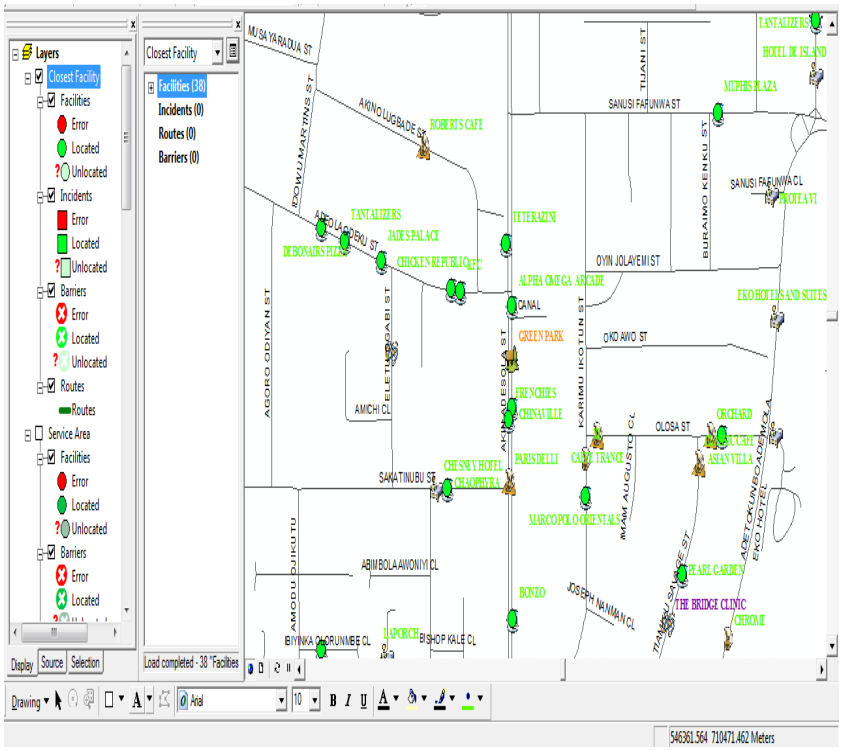


FIG. 7: Locations of restaurants in Victoria Island

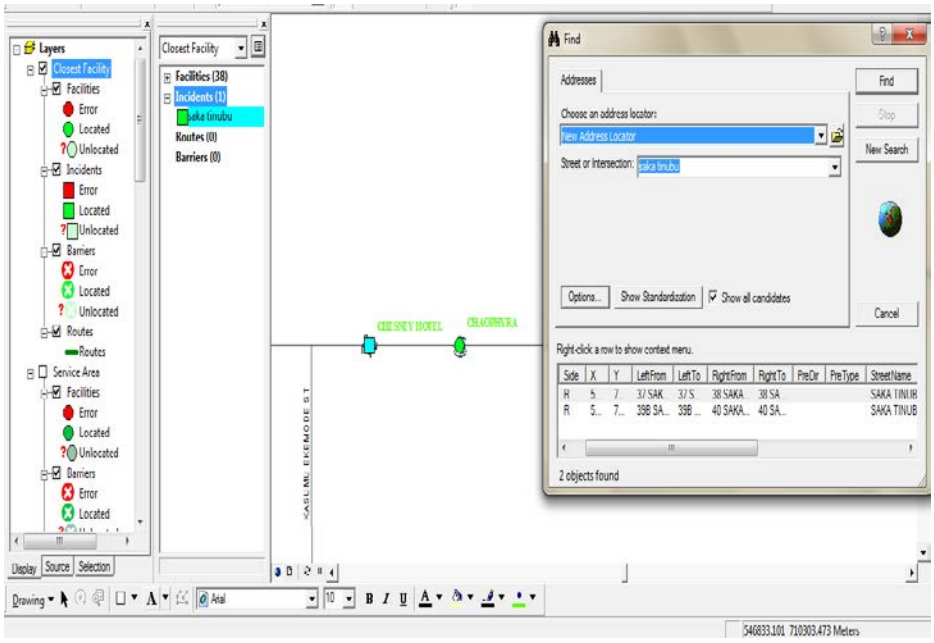


FIG.8: The selected incident point "CHESNEY HOTEL" using address locator

For the execution of the analysis, the criteria's to use is set by right clicking on closet facility layer in the table of content and selecting "properties". Therefore, impedance is set to minutes, default cut off value is set to 5 minutes and number of facilities to find is set to 4 and the travel is set to "Incident to Facilities". The result showed that there were 4 restaurants within 5 minutes drive time from "CHESNEY HOTEL" located at Saka Tinubu Street. The restaurant's name were "CHAOPHYRA" located at Saka Tinubu Street, "CHINAVILLE"

located at Akin Adesola Street, “FRENCHIES” located at Akin Adesola Street and “BONZO” located at Akin Adesola Street in Victoria Island. When the result of the analysis displayed it was observed that “CHAOPHYRA” is the closest facility to “CHESNEY HOTEL” with a distance of 25.6005 meters and a drive time less than a minute.

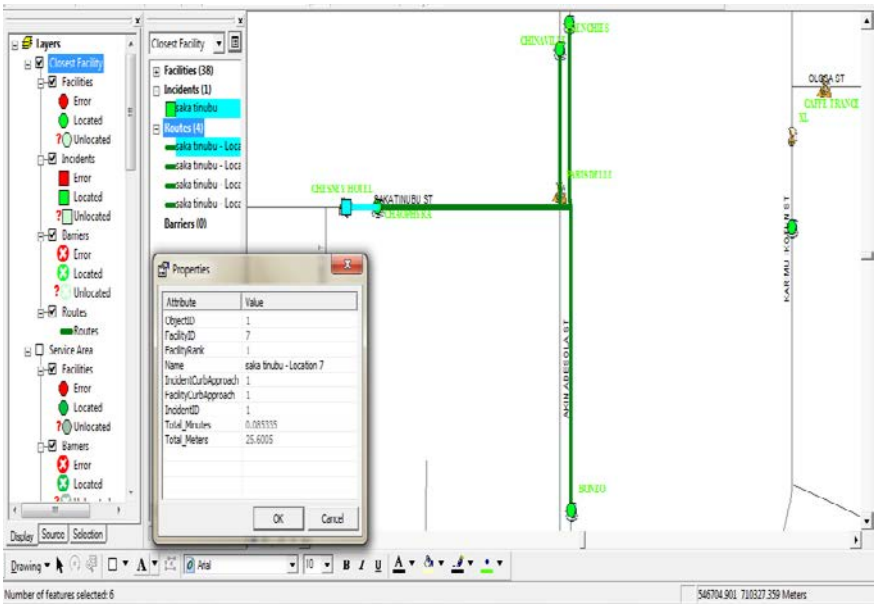


FIG.9: Result closest facility analysis

The fourth analysis performed using ArcGIS 9.3 network analyst is the Origin and Destination cost matrix analysis. Here the address locators is used to find addresses and added as Origins and Destinations. For the Analysis, a selected location of hotels on the network is used. The locations and names of the selected hotels used as Origins included “RADISSION BLU” located at Ozumba Mbadiwe Avenue and “LAPORCH” located at Olugbosi close respectively. For the Destinations, selected Tourists destinations were loaded using the address locator. The selected Tourists Destinations is “DIDI MUSEUM” located at Akin Adesola Street and “EKO ATLANTIC RESORT” located at Ahmadu Bello Way. The necessary analysis settings were made. Impedance was set to “minutes”, “default cut off values” was set to “8 minutes” and “Destinations to find” “All”

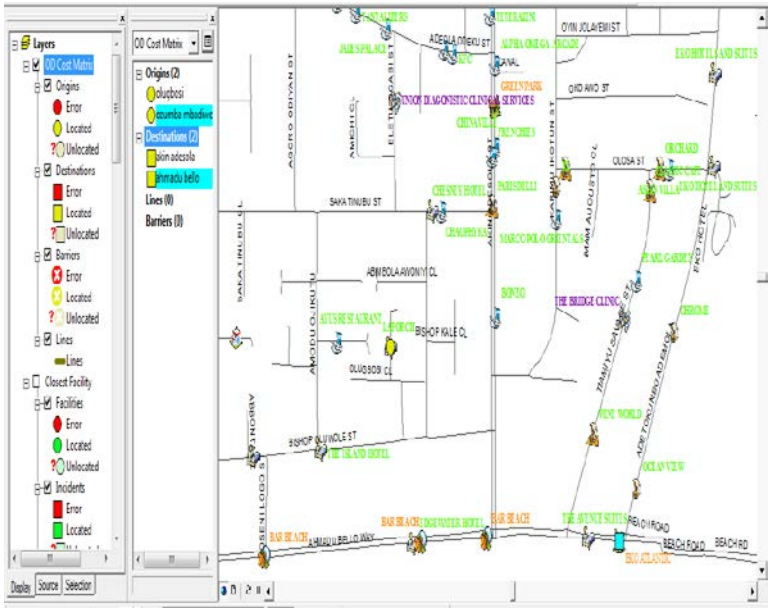


FIG.10: Selected Origins and Destinations

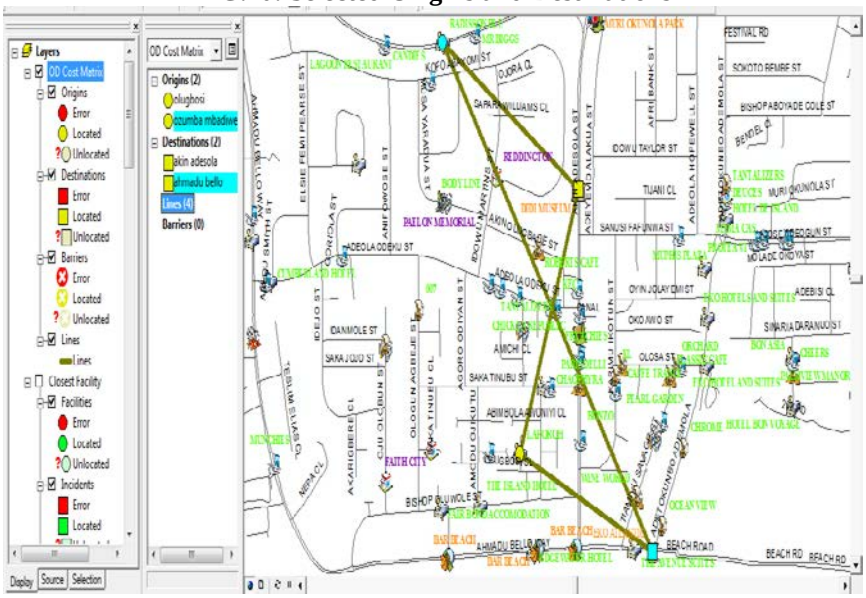


FIG.11: Origin and Destination (OD) Cost Analysis

FIG.12: attribute table of Origin and Destination (OD) cost Analysis

Spatial Statistical Analysis

Another analysis performed using the spatial statistical tool box is central feature analysis. This is used to determine central places within a distribution. To model and determine area central to Facilities layer, Service layer, and Tourists Destinations layer in Victoria Island, the central feature analysis is used. Here measuring geographic distributions is selected from the spatial statistic tool box and central feature tool was double clicked on. To analyse the central feature for Facilities, the Facilities layer is used as the Input feature class and the distance method used was Manhattan distance was used. The same process was applied to the Service and Tourists Destination in Victoria Island.

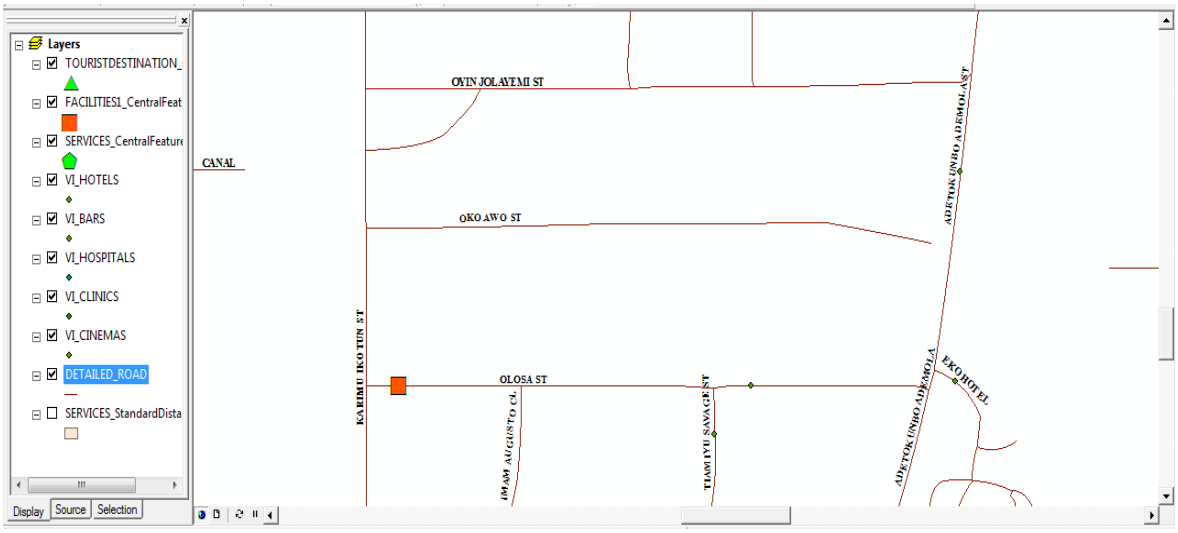


FIG. 13: Central feature for Facilities Layer

The result of the analysis showed that the point central to the Facilities layer is located on Olosa Street in Victoria Island. Also for the Service layer the result showed that the point central to Services is located on Eletu Ogabi Street in Victoria Island and the point central to Tourists Destination is located on Ahmadu Bello Way respectively.

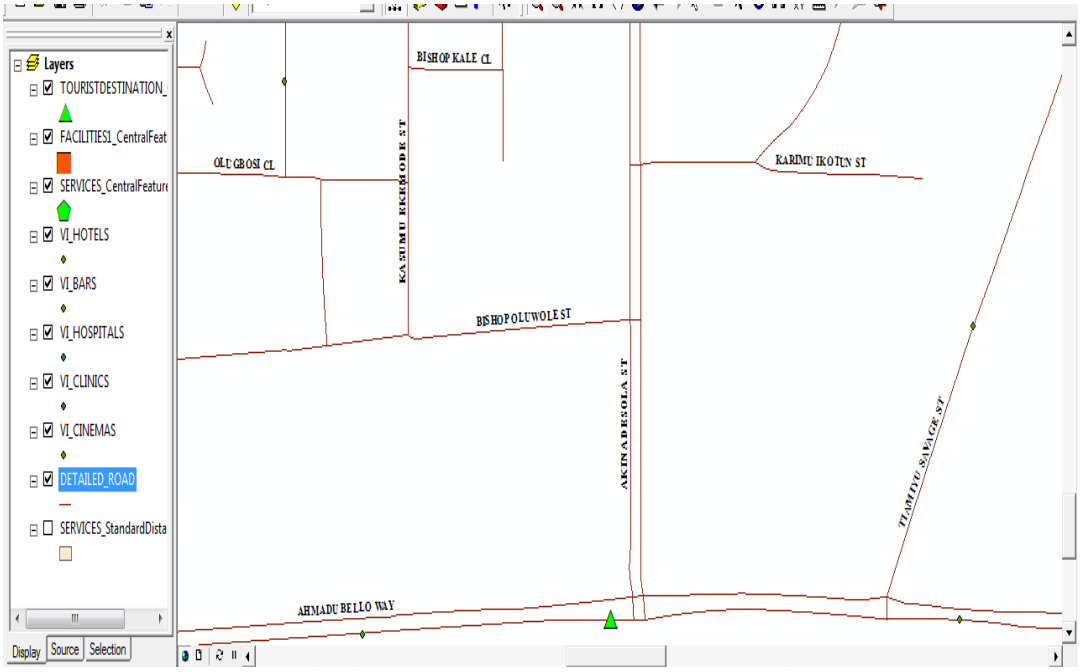


FIG.14: Central feature for Tourists Destinations Layer

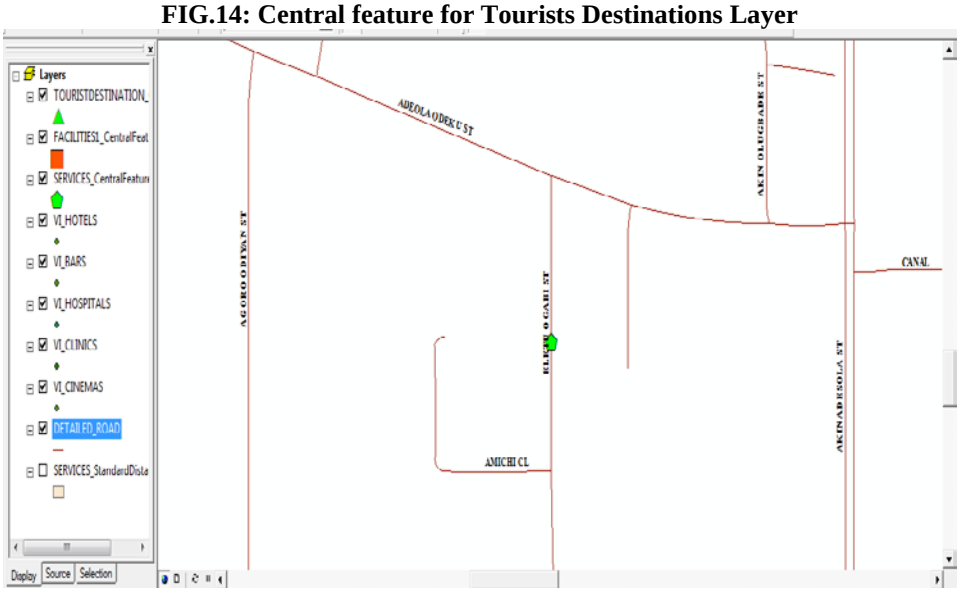


FIG.15: Central feature for Service Layer

The implication of this is that, a visual overview has been created to visualize and ascertain point's central to Facilities, Services, and Tourists Destination layer in Victoria Island. This can aid future planning of additional Service facilities such a fire station which is absent.

Spatial Search

This will be used to query by location or by attributes of features in the database. The first query by location was issued on Facility layer to display hotels in Victoria Island. The process used to carry out the query operation involved clicking on "selection" on the Arc Map Main menu and "selection by location" is selected and the layer to participate was selected. For this query facilities layer and hotels layer participated.

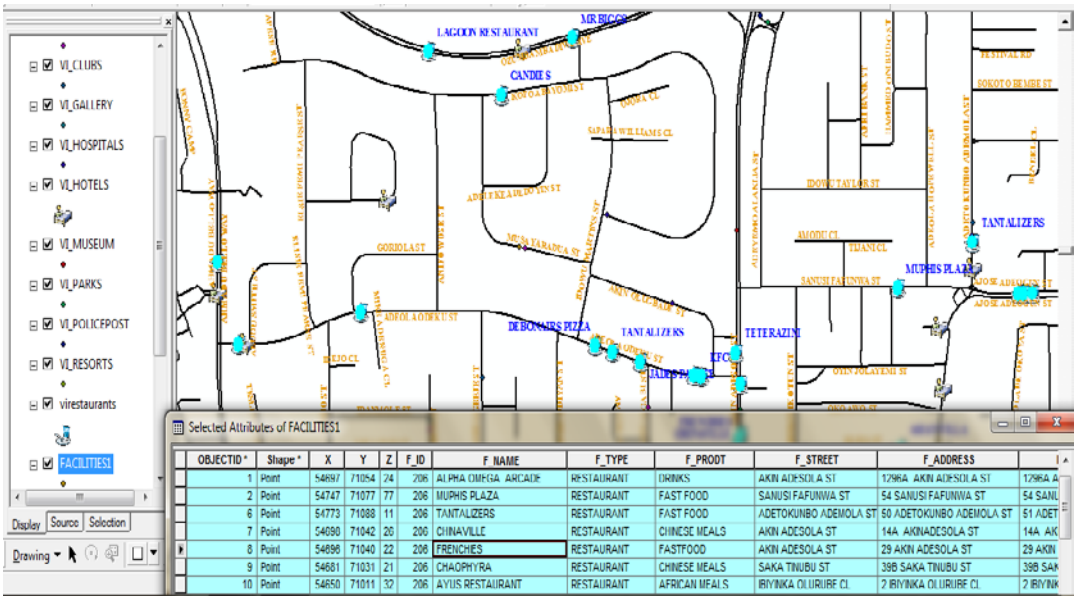


Fig.16: Result of Query by location for Restaurants in Facilities layer

Querying by attributes, the selection tab on the Arc Map main menu is clicked and then selection by attribute. The layer to participate is Facilities.

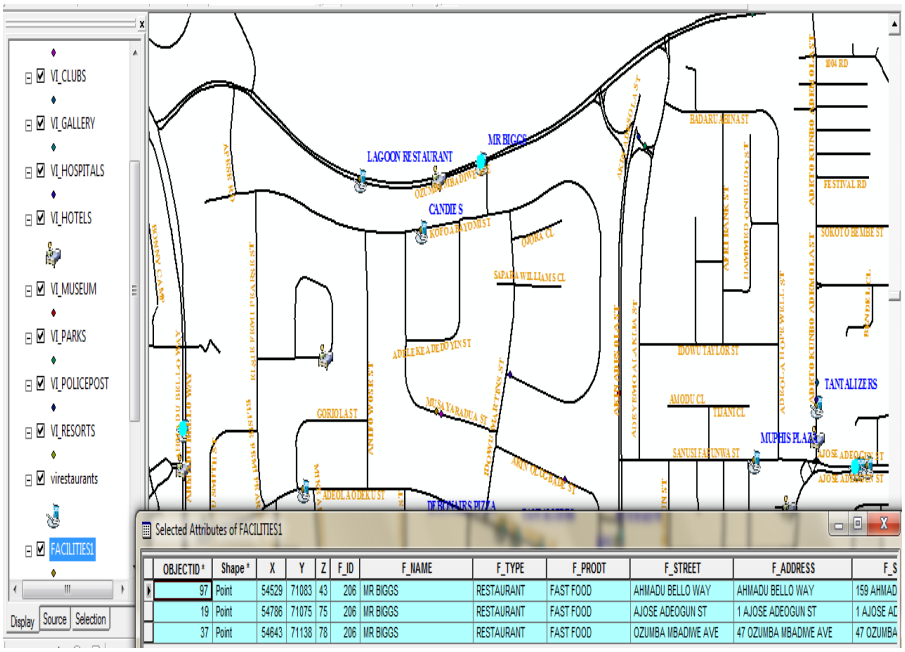
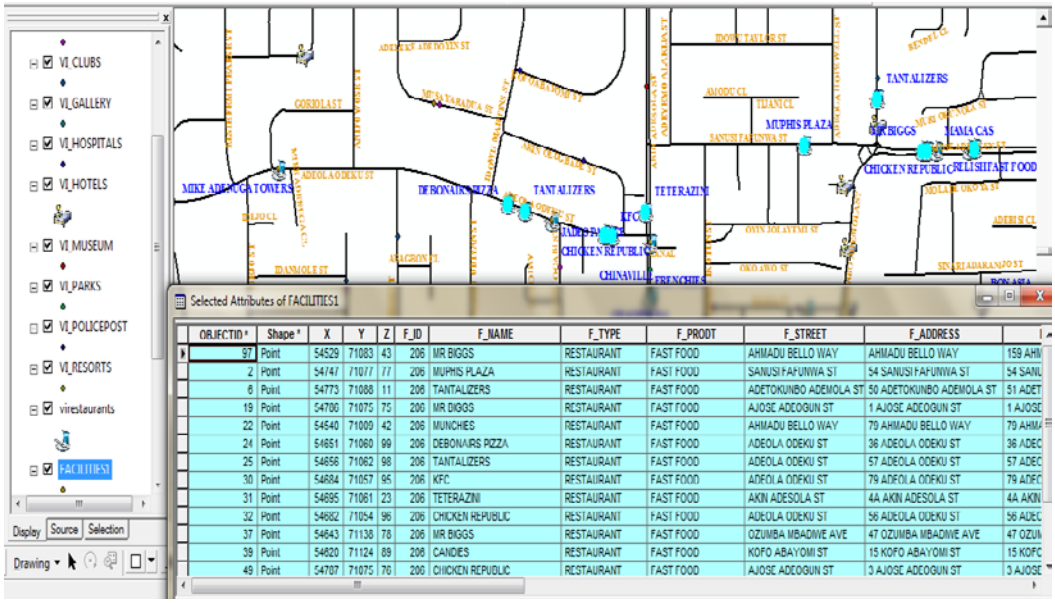


Fig.17: Result of Query by attributes for in Restaurants Named Mr BIGGS.

Using multiple attribute selection queries two or more attributes can be queried at the same time. To query for Facilities whose product is fast food and Type is Restaurant.

The Syntax for the query is Select* from FACILITIES

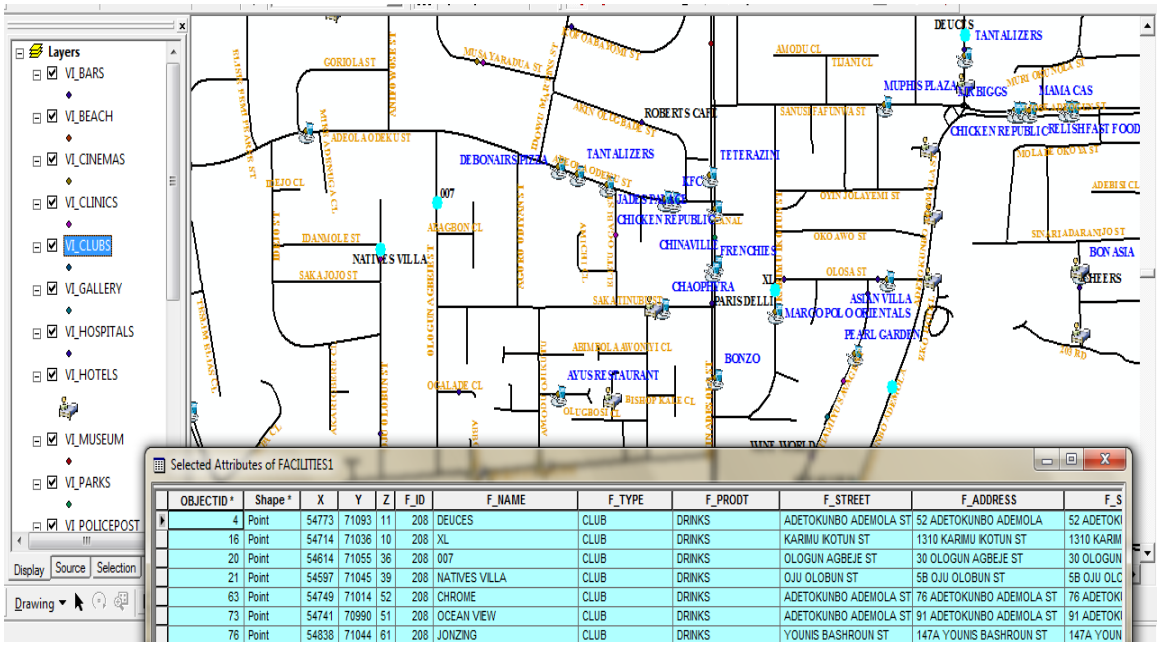
Where F_ PRODUCT = “FAST FOOD” and F_TYPE =”Restaurant”;



OBJECTID *	Shape *	X	Y	Z	F_ID	F_NAME	F_TYPE	F_PRODT	F_STREET	F_ADDRESS
97	Point	54529	71083	43	206	MR BIGGS	RESTAURANT	FAST FOOD	AHMADU BELLO WAY	AHMADU BELLO WAY
2	Point	54747	71077	77	206	MUPHIS PLAZA	RESTAURANT	FAST FOOD	SANUSI FAFUNWA ST	54 SANUSI FAFUNWA ST
6	Point	54773	71088	11	206	TANTALIZERS	RESTAURANT	FAST FOOD	ADETOKUNBO ADEMOLA ST	50 ADETOKUNBO ADEMOLA ST
19	Point	54700	71075	75	206	MR DIGGS	RESTAURANT	FAST FOOD	AJOSE ADEOGUN ST	1 AJOSE ADEOGUN ST
22	Point	54540	71009	42	206	MUNCHIES	RESTAURANT	FAST FOOD	AHMADU BELLO WAY	79 AHMADU BELLO WAY
24	Point	54651	71060	99	206	DEBONAIRS PIZZA	RESTAURANT	FAST FOOD	ADEOLA ODEKU ST	36 ADEOLA ODEKU ST
25	Point	54656	71062	98	206	TANTALIZERS	RESTAURANT	FAST FOOD	ADEOLA ODEKU ST	57 ADEOLA ODEKU ST
30	Point	54684	71057	95	206	KFC	RESTAURANT	FAST FOOD	ADEOLA ODEKU ST	79 ADEOLA ODEKU ST
31	Point	54695	71061	23	206	TETERAZINI	RESTAURANT	FAST FOOD	AKIN ADESOLA ST	4A AKIN ADESOLA ST
32	Point	54682	71054	96	206	CHICKEN REPUBLIC	RESTAURANT	FAST FOOD	ADEOLA ODEKU ST	56 ADEOLA ODEKU ST
37	Point	54643	71138	78	206	MR BIGGS	RESTAURANT	FAST FOOD	OZUMBA MBADIWE AVE	47 OZUMBA MBADIWE AVE
39	Point	54620	71124	89	206	CANDIES	RESTAURANT	FAST FOOD	KOFO ABAYOMI ST	15 KOFO ABAYOMI ST
49	Point	54707	71075	70	206	CHICKEN REPUBLIC	RESTAURANT	FAST FOOD	AJOSE ADEOGUN ST	3 AJOSE ADEOGUN ST

Fig. 18: Result of Query by Attributes for Selecting Restaurant whose product are fast food

Querying for Facilities where product is Drinks and identifier is 208, the query issued is Select* from Facilities where F_ PRODT = “DRINKS” and F_ ID = 208;



OBJECTID *	Shape *	X	Y	Z	F_ID	F_NAME	F_TYPE	F_PRODT	F_STREET	F_ADDRESS	F_S
4	Point	54773	71093	11	208	DEUCES	CLUB	DRINKS	ADETOKUNBO ADEMOLA ST	52 ADETOKUNBO ADEMOLA	52 ADETOKI
16	Point	54714	71036	10	208	XL	CLUB	DRINKS	KARIMU IKOTUN ST	1310 KARIMU IKOTUN ST	1310 KARIM
20	Point	54614	71055	36	208	007	CLUB	DRINKS	OLOGUN AGBEJE ST	30 OLOGUN AGBEJE ST	30 OLOGUN
21	Point	54597	71045	39	208	NATIVES VILLA	CLUB	DRINKS	OJU OLOBUN ST	5B OJU OLOBUN ST	5B OJU OLC
63	Point	54749	71014	52	208	CHROME	CLUB	DRINKS	ADETOKUNBO ADEMOLA ST	76 ADETOKUNBO ADEMOLA ST	76 ADETOKI
73	Point	54741	70990	51	208	OCEAN VIEW	CLUB	DRINKS	ADETOKUNBO ADEMOLA ST	91 ADETOKUNBO ADEMOLA ST	91 ADETOKI
76	Point	54838	71044	61	208	JONZING	CLUB	DRINKS	YOUNIS BASHROUN ST	147A YOUNIS BASHROUN ST	147A YOUN

Fig.19: Result of Query by Attributes for Selecting Facilities whose product is Drinks

Spatial Distribution Analysis

This is used to analyse pattern of distribution of feature. This has been used to analyse the distribution of Facilities, Services and Tourist Destinations in Victoria Island using Arc Map 9.3. This analysis is carried out using average nearest neighbour to ascertain the spatial distribution of Hotels, Restaurants, Bars, Nightclubs, and Cinema in Victoria Island. For the analysis, the distance method specified is Manhattan distance.

The result of the analysis showed that Hotels, Restaurants, Night clubs, Bars, and Cinema in Victoria Island are clustered. The result of this analysis is suitable for planning purpose.

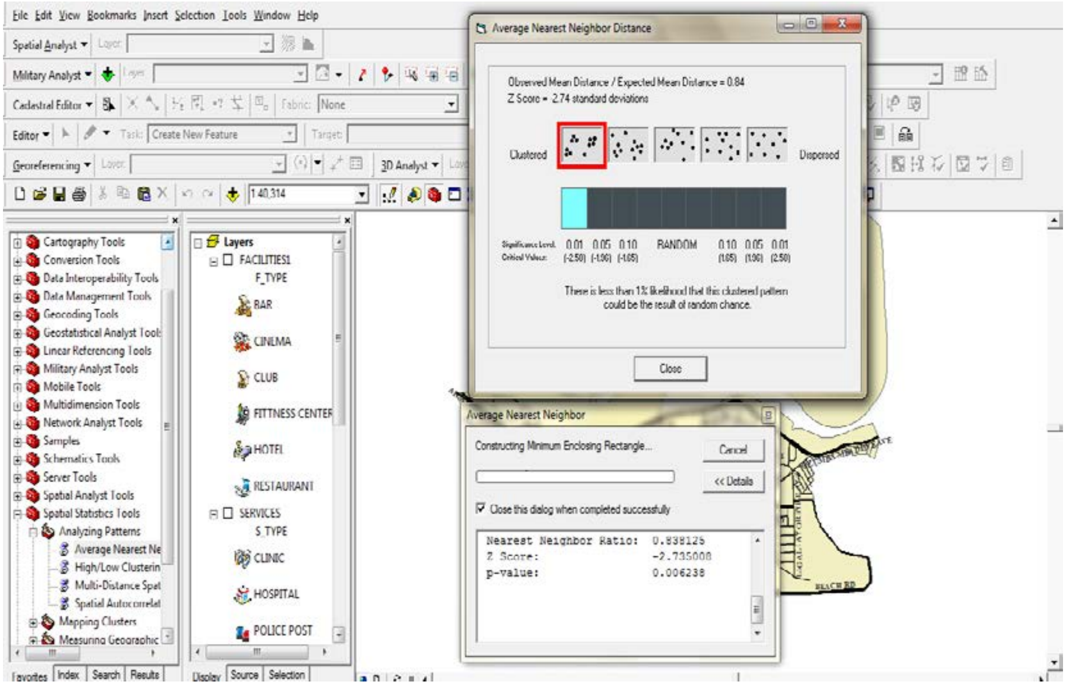
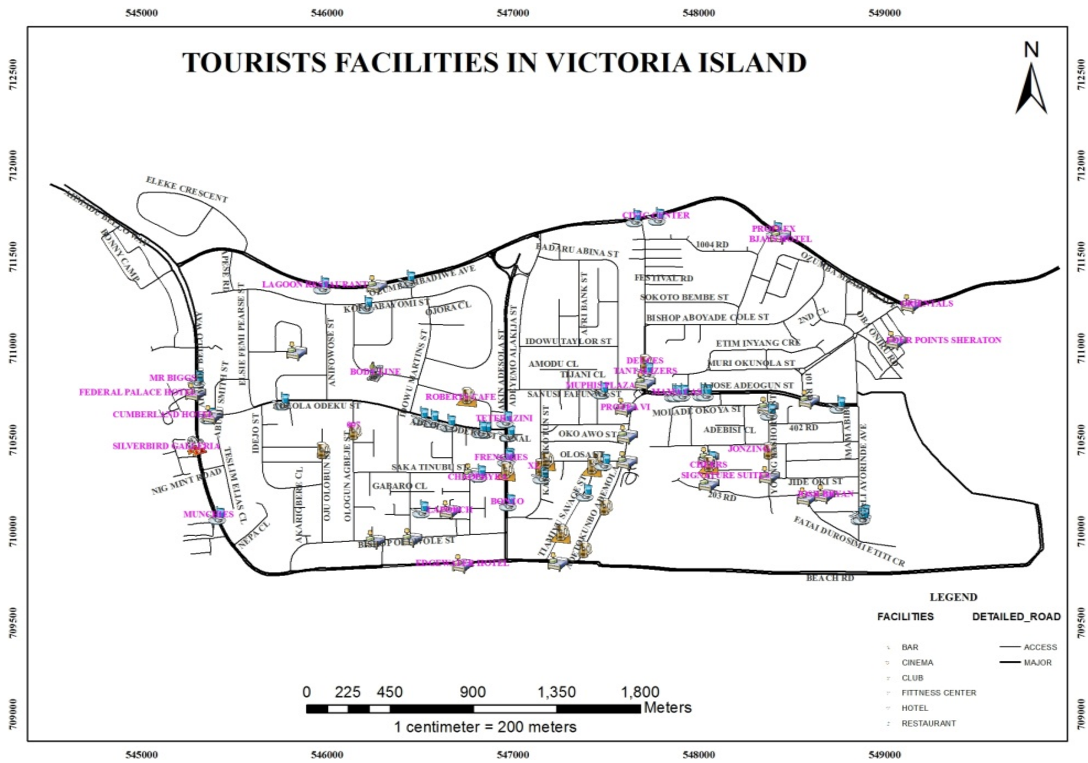
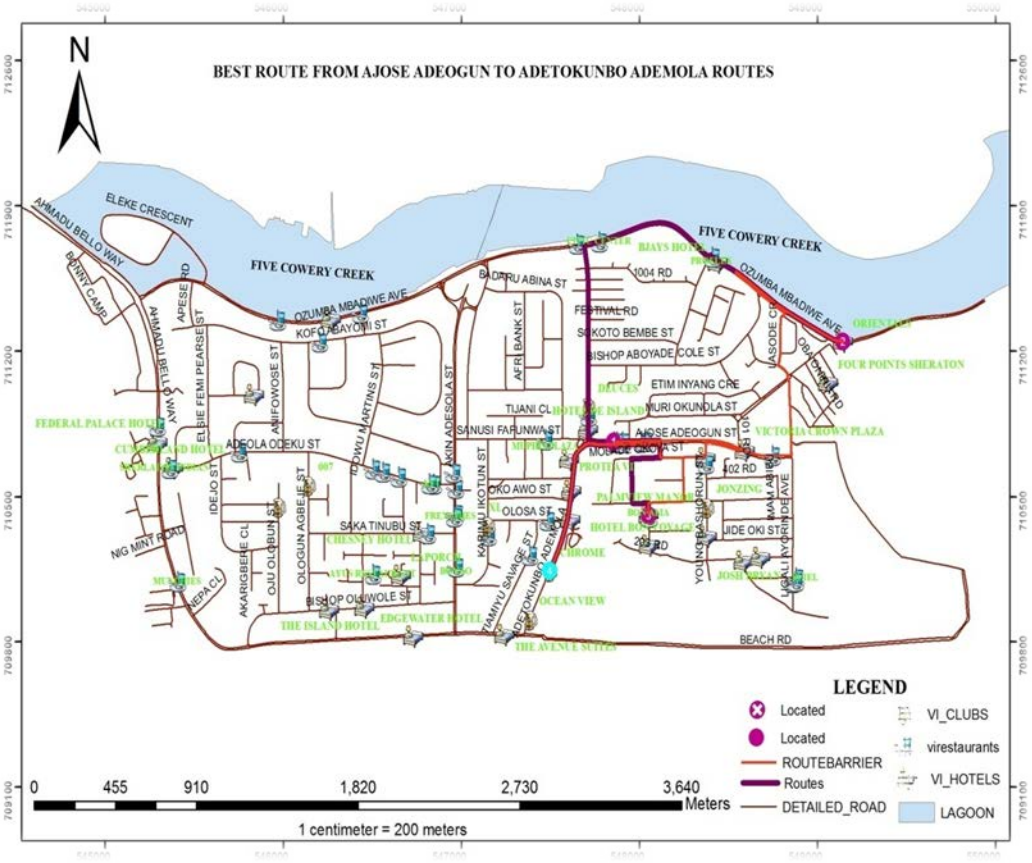


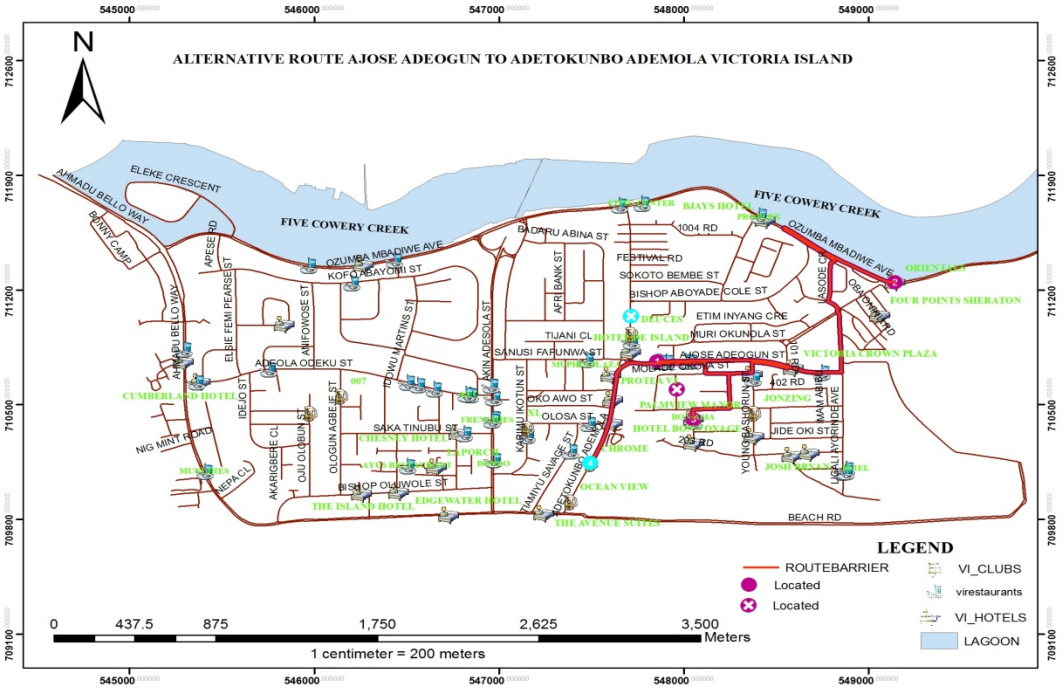
Fig.20: Result showing distribution Pattern of Hotels, Restaurants, Night clubs, Bars, and Cinema in Victoria Island

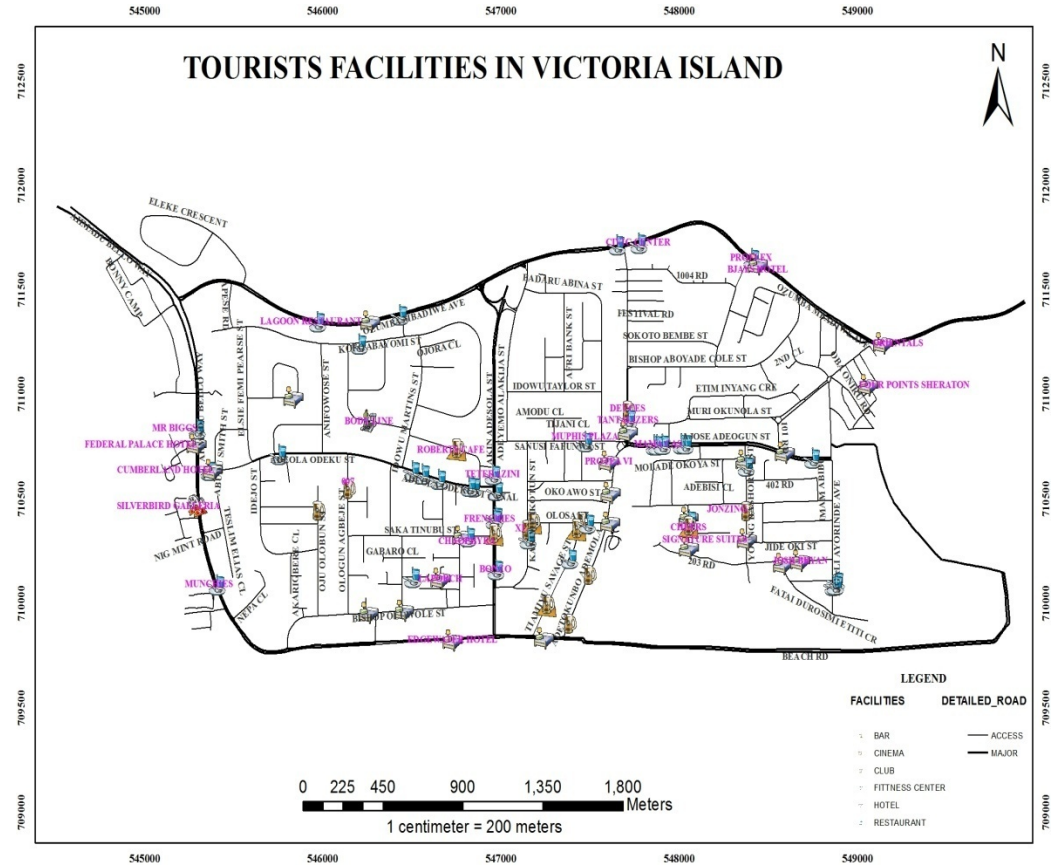
Thematic Maps Deliverables

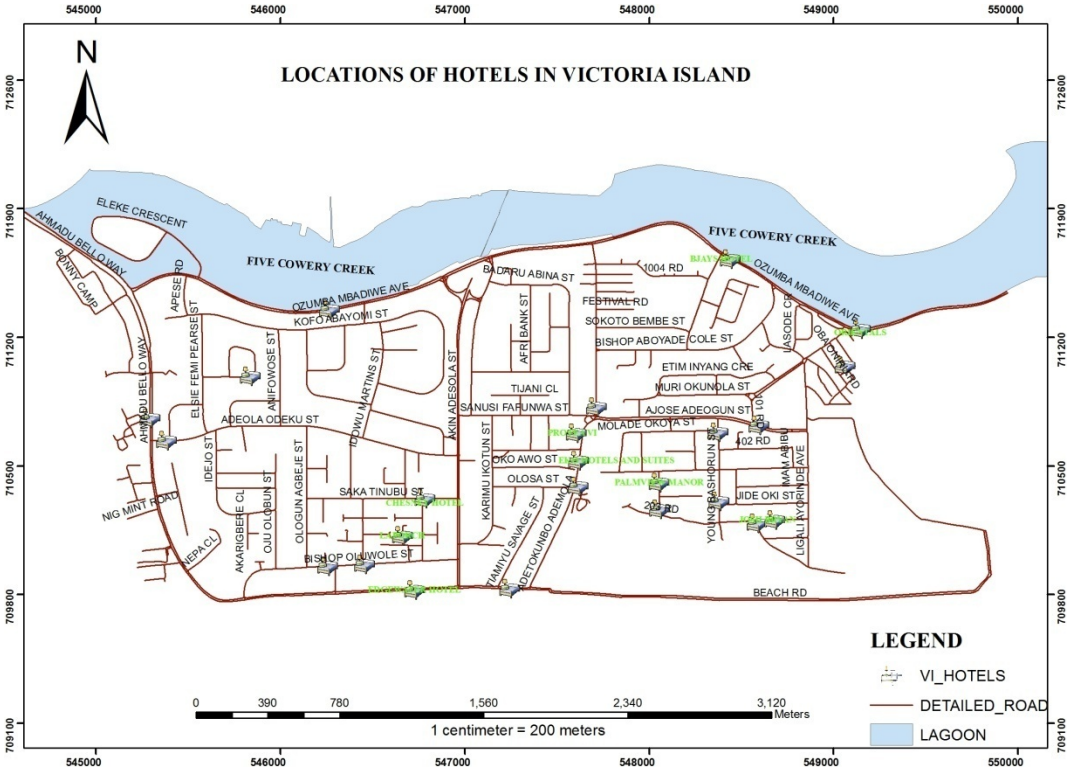
This displays various theme Maps generated in the course of the study.

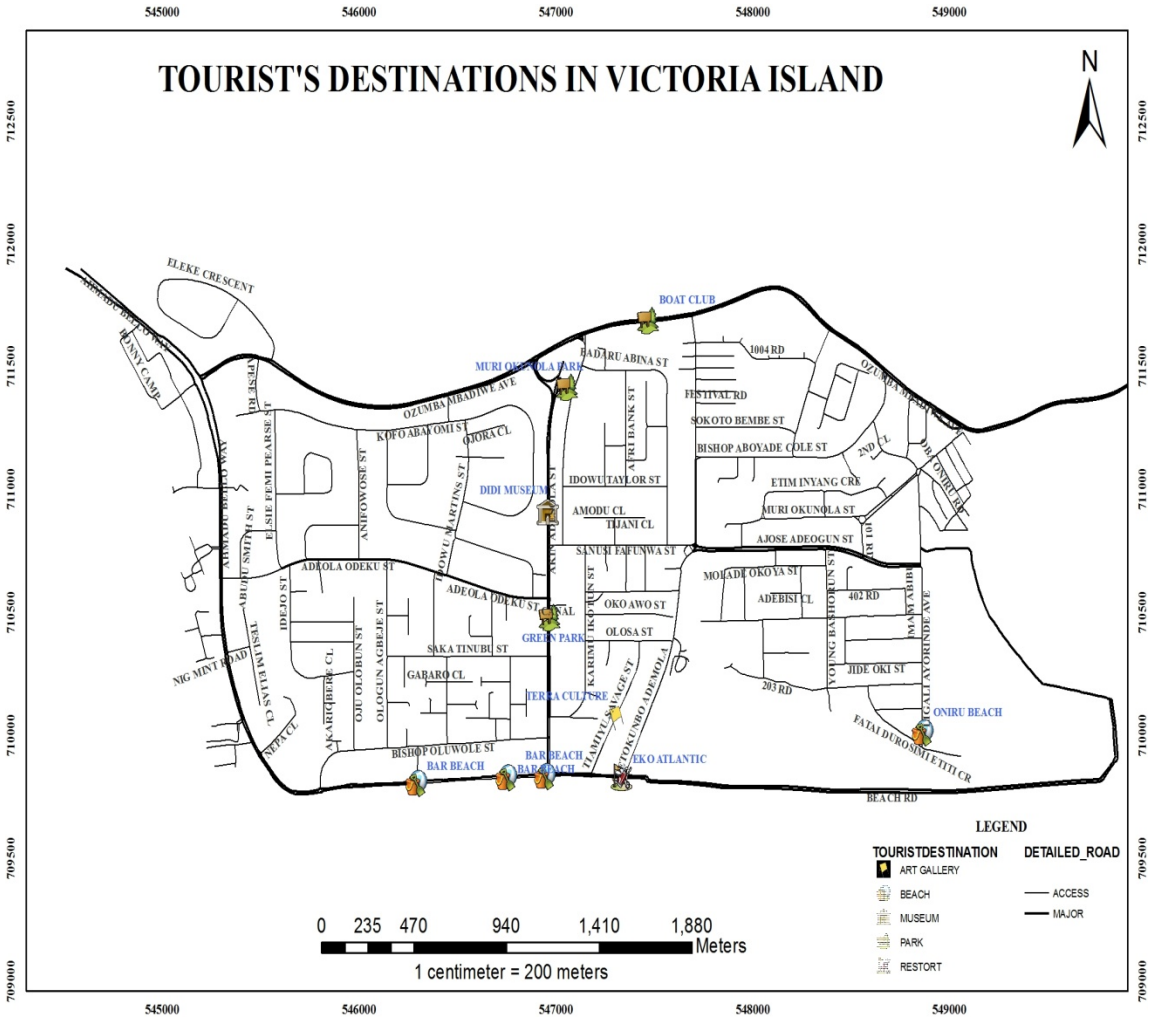



BEST ROUTE FROM AJOSE ADEOGUN TO ADETOKUNBO ADEMOLA ROUTES
N
ELEKE CRESCENT
AHMADU BELLO WAY
FIVE COWERY CREEK
BENNY CAMP
APESE RD
OZUMBA MBADIWE AVE
KOFO ABAYOMI ST
BADARU ABINA ST
1004 RD
FESTIVAL RD
SOKOTO BEMBE ST
BISHOP ABOYADE COLE ST
ETIM INYANG CRE
MURI OKUNOLA ST
AJOSE ADEOGUN ST
MOLADE OKOYA ST
102 RD
203 RD
JIDE OKI ST
ADEOLA ODEKU ST
OKO AWO ST
OLOSA ST
SAKA TINUBU ST
BISHOP OLUWOLE ST
NIG MINT ROAD
BEACH RD
ADETOKUNBO ADEMOLA ST
FEDERAL PALACE HOTEL
CUMBERLAND HOTEL
THE ISLAND HOTEL
EDGEWATER HOTEL
OCEAN VIEW
THE AVENUE SUITES
FOUR POINTS SHERATON
VICTORIA CROWN PLAZA
LEGEND
Located
Located
ROUTEBARRIER
Routes
DETAILED_ROAD
VI_CLUBS
virestaurants
VI_HOTELS
LAGOON
0 455 910 1,820 2,730 3,640
Meters
1 centimeter = 200 meters


ALTERNATIVE ROUTE AJOSE ADEOGUN TO ADETOKUNBO ADEMOLA VICTORIA ISLAND
N
ELEKE CRESCENT
AHMADU BELLO WAY
FIVE COWERY CREEK
BENNY CAMP
APESE RD
OZUMBA MBADIWE AVE
KOFO ABAYOMI ST
BADARU ABINA ST
1004 RD
FESTIVAL RD
SOKOTO BEMBE ST
BISHOP ABOYADE COLE ST
ETIM INYANG CRE
MURI OKUNOLA ST
AJOSE ADEOGUN ST
MOLADE OKOYA ST
102 RD
203 RD
JIDE OKI ST
ADEOLA ODEKU ST
OKO AWO ST
OLOSA ST
SAKA TINUBU ST
BISHOP OLUWOLE ST
NIG MINT ROAD
BEACH RD
ADETOKUNBO ADEMOLA ST
CUMBERLAND HOTEL
THE ISLAND HOTEL
EDGEWATER HOTEL
OCEAN VIEW
THE AVENUE SUITES
FOUR POINTS SHERATON
VICTORIA CROWN PLAZA
LEGEND
ROUTEBARRIER
Located
Located
VI_CLUBS
virestaurants
VI_HOTELS
LAGOON
0 437.5 875 1,750 2,625 3,500
Meters
1 centimeter = 200 meters


TOURISTS FACILITIES IN VICTORIA ISLAND
N
545000
546000
547000
548000
549000
712500
712000
711500
711000
710500
710000
709500
709000
ELEKE CRESCENT
BONNY CAMP
AHMADU BELLO WAY
APESE RD
ELSIE FEMI PEARSE ST
LAGOON
BADARU ABINA ST
1004 RD
FESTIVAL RD
SOKOTO BEMBE ST
BISHOP ABOYADE COLE ST
ETIM INYANG CRE
MURI OKUNOLA ST
AJOSE ADEOGUN ST
MOLADE OKOYA ST
ADEBISI CL
402 RD
203 RD
OKO AWO ST
OLOSA ST
IDOWU TAYLOR ST
AMODU CL
TIJANI CL
SANUSI FARUNWA ST
ADEOLA ODEKU ST
IDEJO ST
ANIFOWOSE ST
IDOWU MARTINS ST
AKIN ADESOLA ST
AFRI BANK ST
KOFO ABAYOMI ST
OJORA CL
OZUMBA MBADIWE AVE
JASODE CR
ETIM INYANG CRE
MURI OKUNOLA ST
JIDE OKI ST
FATAI DUROSINMI ETITI CR
BEACH RD
SAKA TINUBU ST
GABARO CL
OLOGUN AGBEJE ST
OJU OLOBUN ST
AKARIGBERE CL
BISHOP OLUWOLE ST
NEPA CL
NIG MINT ROAD
KARIMU IKOTUN ST
TIAMIYU SAVAGE ST
ADETOKUNBO ADEMOLA ST
LEGEND
FACILITIES
BAR
CINEMA
CLUB
FITNESS CENTER
HOTEL
RESTAURANT
DETAILED_ROAD
ACCESS
MAJOR
0 225 450 900 1,350 1,800
Meters
1 centimeter = 200 meters


LOCATIONS OF HOTELS IN VICTORIA ISLAND
N
545000
546000
547000
548000
549000
550000
712600
711900
711200
710500
709800
709100
ELEKE CRESCENT
AHMADU BELLO WAY
BONNY CAMP
APESE RD
FIVE COWERY CREEK
OZUMBA MBADIWE AVE
KOFO ABAYOMI ST
BADARU ABINA ST
1004 RD
FESTIVAL RD
SOKOTO BEMBE ST
BISHOP ABOYADE COLE ST
ETIM INYANG CRE
MURI OKUNOLA ST
AJOSE ADEOGUN ST
MOLADE OKOYA ST
402 RD
203 RD
OKO AWO ST
OLOSA ST
TIJANI CL
SANUSI FARUNWA ST
ADEOLA ODEKU ST
IDEJO ST
ANIFOWOSE ST
IDOWU MARTINS ST
AKIN ADESOLA ST
AFRI BANK ST
JASODE CR
JIDE OKI ST
BEACH RD
SAKA TINUBU ST
OLOGUN AGBEJE ST
OJU OLOBUN ST
AKARIGBERE CL
BISHOP OLUWOLE ST
NEPA CL
NIG MINT ROAD
KARIMU IKOTUN ST
TIAMIYU SAVAGE ST
ADETOKUNBO ADEMOLA ST
LEGEND
VI_HOTELS
DETAILED_ROAD
LAGOON
0 390 780 1,560 2,340 3,120
Meters
1 centimeter = 200 meters



Conclusion

The study was initiated to identify tourism destinations which include beach, Museums, Parks and resorts. hotels, restaurants, clubs, bars, cinemas and fitness centres, as well as complementing tourism destination Services which includes police post, clinics and hospital in Victoria Island Lagos. Also to model accessibility to these points of interest mentioned above using Geographic information system analytical tools and functions. Geographic coordinates of the location of all bars, clubs, restaurants, cinema, fitness centre, hospital, clinic, police post and various tourists destination have been picked with their corresponding attributes to build a database using Arc Map 9.3 software package Geo database. Other analyses to aid decision for future planning were carried out using the spatial statistical tools in the software application used for the execution of this project. The analysis included central Feature analysis which was used to model area central to Tourism Facilities, Tourism services and Tourisms Destinations in Victoria Island. The result was overlaid on the road layer to identify the Streets and location central. The importance of this is to identify

central area where services such as a Fire station can be located for maximum coverage and efficiency.

This research has been able to demonstrate the dynamic capabilities of Geographic Information System application in Mapping, Analysis, and Modelling of Geographic phenomenon. This tool will aid tourism planning authorities, tourists, and Government Agencies to visualize, plan, and access various Tourists Destinations, Facilities and Services in Victoria Island. It will enable Tourism authority plan for security, enable government official have electronic record of the location and products offered by each Tourism Destination, and Facilities such as hotels, restaurants, clubs, cinemas, fitness centre and bars in Victoria Island and there by enable Tourists have an overview of Victoria Island as to the Tourism resources and facilities it has to offer. This will also aid resident's social night life and will increase tourist's ability to make choice using the network analyst function of ArcGIS 9.3 application software which helps in ascertaining shortest route, nearest facilities from their current location.

Recommendation

Geographic Information System has proven to be useful in analysing scenarios and its database capabilities has made it interactive to users. It enables all forms of queries and manipulation to be made according to data stored in it. Applying it to tourism is beneficial, in that it will enable informed decision making for tourists, tourism planning authorities and government. In the course of the research observations were made and one of such is the fact that there is no fire service station in Victoria Island considering the economic resource and tourism resources it holds should in case of disaster associated with fire. Therefore, the use of spatial statistical analyst deployed in Geographic Information System software application can be used to site a fire station in locations that will be central and within 3-5 minutes drive time around Victoria Island network is important. For other researcher's that will undertake this study, focus should be on the types of services Hotels, Restaurants, and Clubs offers in terms of their opening hours, prices, and ratings in terms of their status. Then incorporate such information to build the database and also develop customized application that can be deployed via the web.

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