APPLICATION OF GIS IN RESTAURANT SITE SELECTION: THE CASE OF MUMBAI

Submitted by

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ABSTRACT

Geographic Information System plays very wide role in making logical decisions for real world problems using various methods and techniques. The main aim of Business Decision Making using GIS to design a geospatial database that can help decision makers select the most perfect locations. The present report also analyses GIS application with special reference to Business Administration. The decision makers in business can easily visualize or trace the result that can support the decision making process for choosing the more profitable places or zones areas to open a new branch out of the suggested districts that contain the most of all traffic generators, most of all high-traffic count accessibility, targeted customers, tourist places and various places such as malls, cinema halls, market place,etc . The present report also aims to protect decision makers from making a random or subjective decision. The present repory can help to apply the developed GIS to some case studies in the field of business, such as site selection, and evaluate their benefits in supporting business decision making. In this report, MUMBAI, a city in INDIA, is selected to act as a case study, for the design and implementation of a GIS application in distribution strategy for a Sea-view restaurant called "R".

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CHAPTER 1
INTRODUCTION

1.1 General

In today's business marketplace, the effective use and flow of information is the key factor to success. Business information parameters, including sales, customer inventory, potential market segmentation, and demographic profile, form the defining factors for all industrial segments, such as retail, real estate, insurance and pharmaceuticals. Since most of this business information has geographical location, it becomes important to use GIS to analyze them spatially. Business GIS and mapping have evolved into a formidable tool by which the corporate world can use spatial information to manage its business. Especially for companies trying to identify uncovered markets, GIS would support business decision-making by adding a spatial component to the decision process. With GIS, businesses make judgments based not only on the attributes of business entities, but on their spatial properties: location, overlaps, proximities, zones of influence, scale, distances. This leads to better-informed decisions.

GIS is an integrated collection of computer software and data used to view and manage information about geographic places, analyze spatial relationships, and model spatial processes. A GIS provides a framework for gathering and organizing spatial data and related information so that it can be displayed and analyzed. GIS can be used as a computer system capable of capturing, storing, analyzing, and displaying geographically referenced information—that is, data identified according to location. Furthermore, GIS helps produce software that enables the geographic mapping of information such as the locations of customers, competitors, suppliers, sales prospects, suppliers, and partners. GIS can be used for site selection, trade area analysis, environmental analysis, sales territory design, and the targeting of marketing. Impacts of GIS on business organizations mean that all types of companies choose GIS to quickly assess real-estate values and market viability. GIS helps business performance in a variety of tasks, including site selection by defining of consumer spending patterns, reallocation of franchise trade areas from the acquisition of new retail outlets, relocation of existing stores based on changing demographic patterns, visualization of market penetration and share of market, mapping of existing customers through address matching, target marketing using lifestyle segmentation statistics, definition of trade areas through drive time analysis, planning for store access by mapping average daily traffic . In

this report the main objective is to design, build, and analyze a geospatial database to help in the use of the place strategy to select the most perfect or the most profitable locations in the city of MUMBAI in INDIA to open a new Sea-view restaurant "R".

1.2 Objective

- To design, build, and analyze a geospatial database to help in the use of the place strategy to select the most perfect or the most profitable locations in the city of MUMBAI in INDIA to open a new Sea-view restaurant "R".

CHAPTER 2
MATERIALS AND METHODOLOGY

2.1 General

The chapter briefly describes the data used in this study. It mentions all the satellite datasets, software and in-situ data involved.

2.2 Study Area

Mumbai City, also known as Bombay, is a district of Maharashtra state in India, with its headquarters in the bustling metropolis of Mumbai. The city is located on the west coast of India, at a latitude of 19.0760° N and longitude of 72.8777° E. The district is bordered by the Arabian Sea to the west, Thane district to the north, Mumbai Suburban district to the east, and Raigad district to the south. Mumbai City has a mean sea level of approximately 14 meters.

Mumbai is the financial capital of India and a major center of commerce, trade, and entertainment. Mumbai is the financial capital of India and a major center of commerce, trade, and entertainment. It is home to the country's largest stock exchange, the Bombay Stock Exchange, and numerous major corporations. The city is served by an extensive network of public transportation, including buses, trains, and taxis. Mumbai is also home to India's largest airport, the Chhatrapati Shivaji Maharaj International Airport, which connects the city to destinations across India and around the world.

The district covers an area of 603.4 square kilometers and is bordered by the Arabian Sea to its west. The selected sites for opening of new Sea-view restaurant called "R" are Bandra, Dadar, Charni Road in the city of Mumbai.
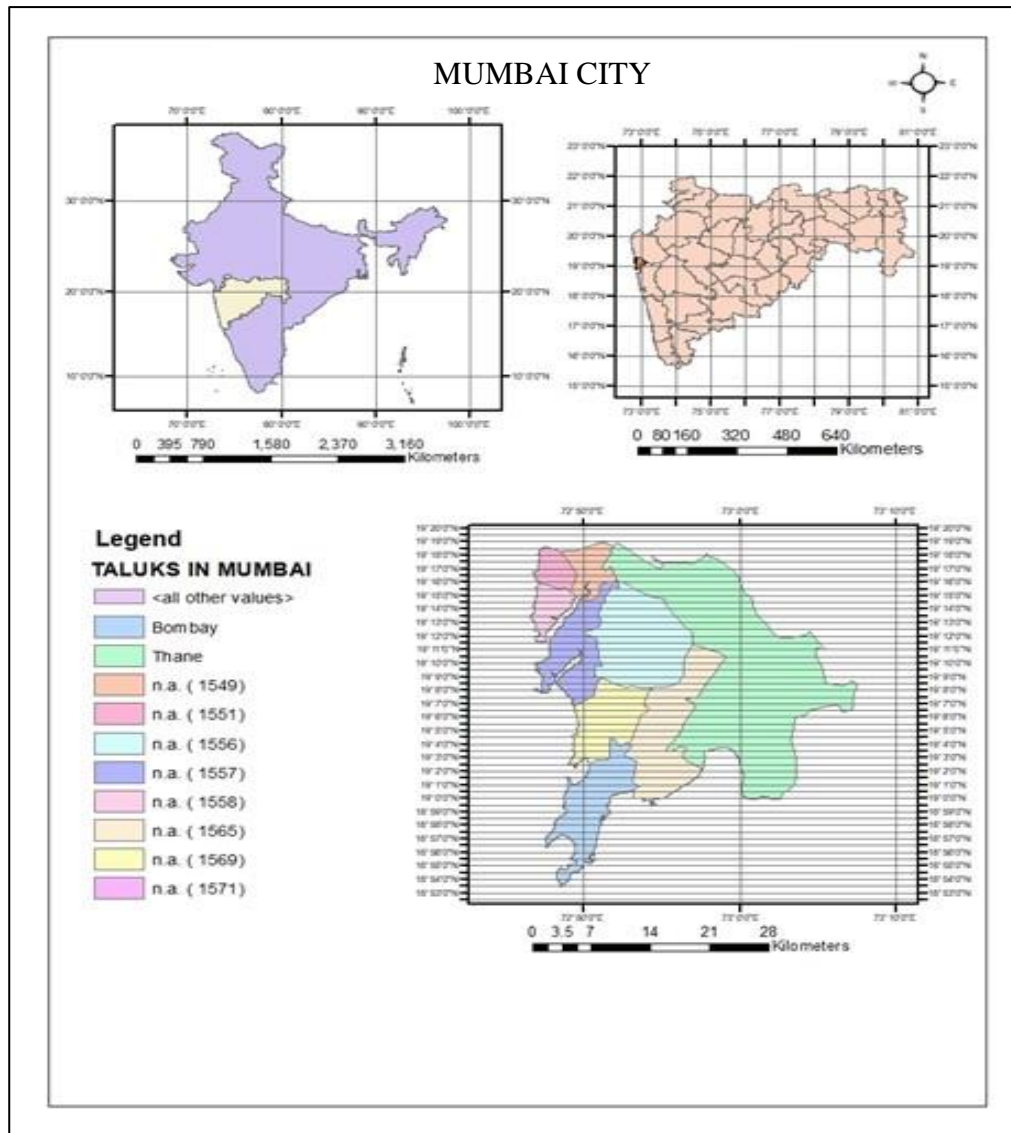
Figure 2.1: Study Area.

2.3 Design Phase

For the design and analysis, the GIS data model suited for the Sea-view restaurant applications is proposed to include the following data layers: Mumbai city boundaries layer, Mumbai districts layer, transportation network layer consisting of Mumbai's major and minor streets, commercial-area and trading-center layer including recreational facilities with. cinemas and theatres, restaurants layer, hotel layer, hospital layer and selected sites. Relevant restaurant site selection criteria must be identified to choose the most suitable location for the restaurant's new branches. The solution for choosing an intelligent criterion could be very complicated. However, the suggested criteria on which the restaurant can decide where to

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choose branch locations are summarized as follows: 3 different sites were located on the west coast of Mumbai city
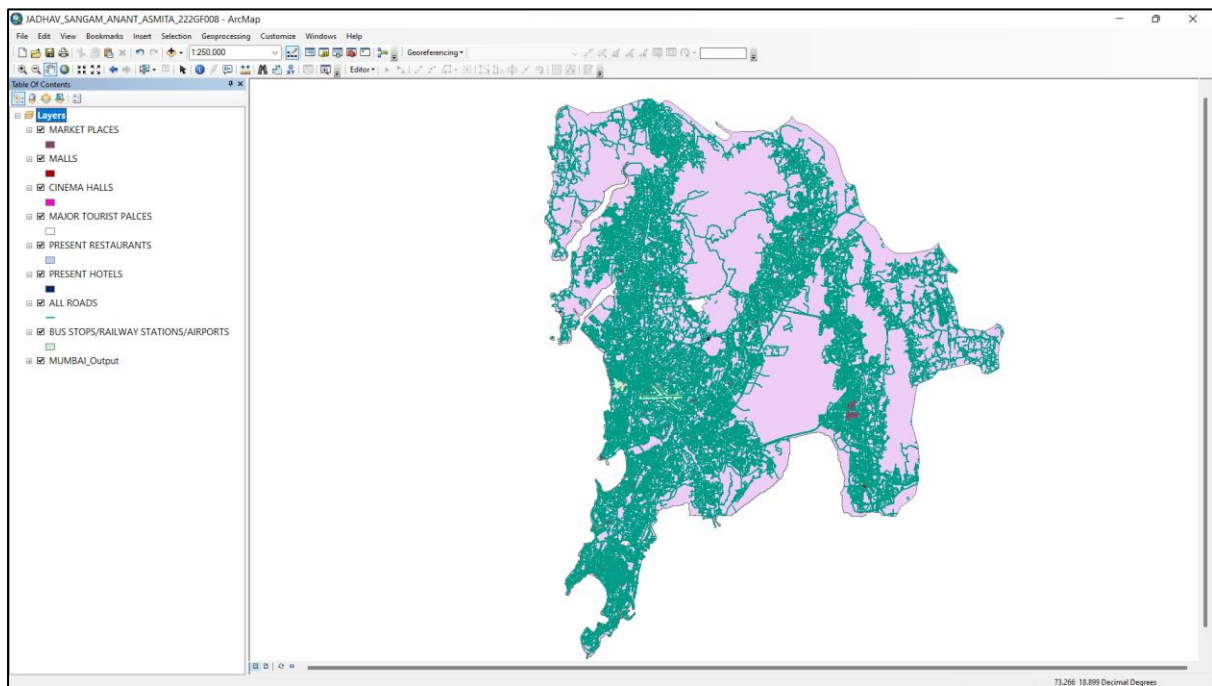
Figure 2.2: Displaying All Required Layers

2.4 GIS Data Model Design

The geographical database that is most relevant to sea-view restaurant applications should include multilayer data. The multilayer database includes layers of current restaurant branches. It includes also the locations and sites of customer attractions where many people need fast-food services from restaurant branches during the day. The names and description of the proposed layers and their importance and benefits are explained as follows: The first data layer, named Mumbai_output.shp, is the base map layer. It represents the boundary of the study area, the city of Mumbai, and the main administrative zones in the city It contains polygon features representing the main areas in Mumbai. It also includes the main district of the city of Mumbai as shown in Figures 1. These Figure shown as a sample to the work that done to the rest of the other layers. The second data layer, named ALL ROADS.shp, contains line features to show the major and important roads in the city of Mumbai. The third data layer shows different airports, bus stops, railway station across the study area, Mumbai; it is named BUS STOPS/RAILWAY STATION/AIRPORTS.shp. The following layers contains point features; its importance is for answering such queries as where

most popular tourist places, cinema halls, malls, market place in Mumbai are located and the type of their point features. The fourth data layer, named PRESENT RESTAURANTS.shp, is the current restaurant branches. It contains point features. The importance of this layer is for answering such queries as where restaurant branches are located and the type of their point features. The Fifth Data layer named, PRESENT HOTELS.shp, is the most popular hotels located in the study area, the city of Mumbai. It contains point features. The importance of this layer is answering such queries as where most popular hotels in Mumbai are located. The sixth data layer, named MARKET PLACES.shp, is the where markets are located in the study area, the city of Mumbai. It contains point features. The seventh data layer, named CINEMA HALLS.shp, is the most popular cinemas located in the study area, the city of Mumbai. It contains point features important for answering such queries as where most popular cinemas in Mumbai are located and the type of their point features. The eighth data layer, named MALLS.shp, is the most popular malls located in the study area, the city of Mumbai. It contains point features. The importance of this layer is to answer such queries as where most popular malls are located .The ninth data layer is the most important one, named MAJOR TOURIST PLACES.shp, is the most popular tourist places located in the study area, the city of Mumbai. It contains point features important to answer such queries as where most popular places in Mumbai are located.

The final layer contains only 3 point features showing Selected sites for Sea-view restaurant at Bandra, Dadar, Charni Road located on the west coast of Mumbai city shown in following Figure:
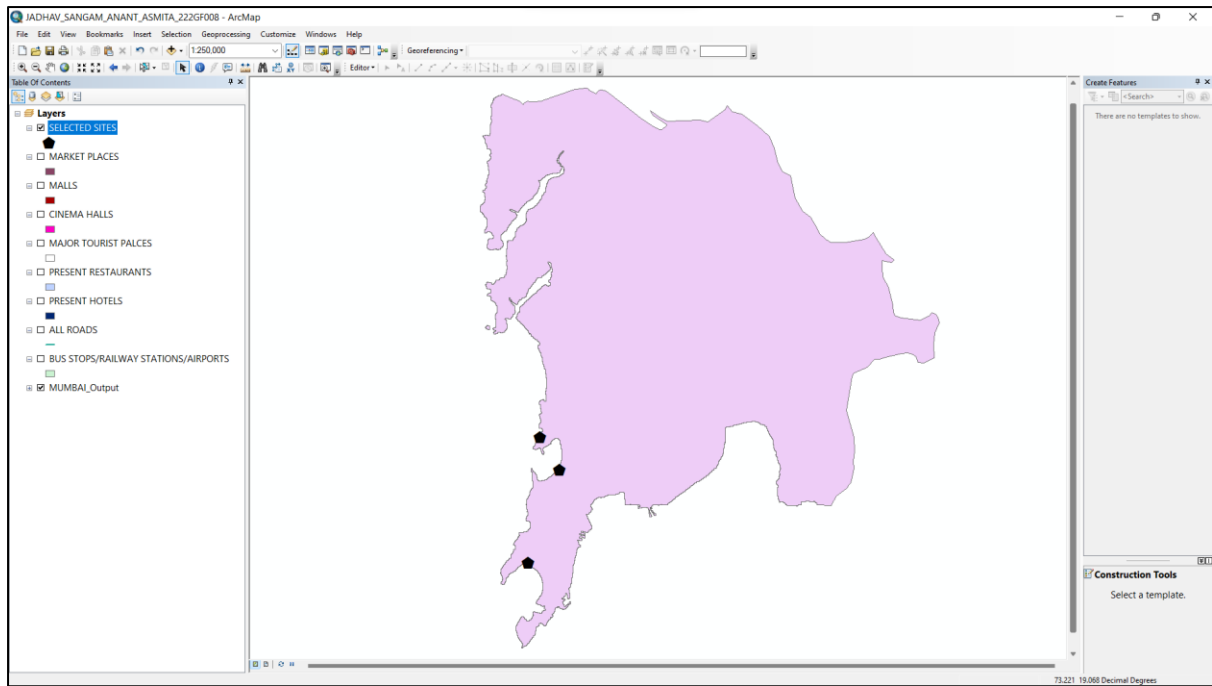
Figure 2.3: Selected Sites.

2.5 Data entry and editing

This section describes the phase of building up the geographical database model. Arc-GIS software is used to build and analyze the developed geospatial database model. Arc-GIS is considered a powerful, easy-to-use tool that brings geographic information to the desktop. Arc-GIS has the power to visualize, explore, query, and analyze data spatially. Then components of an Arc-GIS session—views, tables, charts, layouts, and scripts—are conveniently stored in one file called a project. The capabilities of ArcGIS include visualizing geographic information, updating information, analyzing information, creating quality information, views of interactive maps that contain one or more theme of GIS, storage of data, tables containing descriptive information about geographic locations, and much more. ArcGIS Desktop is an integrated suite of advanced GIS applications. It includes a series of Windows desktop applications (for example, ArcMap and ArcCatalog) with user interface components. ArcMap is the central application in ArcGIS Desktop for all map-based tasks, including cartography,analysis.

Arc Map is a comprehensive map-authoring application for ArcGIS desktop The Arc Catalog application helps to organize and manage all your GIS information, such as maps, globes, datasets, models, metadata, and services. It includes tools to browse and find

geographic information; record, view, and manage metadata; define, export, and import geodatabase schemas and designs; search for and discover GIS data on local networks and the Web; and administer an ArcGIS server.

2.5.1 Geodatabase

The geodatabase, short for geographic database, is the core geographic information model for organizing GIS data into thematic layers and spatial representations. The geodatabase is a comprehensive series of application logic and tools for accessing and managing GIS data. The geodatabase application logic is accessible in client applications (such as ArcGIS Desktop).

The geodatabase is a GIS and DBMS standards-based physical data store and is implemented on a number of multiuser and personal DBMSs and in XML. The geodatabase was designed as an open, simple geometry storage model. Open to many possible storage mechanisms, including DBMS files and XML implementations, the geodatabase is not tied to a single DBMS vendor.

2.5.2 Geodatabase Storage in Relational Database

Geodatabase storage includes both the data dictionary and simple tabular storage of the spatial and attribute data. The GIS database model design explained above can be summarized.

2.5.3 Data Entry

This phase of building up the geographic database concerns input of the data of various data layers and tables. Arc-GIS is used to design and fill data layers and tables, using data entry Tools in Arc-GIS for the various data layers and input to the system. Each layer is first identified as one of three types:

(a) Point Feature Layers: These include selected sites, market places, cinemas, restaurants, hotels, tourist places, and malls. Each point feature is selected and inserted in its location in the graphical database in its proper layer. The Selected Sites layer is found to include 3point features (Bandra, Dadar, Charni Road); the hotel layer is found to include 78 point features, among which are the most popular hotels in Mumbai. Most of these hotels are concentrated

near the main roads and important places; the restaurant layer is found to include 60 point features, among which are the most popular restaurants in Mumbai; the cinema layer is found to include 30 point features, among which are the most popular cinemas in Mumbai, most of cinema halls concentrated in the city (in Bandra, Charni road); the malls layer is found to include 56 point features, among which are the most popular malls in Mumbai; the market places layer is found to include 46 point features.the main layer is major tourist places layer found to include 82 point features which are mostly concentrated around Bandra and Charni Road of Mumbai city.

(b) Line Feature Layers: such as ALL ROADS

(c) Polygon Feature Layer: such as Mumbai_Output.

The attribute table of each point layers are as follows:

Table 2.1: Attribute Table For "Present Restaurant"Layer.

FID	Shape *	osm_id	code	fclass	name
72	Polygon	39839316	2301	restaurant	Cinnabon
83	Polygon	40297960	2301	restaurant	Bootleggers
90	Polygon	40382476	2301	restaurant	Cafe Churchill
100	Polygon	40387597	2301	restaurant	Cafe Leopold
102	Polygon	40387615	2301	restaurant	Aldo's Bar Restaurant
116	Polygon	40739096	2301	restaurant	Goa Portugesa
159	Polygon	48804708	2301	restaurant	B Merwan & Co Bakers
186	Polygon	51937306	2301	restaurant	Cafe Universal
188	Polygon	51939364	2301	restaurant	Model Cafe
405	Polygon	151355955	2301	restaurant	
593	Polygon	206961940	2301	restaurant	Raheja Classique Club
981	Polygon	314367859	2301	restaurant	rozy ...noodle khaoo bhuk mitaao noodle khao
1066	Polygon	352788897	2301	restaurant	baba foodin
1074	Polygon	352803322	2301	restaurant	Rasoii Veg Inn
1086	Polygon	352937727	2301	restaurant	Cream Lounge
1090	Polygon	352963932	2301	restaurant	timepass
1100	Polygon	352983788	2301	restaurant	SITARA
1132	Polygon	353202263	2301	restaurant	TSH Canteen
1133	Polygon	353202872	2301	restaurant	Sai Palace
1141	Polygon	353351986	2301	restaurant	Testbuds
1158	Polygon	353378180	2301	restaurant	Daily Tiffin Service
1161	Polygon	353388782	2301	restaurant	
1191	Polygon	353415856	2301	restaurant	Sadguru
1199	Polygon	353424945	2301	restaurant	Sandeep Restaurant and Bar
1205	Polygon	353751061	2301	restaurant	eat and eat
1307	Polygon	357472243	2301	restaurant	PreZzo The Fusion Eatery
1310	Polygon	358293537	2301	restaurant	Amit Garden
1312	Polygon	358298872	2301	restaurant	Delicasy
1319	Polygon	358341277	2301	restaurant	BGF - BakeGrillFry
1337	Polygon	360329422	2301	restaurant	
1546	Polygon	415708422	2301	restaurant	Priyanka Restaurant
1678	Polygon	457728704	2301	restaurant	
1751	Polygon	479859416	2301	restaurant	Apoorva Bar & Restaurant
1753	Polygon	480788776	2301	restaurant	BARC Hospital Canteen
1840	Polygon	543778459	2301	restaurant	Salt Water Cafe
1866	Polygon	554800149	2301	restaurant	
2532	Polygon	682460798	2301	restaurant	Shivraj Fine and Dine
2788	Polygon	824809087	2301	restaurant	Dil Bahar Hotel
2789	Polygon	824809089	2301	restaurant	Shalimar
2791	Polygon	824809141	2301	restaurant	Abhinandan
2792	Polygon	824809156	2301	restaurant	Nogauri Ama Milk center
2793	Polygon	824809183	2301	restaurant	Datar Darbar
2794	Polygon	824809184	2301	restaurant	Datar Darbar
2993	Polygon	905716238	2301	restaurant	North Gate food court
3031	Polygon	910328939	2301	restaurant	VEG TREAT ROYAL

PRESENT RESTAURANTS

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Table 2.2: Attribute Table For
"Present Hotels" Layer.

PRESENT HOTELS

FID	Shape *	osm_id	code	fclass	name
1	Polygon	27036055	2401	hotel	JW Marriott
12	Polygon	28846517	2401	hotel	Taj Mahal Hotel
32	Polygon	38833386	2401	hotel	Regency Hotel
45	Polygon	39165067	2401	hotel	Hotel Shalimar
60	Polygon	39354898	2401	hotel	Sea Princess Hotel
82	Polygon	40295883	2401	hotel	Taj President
84	Polygon	40309557	2401	hotel	Hotel Marine Plaza
85	Polygon	40379745	2401	hotel	Hotel Prosser's
87	Polygon	40381052	2401	hotel	Hotel Harbour View
88	Polygon	40381057	2401	hotel	Sea Palace Hotel
91	Polygon	40382485	2401	hotel	Bentley's Hotel; Jer Manzil 1930
92	Polygon	40384135	2401	hotel	Hotel Oliver
93	Polygon	40384228	2401	hotel	Garden Hotel
95	Polygon	40384404	2401	hotel	Hotel Godwin
96	Polygon	40384407	2401	hotel	Hotel Ascot
104	Polygon	40388248	2401	hotel	Hotel Regency
105	Polygon	40388251	2401	hotel	Gordon House Hotel
106	Polygon	40388254	2401	hotel	Hotel Suba Palace
107	Polygon	40388258	2401	hotel	Apollo Hotel
119	Polygon	40772065	2401	hotel	Sahara Star
121	Polygon	40819147	2401	hotel	ITC Grand Maratha
123	Polygon	40819205	2401	hotel	Hilton Mumbai International Airport
136	Polygon	46717565	2401	hotel	West End Hotel
139	Polygon	46721513	2401	hotel	ITC Grand Central
167	Polygon	3200182	2401	hotel	Grand Hyatt
184	Polygon	50880774	2401	hotel	Grand Hotel
203	Polygon	54224854	2401	hotel	Taj Wellington Mews
247	Polygon	73058518	2401	hotel	Tulip Star
248	Polygon	74142539	2401	hotel	Sea Rock
249	Polygon	74143794	2401	hotel	Taj Lands End
277	Polygon	102537882	2401	hotel	Grand Sarowar Premiere
323	Polygon	113721904	2401	hotel	Hotel City Point
364	Polygon	124990238	2401	hotel	Imperial Grand Palace
369	Polygon	130988081	2401	hotel	Sarovar Portico
383	Polygon	137835197	2401	hotel	Hotel Astoria
461	Polygon	183155889	2401	hotel	Domino's
469	Polygon	192537217	2401	hotel	Bawa International
470	Polygon	192537218	2401	hotel	Ibis
471	Polygon	192537219	2401	hotel	Hotel Transit
553	Polygon	204705451	2401	hotel	The Retreat
575	Polygon	206478063	2401	hotel	Renaissance Mumbai Convention Centre Hotel
576	Polygon	206478064	2401	hotel	Renaissance Mumbai Convention Centre Hotel
850	Polygon	257072951	2401	hotel	Hotel Bawa Continental
852	Polygon	257073252	2401	hotel	Sun-n-Sand
896	Polygon	275865017	2401	hotel	The St. Regis Mumbai

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Table 2.3: Attribute Table For
"Cinema Halls" Layer.

CINEMA HALLS

FID	Shape *	osm_id	code	fclass	name
137	Polygon	46717569	2203	cinema	Liberty Cinema
138	Polygon	46717574	2203	cinema	Metro Adlabs
143	Polygon	47978361	2203	cinema	Naaz Cinema
144	Polygon	47978362	2203	cinema	Swastik Cinema
145	Polygon	47978363	2203	cinema	Imperial Cinema
146	Polygon	47978479	2203	cinema	Dreamland
229	Polygon	72455636	2203	cinema	Moti Talkies
301	Polygon	113566063	2203	cinema	Chitra Cinema
306	Polygon	113570536	2203	cinema	Bharat Mata Cinema
312	Polygon	113696491	2203	cinema	Plaza Cinema
324	Polygon	113775902	2203	cinema	Aurora Cinema
335	Polygon	116072869	2203	cinema	Sharada Talkies
351	Polygon	120169295	2203	cinema	Star City Cinema
375	Polygon	135137729	2203	cinema	MovieTime Cinema
377	Polygon	135730532	2203	cinema	Plaza Cinema
418	Polygon	151806622	2203	cinema	Ashford City Light
475	Polygon	193632118	2203	cinema	Infiniti Mall
478	Polygon	193632132	2203	cinema	Fun Republic
537	Polygon	203143523	2203	cinema	Chandan Cinema
681	Polygon	221964519	2203	cinema	Deep Mandir
790	Polygon	246344383	2203	cinema	Carnival Cinemas
897	Polygon	275865018	2203	cinema	PVR Cinemas
1075	Polygon	352804237	2203	cinema	CINEMAX
1188	Polygon	353415217	2203	cinema	Inox Movie Theater
1250	Polygon	354016269	2203	cinema	Cinemex
1261	Polygon	354278881	2203	cinema	Deepak Talkies
1313	Polygon	358298887	2203	cinema	Mayur Cinema
2370	Polygon	632245751	2203	cinema	Mehul Cinema
2521	Polygon	681516924	2203	cinema	Ashok Cinema
2621	Polygon	746288110	2203	cinema	Cinepolis - Seawoods

Table 2.4: Attribute Table For "Malls" Layer.

FID	Shape *	osm_id	code	fclass	name
129	Polygon	42441130	2504	mall	Atria Mall
224	Polygon	57679787	2504	mall	Royal Touch Shopping Mall
276	Polygon	102537787	2504	mall	Oberoi Mall
354	Polygon	120175206	2504	mall	Star Mall
365	Polygon	125059117	2504	mall	Raghuleela Mall
398	Polygon	151205175	2504	mall	Dreams Mall
399	Polygon	151205176	2504	mall	Magnet Mall
422	Polygon	151848226	2504	mall	InOrbit Mall
424	Polygon	151889253	2504	mall	Phoenix Market City Kurla
476	Polygon	193632118	2504	mall	Infiniti Mall
477	Polygon	193632123	2504	mall	Citi Mall
480	Polygon	194579567	2504	mall	Korum Mall
504	Polygon	202516359	2504	mall	Mega Mall
512	Polygon	202563247	2504	mall	Tata Star Bazaar
731	Polygon	234976487	2504	mall	Boulevard
732	Polygon	234977123	2504	mall	High Street Mall
733	Polygon	234977124	2504	mall	Lake City Mall
734	Polygon	234977280	2504	mall	Viviana Mall
848	Polygon	255629913	2504	mall	R Odean
995	Polygon	314857086	2504	mall	Shoppers Stop
1079	Polygon	352922006	2504	mall	WonderMall
1080	Polygon	352922213	2504	mall	Harmony Mall
1081	Polygon	352922998	2504	mall	Maxus Mall
1091	Polygon	352963934	2504	mall	shopping malls
1114	Polygon	353157826	2504	mall	R-Mall (Ghodbunder)
1120	Polygon	353175535	2504	mall	Big Centre
1157	Polygon	353378128	2504	mall	Bayside Mall
1171	Polygon	353396353	2504	mall	Surya Shopping Centre
1208	Polygon	353760926	2504	mall	Centurion Mall
1229	Polygon	353790955	2504	mall	Boomi Mall
1236	Polygon	353818730	2504	mall	Milap
1311	Polygon	358298845	2504	mall	Growels 101
1511	Polygon	384551648	2504	mall	Viviana Mall
1530	Polygon	402322279	2504	mall	Maker Arcade
1656	Polygon	436337946	2504	mall	Phoenix Paragon Plaza
1792	Polygon	495716612	2504	mall	Moksha Plaza
1811	Polygon	510511580	2504	mall	Seawoods Grand Central Mall
2036	Polygon	573947460	2504	mall	Satra Plaza
2037	Polygon	573947466	2504	mall	City Centre Mall
2038	Polygon	573947470	2504	mall	Palm Beach Galleria Mall
2153	Polygon	594407882	2504	mall	High Street Phoenix
2197	Polygon	617989959	2504	mall	Filix Mall
2320	Polygon	627612997	2504	mall	R Mall
2353	Polygon	629015648	2504	mall	Express Zone Mall
2380	Polygon	632275578	2504	mall	Color Scape Mall

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Table 2.5: Attribute Table For "Major Tourist Places" Layer.

MAJOR TOURIST PALCES

FID	Shape *	osm_id	code	fclass	name
725	Polygon	231592044	2733	archaeological	Mandapeshwar Caves
1793	Polygon	496634583	2733	archaeological	Mahakali Caves
2248	Polygon	625929082	2733	archaeological	Jogeshwari Caves
4345	Polygon	1061212416	2733	archaeological	
640	Polygon	207413391	2014	arts_centre	National Centre for the Performing Arts
1007	Polygon	315451804	2014	arts_centre	Fine Arts Society and Cultural Center
1303	Polygon	357470007	2014	arts_centre	Akhil Bharatiya Gandharva Mahavidyalaya Mandal
1305	Polygon	357470057	2014	arts_centre	Akhil Bharatiya Gandharva Mahavidyalaya Mandal
2604	Polygon	727746253	2725	artwork	
3737	Polygon	950095640	2725	artwork	Dariyacha Raja Statue
4324	Polygon	1051146102	2725	artwork	
4353	Polygon	1064863799	2725	artwork	
4392	Polygon	1071052545	2725	artwork	
4406	Polygon	1072565554	2725	artwork	
20	Polygon	38718382	2721	attraction	Girgaum Chowpatty Beach
176	Polygon	49480530	2721	attraction	
187	Polygon	51937306	2721	attraction	Cafe Universal
201	Polygon	53361712	2721	attraction	सखरी शिल्ला
210	Polygon	55794887	2721	attraction	Flamingo Point
241	Polygon	73045131	2721	attraction	Gilbert Hill
256	Polygon	79304233	2721	attraction	Mangaldas Market
400	Polygon	151253238	2721	attraction	छत्र बीच
552	Polygon	204704714	2721	attraction	Madh Beach
606	Polygon	6356858	2721	attraction	Gateway of India
1633	Polygon	431512593	2721	attraction	सादन शिल्ला
2280	Polygon	626249301	2721	attraction	Sewri Fort
2346	Polygon	628861196	2721	attraction	Vedic Park
2356	Polygon	629094962	2721	attraction	Film City Temple
2357	Polygon	629094968	2721	attraction	Abu Village
2361	Polygon	8757021	2721	attraction	Dadasaheb Phalke Chitranagari
200	Polygon	53361712	2737	fort	सखरी शिल्ला
1594	Polygon	427324277	2737	fort	Bombay Fort Wall Remnant
2279	Polygon	626249301	2737	fort	Sewri Fort
2299	Polygon	626407354	2737	fort	Ghodbandar Fort
2302	Polygon	627248997	2737	fort	Thane Fort
2420	Polygon	654567861	2737	fort	Bandra Fort
2566	Polygon	708635268	2737	fort	Belapur Fort
2841	Polygon	835846779	2737	fort	Belapur Fort
204	Polygon	54224946	2904	fountain	Flora Fountain
333	Polygon	115832672	2904	fountain	Five Gardens Fountain
1697	Polygon	468693137	2904	fountain	
1713	Polygon	469429545	2904	fountain	Rotunda Water Fountain
2002	Polygon	571255423	2904	fountain	Seawoods Fountain
2495	Polygon	678334843	2904	fountain	
2535	Polygon	683026261	2904	fountain	Dolphin Fountain

I◄ ◄ 1 ► ►I (0 out of 82 Selected)

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Table 2.6: Attribute Table For

"Market Places" Layer

FID	Shape *	osm_id	code	fclass	name
142	Polygon	47977744	2016	market_place	Lokmanya Tilak Market
156	Polygon	48790490	2016	market_place	APMC Grain Market
157	Polygon	48790492	2016	market_place	APMC Spice Market
158	Polygon	48790495	2016	market_place	APMC Fruit & Vegetable Market
165	Polygon	49001325	2016	market_place	महात्मा ज्योतिबा फुले मार्ई
219	Polygon	57677079	2016	market_place	Mirza Ghalib Municipal Market
220	Polygon	57677080	2016	market_place	Mirza Ghalib Municipal Market
221	Polygon	57677081	2016	market_place	Mirza Ghalib Municipal Market
222	Polygon	57677082	2016	market_place	Mirza Ghalib Municipal Market
223	Polygon	57677083	2016	market_place	Mirza Ghalib Municipal Market
271	Polygon	101310848	2016	market_place	Topiwala Vegetable Market
314	Polygon	113696502	2016	market_place	
328	Polygon	113777721	2016	market_place	Wadala Market
330	Polygon	113792252	2016	market_place	Gopi Tank Market
355	Polygon	120177533	2016	market_place	Chhatrapati Shivaji Municipal Market
379	Polygon	5327411	2016	market_place	Matunga Market
414	Polygon	151768178	2016	market_place	APMC Onion & Potato Market
419	Polygon	151807307	2016	market_place	MUNCIPAL MARKED
420	Polygon	151842114	2016	market_place	Andheri Market
466	Polygon	185467218	2016	market_place	Amrapali Arcade
467	Polygon	185467427	2016	market_place	Thane Vegetable Market
770	Polygon	236629909	2016	market_place	Dadar Flower Market
773	Polygon	237025757	2016	market_place	Pali Bazaar
874	Polygon	260754870	2016	market_place	Trombay Market
980	Polygon	314366757	2016	market_place	Kena Market
1047	Polygon	346686045	2016	market_place	Footware market
1048	Polygon	346687370	2016	market_place	footware Market
1102	Polygon	352988902	2016	market_place	Sant Jalaram Bappa Market
1244	Polygon	353986113	2016	market_place	Adarsh Market
1565	Polygon	415984454	2016	market_place	Fish Market
1567	Polygon	416559780	2016	market_place	Jai Kisan Mandai
1637	Polygon	433255062	2016	market_place	Fish Market
1903	Polygon	558708646	2016	market_place	Sector-48 Market
2243	Polygon	625809278	2016	market_place	Sewri Fish Market
2281	Polygon	626348893	2016	market_place	Janata Timber Market
2415	Polygon	652167195	2016	market_place	
2443	Polygon	665546546	2016	market_place	Mulund Market
2507	Polygon	680077236	2016	market_place	Dongri Bazaar
2510	Polygon	680538979	2016	market_place	Fish Market
2602	Polygon	727741043	2016	market_place	Local Market
2829	Polygon	827899850	2016	market_place	
2830	Polygon	828076213	2016	market_place	Karave Market
3736	Polygon	950095639	2016	market_place	Jai Bhawani Dainandin Bazaar
4105	Polygon	981951747	2016	market_place	
4350	Polygon	1063809518	2016	market_place	Mira Road Fish Market

I◄ ◄ 1 ► ►I (0 out of 46 Selected)

After completing the design phase of the geodatabase model, decision makers have the ability to visualize, explore, query, and analyze data spatially by using modern GISs. Powerful analytical tools as will be shown and discussed in the following topic.

3.6 Analysis Phase

GIS provides sophisticated analysis tools to provide timely information to managers and analysts alike. GIS technology really comes into its own when used to analyze geographic data to look for patterns and trends and to undertake "what if" scenarios

3.6.1 Query

Modern GISs have many powerful analytical tools. They provide simple point-and-click query capabilities. A query builder in Arc-GIS 10.3 was used to answer the various queries to find more suitable locations:

1. Where are the high-density Tourist places located?
2. Where are the recent restaurants and hotels?
3. Where are the districts and subdistricts with traffic generators, such as malls, cinema,

market places?

4. Where are the districts and subdistricts including high traffic count and accessibility, such as roads where people flow by car and by foot pass?

5. Where are the competitors in districts and subdistricts?

6. Where should new Sea-view restaurant "R" be?

To do this, queries use a query builder by selecting the Mumbai_Output.shp layer, because this layer includes the each district and selects a field of district called Dist_. One clicks "verify" to confirm that the expression is correct and to specify where high density tourist places are?
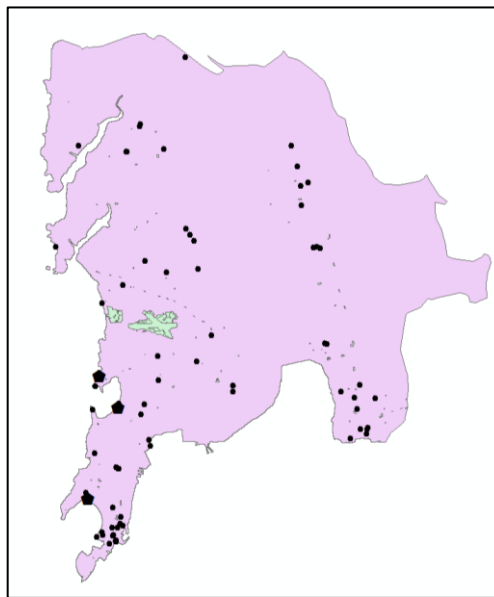
Figure 2.4: Output For Query 1).

3.6.2 Overlay

The first query aims to show where high density tourist places are located. The query based on select by location tool applies Major Tourist Places layer because this layer includes the location of these tourist attractions. The decision maker is able to know where the districts are that contain targeted restaurant customers and have dense crowd. One can apply a second query to show where the current restaurant branches are located by making a query using select by location from the current selection by Present Restaurants layer because this layer includes the location of the main current branches. Now the decision maker know density distribution for new restaurant who are served by the current restaurant that is included by the same districts.
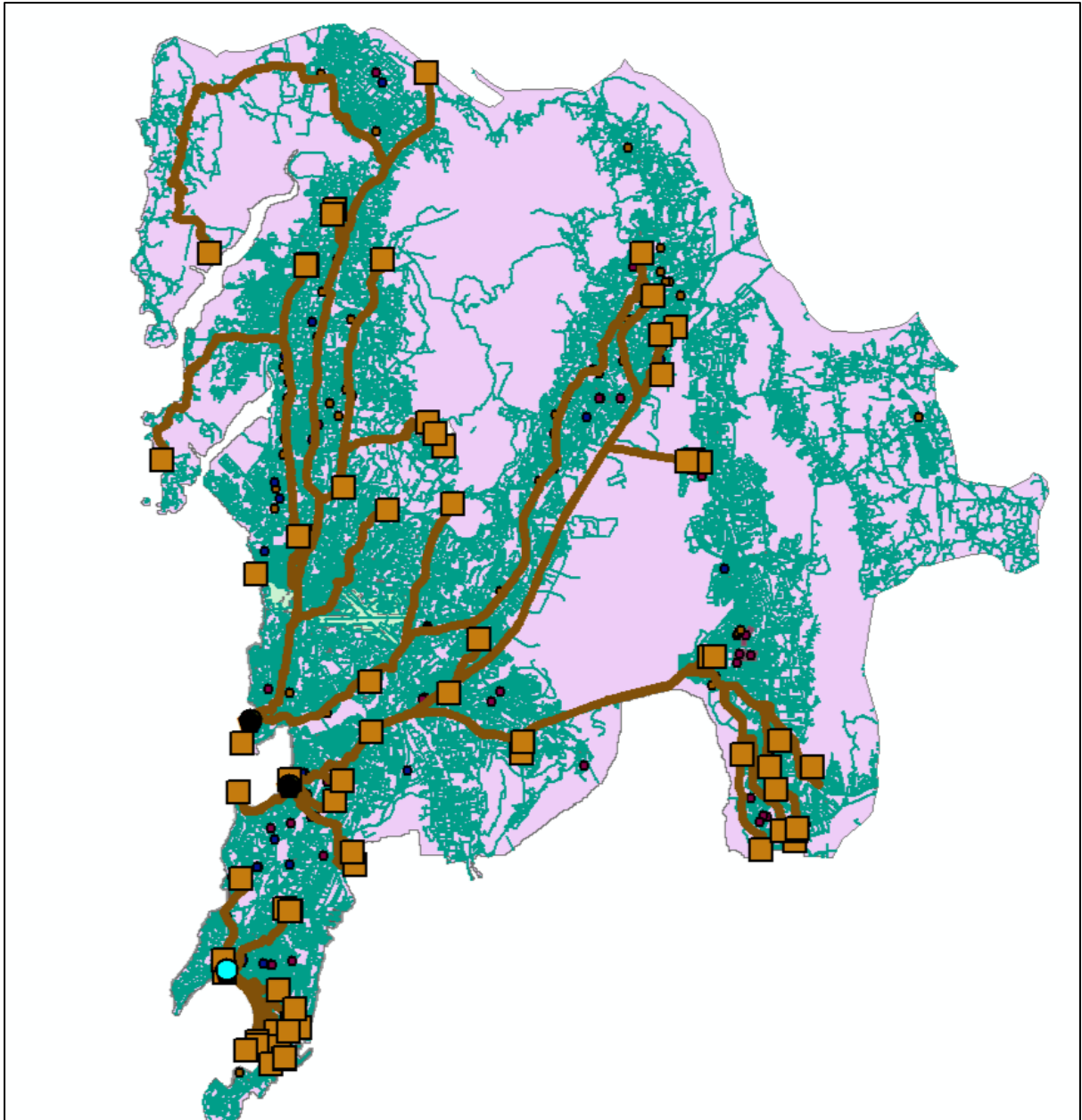
Figure 2.5: Analysis Using Major Tourist Places.

3.6.3 Buffer zone

Suppose that each one of the three selected sites of Mumbai city perfectly serve a buffered zone within a distance of 5 km by the researchers subjective selection, which will be the served zones in the districts . The detailed explanation appears clearly in Figure 8: to specify the best location to open a new sea-view restaurant branch through the distribution strategy "Site selection or place strategy" in districts that include many tourist places and buffered zones not covered by Dadar site, many overlay processes may be run to help in this specification. This overlay processes may include all the traffic generators, such as malls,

cinema, hotels, and market places etc accessibility such as "People flow by car and by foot pass that intersect," or are contained by the last selected sites. A full view to the last Figure after adding buffer zone of 7 KM accessibility is in Figure 12. As shown in Figure 12, it is clear to the decision maker which of the selected sites are partly within the buffer zone area,which area is common between any two selected sites; the result will be as shown in following figure:
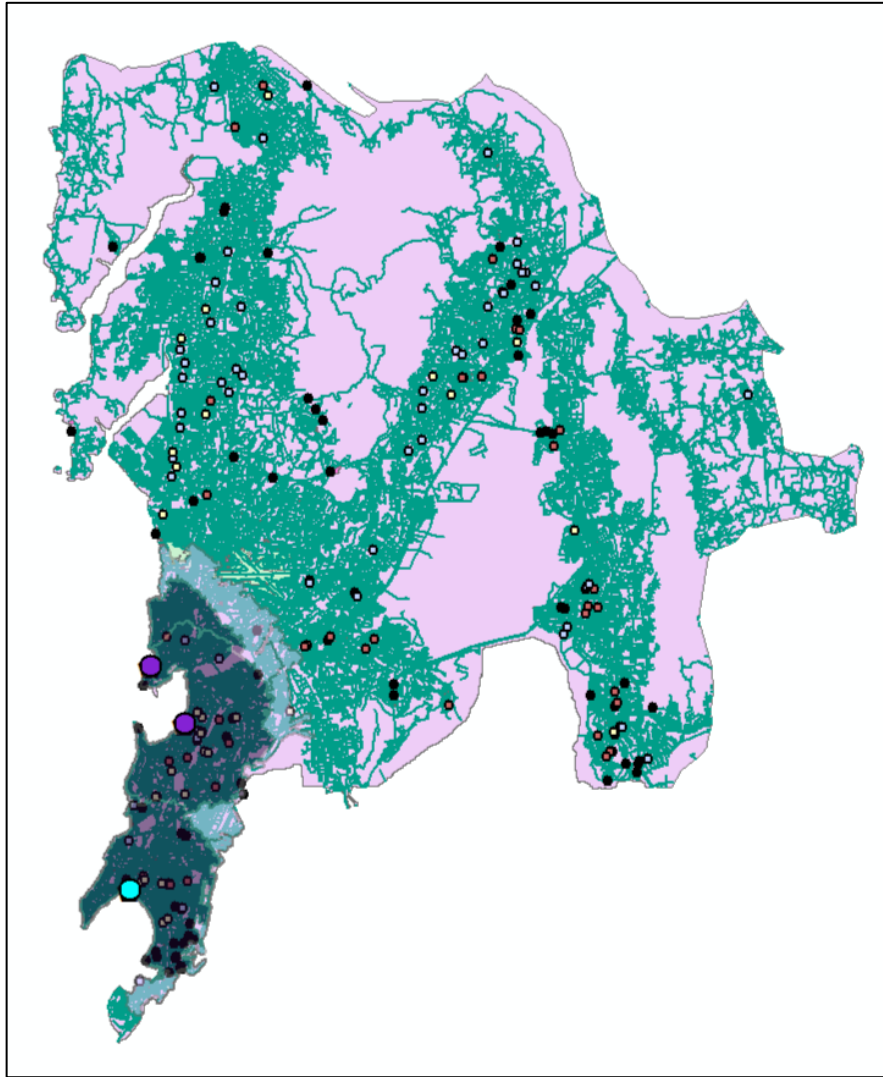

Figure 2.6: Buffer Zones For All 3 Selected Sites

CHAPTER 4

RESULTS AND DISCUSSIONS

The cooperation and merging between GIS applications and the field of business administration, such as the marketing sector, especially in distribution strategy and specifically depending upon Major Tourist Places in city of Mumbai.

- Two sites are selected from 3 selected sites. Bandra and/or Charni Road are selected for opening of new Sea-view restaurant "R" in the city of Mumbai as shown in Figure.
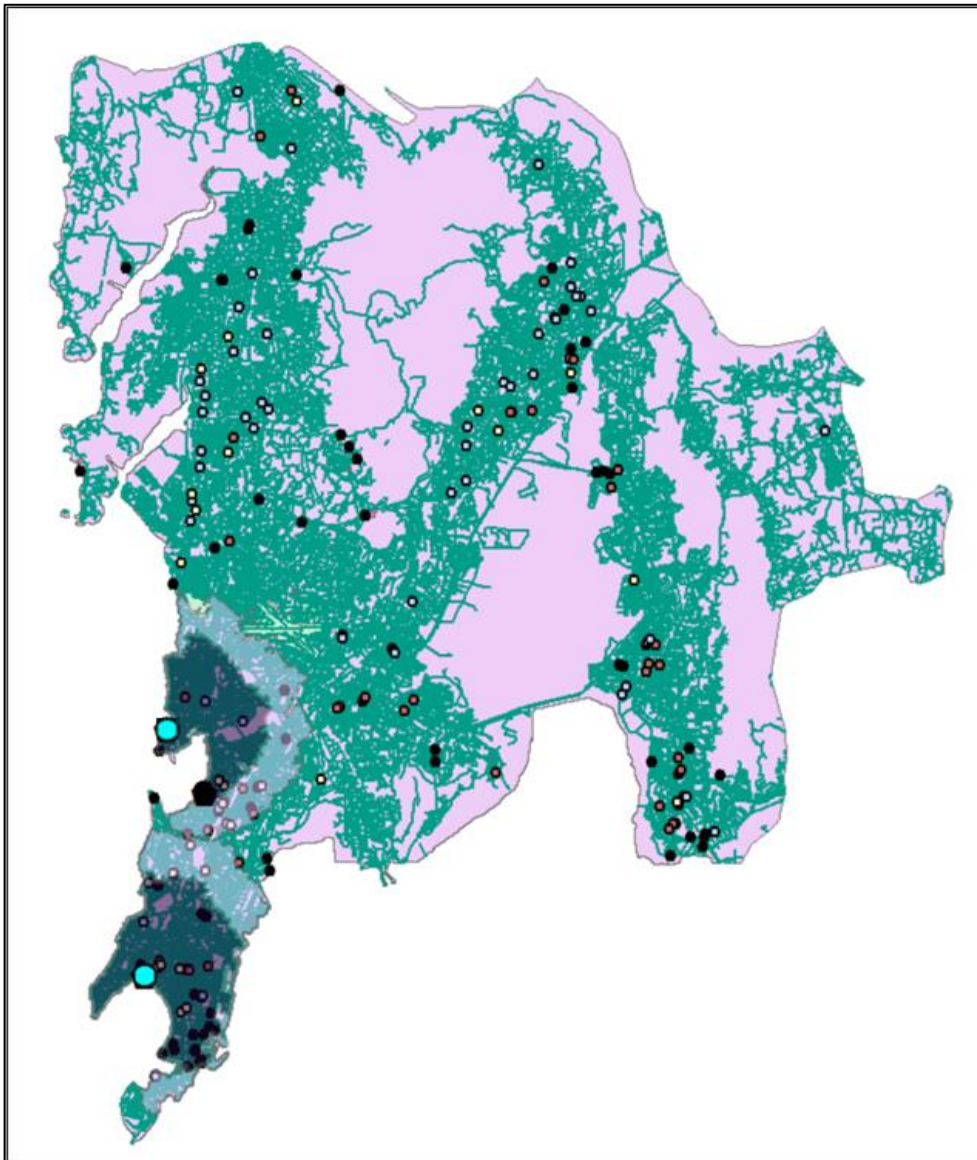- Dadar site is excluded since it comes under service areas of Bandra and Charni Road sites of Mumbai City

Figure 3.1: Selected Sites. (Bandra And Charni Road)

CHAPTER 6
CONCLUSION

The main objectives have been successfully achieved to design, build and analyze a geospatial database that can be used in the field of business administration to support business decision making by adding a spatial component to the decision process. With GIS, businesses make judgments based not only on the attributes of business entities, but on their spatial properties as well: location, overlaps, proximities, zones of influence, scale, and distances. This leads to better-informed decisions. "R" is a sea-view restaurant deciding where to locate its concessions in a city. The restaurant not only needs attribute information such as its own and competitors' sales and food menu items, but also the distance between its own competitors', proximity to highways, customer locations, and direction of city growth.

GIS is important in business because most business problems include significant spatial components and GIS enables decision makers to exploit their spatial data resources more effectively and protect them from making a random or subjective decision. From the results, it could be concluded that the decision maker can make the right decision by choosing the most profitable place or zone in which to open a new branch for "R" restaurant in the two selected districts.

In light of these findings related to GIS study in Mumbai, the main recommendation to the marketing and other commercial sectors organize their efforts to build one geospatial database infrastructure that can be used by all the users and at the same time can be published via the Internet for public use.

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