

Predicting the Best Place to Open a Restaurant in London

Naz Temucin
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1. Introduction

People now eat out more often, and for a wider range of occasions. This has led to significant growth within the restaurant sector, particularly over the past two years.

However, it's also important to note that there are significant challenges within the sector. The eating out landscape has evolved significantly over the past decade, with chains taking market share and growing the market through aggressive roll out and by offering more choice, better quality, and more consistency to customers.

There is also more crossover between market segments. The food to go sector has grown and is available 24/7, whilst dine in chains are increasingly offering take away options. At the same time, advances in technology have led to more visibility for smaller providers, as well as providing help to drive the popularity of delivery services such as "Deliveroo" and "Uber Eats."

In addition to an increasingly competitive backdrop, and the challenging outlook for consumer spending, there are also stringent requirements to start a restaurant and growing cost pressures.

At this point choosing the right location become the crucial part of your success from your business.

This study, with all these challenges mentioned above, will assist you to spot the best place to open your restaurant in London.

2. Data Acquisition and Cleaning

Since there is not any open source for London neighborhood coordinates, needed file self created with using the website <https://latitudelongitude.org/map-address-latlong>. Since the file is self made there was no need to clean it.

Foursquare API is used to explore the neighborhoods and segment them.

After merging the both data, there were 1000 samples and 159 features. All of the features were useful for selecting the right place with its surroundings so there were not any need to clean or classify the features.

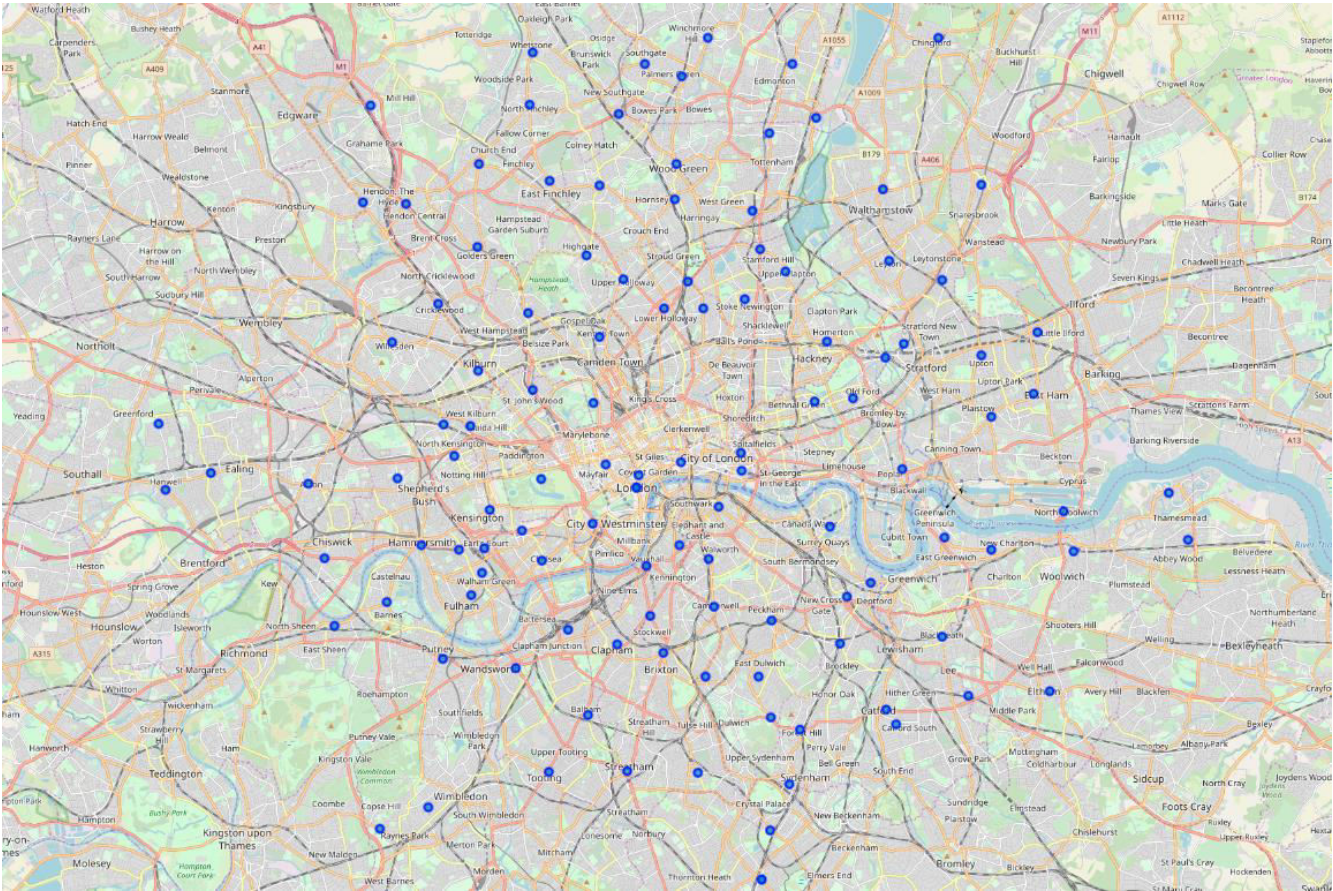
London Coordinates file includes the followings:

Postcode	Borough	Neighbourhood	Latitude	Longitude
E1	Eastern	Eastern Head district	51.507351	-0.127758
E2	Eastern	Bethnal Green	51.531103	-0.04808
E3	Eastern	Bow	51.532089	-0.03082
E4	Eastern	Chingford	51.632067	0.007363
E5	Eastern	Clapton	51.56723	-0.06119
E6	Eastern	East Ham	51.533397	0.049911
E7	Eastern	Forest Gate	51.543922	0.026427
E8	Eastern	Hackney	51.573445	-0.072438
E9	Eastern	Homerton	51.547861	-0.04259
E10	Eastern	Leyton	51.570222	-0.014694
E11	Eastern	Leytonstone	51.564962	0.008814
E12	Eastern	Manor Park	51.550487	0.051412
E13	Eastern	Plaistow	51.526832	0.030814
E14	Eastern	Poplar	51.512379	-0.008798
E15	Eastern	Stratford	51.547181	-0.00813
E16	Eastern	Victoria Docks and North Woolwich	51.500712	0.063147
E17	Eastern	Walthamstow	51.590177	-0.017344
E18	Eastern	Woodford and South Woodford	51.591267	0.026472
E20	Eastern	Olympic Park	51.543296	-0.016552
EC1	Eastern Central	Eastern Central Head district	51.507351	-0.127758
EC2	Eastern Central	Bishopsgate	51.516798	-0.081059
EC3	Eastern Central	Fenchurch Street	51.511924	-0.080823
EC4	Eastern Central	Fleet Street	51.514224	-0.107964
N1	Northern	Northern Head district	51.497293	-0.147197
N2	Northern	East Finchley	51.592468	-0.166434
N3	Northern	Finchley	51.597143	-0.197955
N4	Northern	Finsbury Park	51.564578	-0.104726
N5	Northern	Highbury	51.556965	-0.097966
N6	Northern	Highgate	51.571703	-0.150124
N7	Northern	Holloway	51.557017	-0.115522
N8	Northern	Hornsey	51.587271	-0.110381
N9	Northern	Lower Edmonton	51.624813	-0.058181
N10	Northern	Muswell Hill	51.591182	-0.144301
N11	Northern	New Southgate	51.611001	-0.135469
N12	Northern	North Finchley	51.613509	-0.17542
N13	Northern	Palmers Green	51.621487	-0.107566
N14	Northern	Southgate	51.624761	-0.124046
N15	Northern	South Tottenham	51.58401	-0.075759
N16	Northern	Stoke Newington	51.559676	-0.07937
N17	Northern	Tottenham	51.605575	-0.068166
N18	Northern	Upper Edmonton	51.610011	-0.047471
N19	Northern	Upper Holloway	51.565216	-0.133487
N20	Northern	Whetstone	51.627989	-0.174033
N21	Northern	Winchmore Hill	51.632028	-0.095802
N22	Northern	Wood Green	51.597172	-0.109802

NW1	North Western	North Western Head district	51.530687	-0.146932
NW2	North Western	Cricklewood	51.558189	-0.216358
NW3	North Western	Hampstead	51.555646	-0.176175
NW4	North Western	Hendon	51.58609	-0.230706
NW5	North Western	Kentish Town	51.549095	-0.144084
NW6	North Western	Kilburn	51.539813	-0.198529
NW7	North Western	Mill Hill	51.613382	-0.246357
NW8	North Western	St John's Wood	51.534358	-0.174206
NW9	North Western	The Hyde	51.5864	-0.249812
NW10	North Western	Willesden	51.54763	-0.236925
NW11	North Western	Golders Green	51.574001	-0.198773
SE1	South Eastern	South Eastern Head district	51.501833	-0.090951
SE2	South Eastern	Abbey Wood	51.492612	0.118818
SE3	South Eastern	Blackheath	51.465839	0.009034
SE4	South Eastern	Brockley	51.463772	-0.036603
SE5	South Eastern	Camberwell	51.474085	-0.093014
SE6	South Eastern	Catford	51.445395	-0.016091
SE7	South Eastern	Charlton	51.49004	0.030774
SE8	South Eastern	Deptford	51.480799	-0.02311
SE9	South Eastern	Eltham	51.450634	0.057086
SE10	South Eastern	Greenwich	51.493367	0.009821
SE11	South Eastern	bethnal green	51.491308	-0.108533
SE12	South Eastern	Lee	51.449333	0.020484
SE13	South Eastern	Lewisham	51.441458	-0.011701
SE14	South Eastern	New Cross	51.476905	-0.03369
SE15	South Eastern	Peckham	51.470324	-0.067387
SE16	South Eastern	Rotherhithe	51.49629	-0.041193
SE17	South Eastern	Walworth	51.487378	-0.095307
SE18	South Eastern	Woolwich	51.489475	0.067588
SE19	South Eastern	Norwood	51.398134	-0.0716
SE20	South Eastern	Anerley	51.411911	-0.067978
SE21	South Eastern	Dulwich	51.443326	-0.067555
SE22	South Eastern	East Dulwich	51.454563	-0.07321
SE23	South Eastern	Forest Hill	51.439778	-0.054642
SE24	South Eastern	Herne Hill	51.454546	-0.096661
SE25	South Eastern	South Norwood	51.398134	-0.0716
SE26	South Eastern	Sydenham	51.42476	-0.059399
SE27	South Eastern	West Norwood	51.427905	-0.100249
SE28	South Eastern	Thamesmead	51.505758	0.110059
SW1	South Western	South Western Head district	51.507351	-0.127758
SW2	South Western	Brixton	51.461279	-0.115615
SW3	South Western	Chelsea	51.486943	-0.170037
SW4	South Western	Clapham	51.463698	-0.136305
SW5	South Western	Earls Court	51.490331	-0.195842
SW6	South Western	Fulham	51.477343	-0.201682

SW7	South Western	South Kensington	51.495329	-0.178991
SW8	South Western	South Lambeth	51.485381	-0.123321
SW9	South Western	Stockwell	51.471593	-0.121664
SW10	South Western	West Brompton	51.483494	-0.196802
SW11	Battersea	Battersea Head district	51.46761	-0.158348
SW12	Battersea	Balham	51.443989	-0.14941
SW13	Battersea	Barnes	51.475294	-0.239205
SW14	Battersea	Mortlake	51.468736	-0.262742
SW15	Battersea	Putney	51.459643	-0.214126
SW16	Battersea	Streatham	51.42826	-0.131734
SW17	Battersea	Tooting	51.428215	-0.166925
SW18	Battersea	Wandsworth	51.457072	-0.181782
SW19	Battersea	Wimbledon	51.418339	-0.220629
SW20	Battersea	West Wimbledon	51.412317	-0.242284
W1	Western	Western Head district	51.51369	-0.141487
W2	Paddington	Paddington Head district	51.509628	-0.170354
W3	Paddington	Acton	51.508372	-0.27444
W4	Paddington	Chiswick	51.487627	-0.267173
W5	Paddington	Ealing	51.525037	-0.341396
W6	Paddington	Hammersmith	51.491187	-0.223731
W7	Paddington	Hanwell	51.506637	-0.338323
W8	Paddington	Kensington	51.50101	-0.193279
W9	Paddington	Maida Hill	51.524363	-0.201733
W10	Paddington	North Kensington	51.52467	-0.213888
W11	Paddington	Notting Hill	51.516013	-0.209015
W12	Paddington	Shepherds Bush	51.509777	-0.234566
W13	Paddington	West Ealing	51.51141	-0.318016
W14	Paddington	West Kensington	51.489862	-0.207001
WC1	Western Central	Head district	51.507351	-0.127758
WC2	Western Central	Strand	51.510583	-0.126768

Below if the map of London's boroughs.



3.Exploratory Data Analysis

Firstly, **South Western** is selected as Borough to locate our restaurant in more popular location.

	Postcode	Borough	Neighbourhood	Latitude	Longitude
0	SW1	South Western	South Western Head district	51.507351	-0.127758
1	SW2	South Western	Brixton	51.461279	-0.115615
2	SW3	South Western	Chelsea	51.486943	-0.170037
3	SW4	South Western	Clapham	51.463698	-0.136305
4	SW5	South Western	Earls Court	51.490331	-0.195842
5	SW6	South Western	Fulham	51.477343	-0.201682
6	SW7	South Western	South Kensington	51.495329	-0.178991
7	SW8	South Western	South Lambeth	51.485381	-0.123321
8	SW9	South Western	Stockwell	51.471593	-0.121664
9	SW10	South Western	West Brompton	51.483494	-0.196802

The map

Thirdly, the 10 most common venues founded for each neighborhood.

Detailed frequency for each neighborhood is below.

----Brixton----			----Chelsea----			----Earls Court----			----Clapham----		
	venue	freq		venue	freq		venue	freq		venue	freq
0	Coffee Shop	0.09	0	Italian Restaurant	0.07	0	Café	0.07	0	Pub	0.10
1	Pub	0.07	1	Hotel	0.06	1	Pizza Place	0.05	1	Coffee Shop	0.07
2	Café	0.05	2	Japanese Restaurant	0.04	2	Pub	0.05	2	Pizza Place	0.05
3	Park	0.05	3	Ice Cream Shop	0.04	3	Italian Restaurant	0.04	3	Park	0.04
4	Brewery	0.04	4	Pizza Place	0.03	4	Hotel	0.04	4	Market	0.04
5	Cocktail Bar	0.04	5	Restaurant	0.03	5	Yoga Studio	0.03	5	Italian Restaurant	0.03
6	Market	0.04	6	Indian Restaurant	0.03	6	Indian Restaurant	0.03	6	Restaurant	0.03
7	Pizza Place	0.03	7	Café	0.03	7	Science Museum	0.03	7	Indian Restaurant	0.03
8	Tapas Restaurant	0.03	8	Science Museum	0.03	8	Park	0.03	8	Yoga Studio	0.02
9	Caribbean Restaurant	0.03	9	Garden	0.03	9	French Restaurant	0.03	9	Caribbean Restaurant	0.02

----South Kensington----			----Fulham----			----South Lambeth----			----South Western Head district----		
	venue	freq		venue	freq		venue	freq		venue	freq
0	Hotel	0.09	0	Café	0.09	0	Theater	0.11	0	Hotel	0.08
1	Indian Restaurant	0.04	1	Pub	0.08	1	Hotel	0.09	1	Clothing Store	0.05
2	Garden	0.04	2	Park	0.07	2	Park	0.05	2	Steakhouse	0.05
3	Park	0.03	3	Coffee Shop	0.07	3	Garden	0.04	3	Theater	0.04
4	Science Museum	0.03	4	Pizza Place	0.06	4	Art Gallery	0.04	4	Ice Cream Shop	0.03
5	French Restaurant	0.03	5	Italian Restaurant	0.05	5	Plaza	0.04	5	Indian Restaurant	0.03
6	Japanese Restaurant	0.03	6	Bakery	0.03	6	Coffee Shop	0.04	6	Bookstore	0.03
7	Italian Restaurant	0.03	7	Gastropub	0.03	7	Art Museum	0.03	7	Gourmet Shop	0.02
8	Restaurant	0.03	8	Soccer Stadium	0.03	8	Movie Theater	0.03	8	Grocery Store	0.02
9	Café	0.03	9	Yoga Studio	0.02	9	Deli / Bodega	0.03	9	Comic Shop	0.02

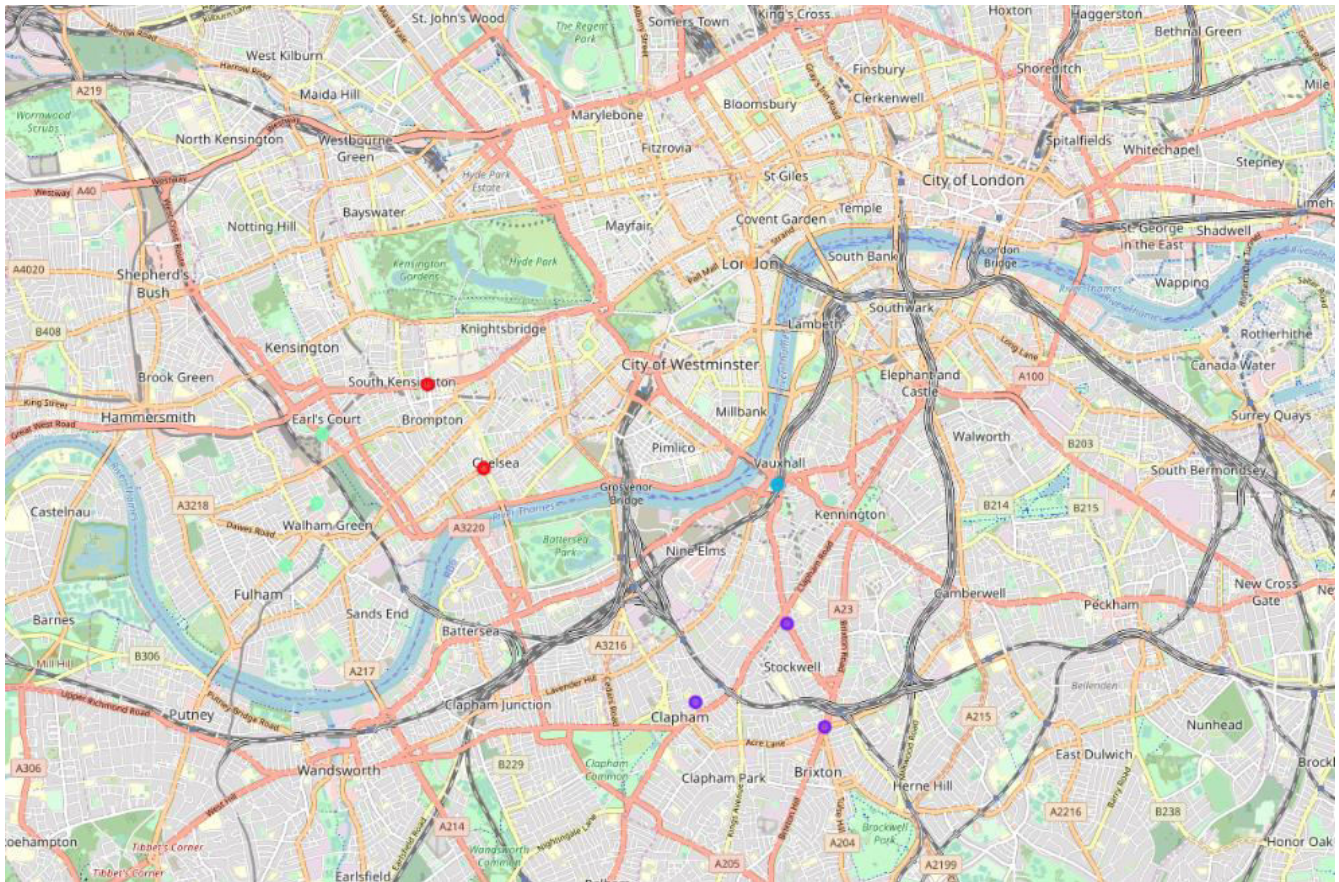
----West Brompton----			----Stockwell----		
	venue	freq		venue	freq
0	Café	0.08	0	Café	0.09
1	Italian Restaurant	0.06	1	Coffee Shop	0.08
2	Pub	0.05	2	Pub	0.08
3	Pizza Place	0.04	3	Pizza Place	0.04
4	Hotel	0.04	4	Market	0.04
5	Bakery	0.04	5	Park	0.04
6	Park	0.04	6	Cocktail Bar	0.03
7	Yoga Studio	0.03	7	Brewery	0.03
8	French Restaurant	0.03	8	Yoga Studio	0.02
9	Soccer Stadium	0.03	9	Gastropub	0.02

4.Applying one of Machine Learning Techniques (K-Means Clustering)

So, now we have the best 10 places for each neighborhood, we will classify them into 5 parts with using **k-means**.

	Postcode	Borough	Neighbourhood	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	SW1	South Western	South Western Head district	51.507351	-0.127758	4	Hotel	Steakhouse	Clothing Store	Theater	Ice Cream Shop	Indian Restaurant	Bookstore	Art Museum	Bakery	Movie Theater
1	SW2	South Western	Brixton	51.461279	-0.115615	1	Coffee Shop	Pub	Park	Café	Market	Brewery	Cocktail Bar	Caribbean Restaurant	Pizza Place	Restaurant
2	SW3	South Western	Chelsea	51.486943	-0.170037	0	Italian Restaurant	Hotel	Japanese Restaurant	Ice Cream Shop	Restaurant	Pizza Place	Indian Restaurant	Garden	Café	Science Museum
3	SW4	South Western	Clapham	51.463698	-0.136305	1	Pub	Coffee Shop	Pizza Place	Park	Market	Italian Restaurant	Indian Restaurant	Restaurant	Portuguese Restaurant	French Restaurant
4	SW5	South Western	Earls Court	51.490331	-0.195842	3	Café	Pizza Place	Pub	Italian Restaurant	Hotel	French Restaurant	Restaurant	Park	Science Museum	Indian Restaurant
5	SW6	South Western	Fulham	51.477343	-0.201682	3	Café	Pub	Park	Coffee Shop	Pizza Place	Italian Restaurant	Soccer Stadium	Bakery	Gastropub	French Restaurant
6	SW7	South Western	South Kensington	51.495329	-0.178991	0	Hotel	Indian Restaurant	Garden	Japanese Restaurant	French Restaurant	Park	Italian Restaurant	Ice Cream Shop	Science Museum	Restaurant
7	SW8	South Western	South Lambeth	51.485381	-0.123321	2	Theater	Hotel	Park	Coffee Shop	Plaza	Art Gallery	Garden	Café	Del / Bodega	Movie Theater
8	SW9	South Western	Stockwell	51.471593	-0.121064	1	Café	Pub	Coffee Shop	Pizza Place	Park	Market	Brewery	Cocktail Bar	Cricket Ground	Restaurant
9	SW10	South Western	West Brompton	51.483494	-0.196802	3	Café	Italian Restaurant	Pub	Bakery	Pizza Place	Park	Hotel	Yoga Studio	Soccer Stadium	Restaurant

Let's visualize the clusters on London map:



Red represents the Cluster # 1

Purple represents the Cluster # 2

Blue represents the Cluster # 3

Green represents the Cluster # 4

Yellow represents the Cluster # 5

5. Decision Making and Reporting Results

Cluster #3 which is the neighborhood named South Lambeth is the best suitable location for opening a restaurant.

The reasons are;

1. Since there is only a cafe and a Deli/Bodega place which are not enough to eat properly.
2. South London is the southern part of London, England. Situated south of the River Thames, it includes the historic districts of Southwark, Lambeth, Bankside and Greenwich. This makes the area popular for the tourists and aside from locals, restaurant can make a lot profit from tourists.
3. South London contains a very extensive overground rail network and all of London's trams operate within the area. So it really easy to reach from anyplace of London.
4. The residents of the area tend to be young, transient and highly mobile. Given the industrial aesthetic, young professionals are most likely to be attracted to the area. Property prices are high and therefore pull in a largely affluent population.
5. The neighborhood is situated in close proximity to Brixton, once edgy and shady but now vibrant and packed with great bars and restaurants. The afro-Caribbean heritage of Brixton has given the area its buzz and fantastic nightlife. Daytime in South Lambeth can be spent at Battersea Park, a large green space directly on the Thames. It's usually filled with families and their canine friends on the weekends.
6. Despite Lambeth's reputation as a rowdy neighborhood, the area is going through a huge regeneration. The Battersea Power Station is a catalyst for the changes in the area. More families are purchasing property, and foreign investment is pouring in. The area benefits from two rail stations and has great access to west London by Vauxhall Bridge and the Chelsea Bridge Road.

6. Future Directions

This study is mainly for finding the best location in a popular area of London for open a restaurant. More analysis can be made for;

- Detecting the optimal prices for foods and beverages by local people's income
- Finding the best store with real estate prices and transportation of the neighborhood.
- This study applied on South Western borough to open the restaurant in a popular area but all the study can be applied for each boroughs to find the optimum location.