The Battle of

Neighborhoods:

IBM Capstone Project

Introduction

The service industry is one of the greatest producers of wealth.

In México the biggest city is Mexico City, and therefore has the largest number or service related locations.

Mexico City is one of the biggest cities in the world, and because of this, there is a high density of Neighborhoods for each Borough, and as a consequence, the battle to establish a patter between these is highly problematic.

Being a person with the intent of placing a service related establishment, you need to find a type of establishment that doesn't have the same specialty of the most common in a certain Neighborhood.

Problem

The objetive of this report is to find the highest profile Borough in Mexico City based in HDI (Human Development Index) that is a statistic composite of life expectancy, education and per capita income, among other indicators.

Once that we profiled the highest borough, find the neighborhoods inside that borough and locate the food related locations on each neighborhood and find a correlation between the food establishments and obtain the top 10 on each cluster.

Data Acquisition

The data for the Boroughs and Neighborhoods was acquired by the official gubernamental site https://datos.cdmx.gob.mx/explore/dataset/coloniascdmx/table/

In that CSV the information contained was:

- Entidad
- Colonia (Neighborhood)
- Geo Point (Latitude, Longitude)
- Geo Shape
- Alcaldía (Borough)

The data for HDI will come from Wikipedia: https://es.wikipedia.org/wiki/Anexo:Delegaciones_de_la_Ciudad_de_México_por_IDH.

- Place
- Borough
- HDI
- Comparable Country

The data for the food related establishment comes from foursquare API. In order to obtain the information I searched for food in Benito Juarez neighborhoods.

Data Processing

Boroughs and Neighborhoods

The information was got as a CSV with the following headers, for Borough, Neighborhoods

2_colonias_cdmx_csv

COLONIA	ENTIDAD	Geo Point	Geo Shape	CVE_ALC	ALCALDIA	CVE_COL	SECC_COM	SECC_PAR

In order to be able to use the data, I dropped the columns that wasn't useful, formatted the latitude and longitude, also being necessary to convert these to numbers.
The result I got was the following

	COLONIA	Geo Point	ALCALDIA
0	LOMAS DE CHAPULTEPEC	19.4228411174,-99.2157935754	MIGUEL HIDALGO
1	LOMAS DE REFORMA (LOMAS DE CHAPULTEPEC)	19.4106158914,-99.2262487268	MIGUEL HIDALGO
2	DEL BOSQUE (POLANCO)	19.4342189235,-99.2094037513	MIGUEL HIDALGO
3	PEDREGAL DE SANTA URSULA I	19.314862237,-99.1477954505	COYOACAN
4	AJUSCO I	19.324571116,-99.1561602234	COYOACAN

For HDI

3_hdi

Puesto	Delegación	IDH	País comparable

|	COLONIA	ALCALDIA	Latitude	Longitude
0	NARVARTE V	BENITO JUAREZ	19.386051	-99.157160
1	PORTALES III	BENITO JUAREZ	19.363211	-99.148887
2	DEL VALLE VII	BENITO JUAREZ	19.368136	-99.171326
3	NAPOLES (AMPL)	BENITO JUAREZ	19.387303	-99.177728
4	LETRAN VALLE	BENITO JUAREZ	19.376132	-99.155067

Foursquare JSON file into Pandas DataFrame

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	NARVARTE V	19.386051	-99.15716	La Esperanza	19.385898	-99.157321	Bakery
1	NARVARTE V	19.386051	-99.15716	Almanegra Café	19.385326	-99.155343	Coffee Shop
2	NARVARTE V	19.386051	-99.15716	CADE Centro de Artes Decorativas	19.384619	-99.156920	Flower Shop
3	NARVARTE V	19.386051	-99.15716	Costra	19.386832	-99.154611	Bakery
4	NARVARTE V	19.386051	-99.15716	Pimienta Gorda	19.388296	-99.156791	Vegetarian / Vegan Restaurant

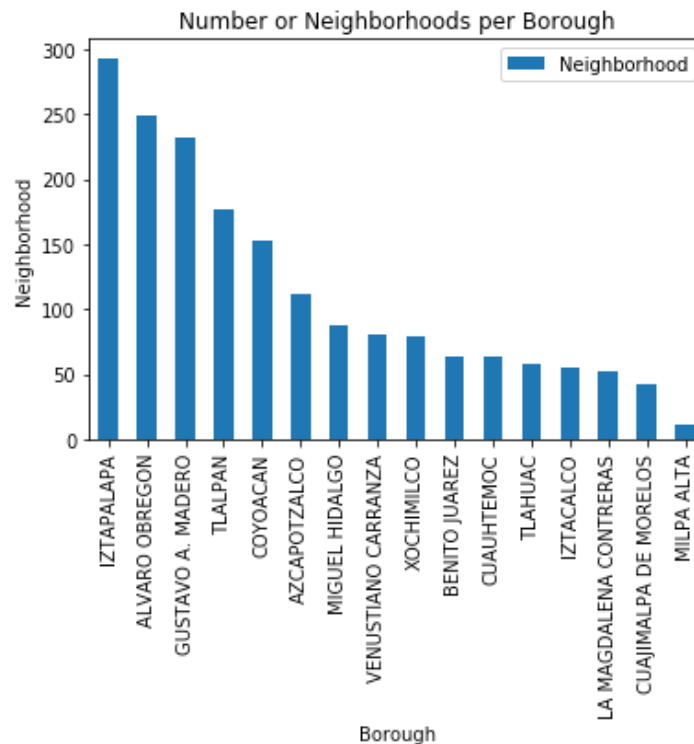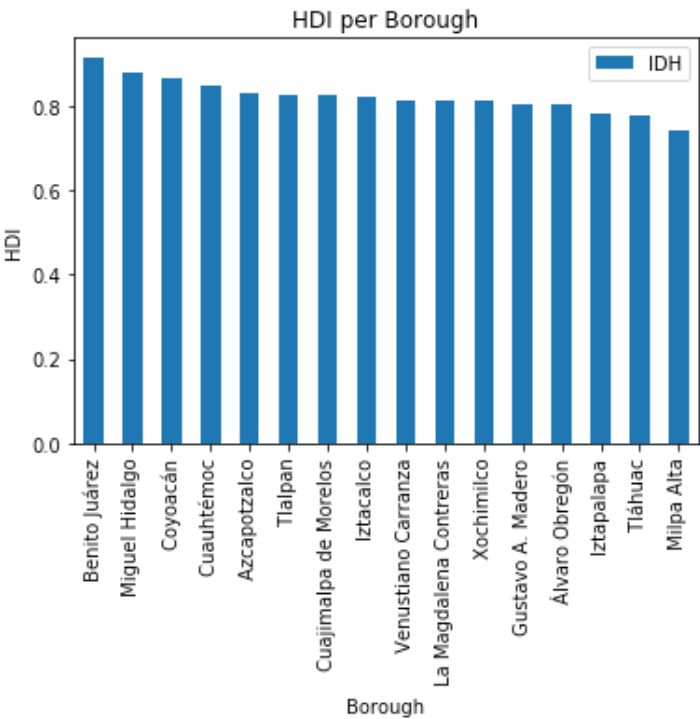# Methodology

The first step was to map the Neighborhoods in Mexico City in order to visualize how many there are.
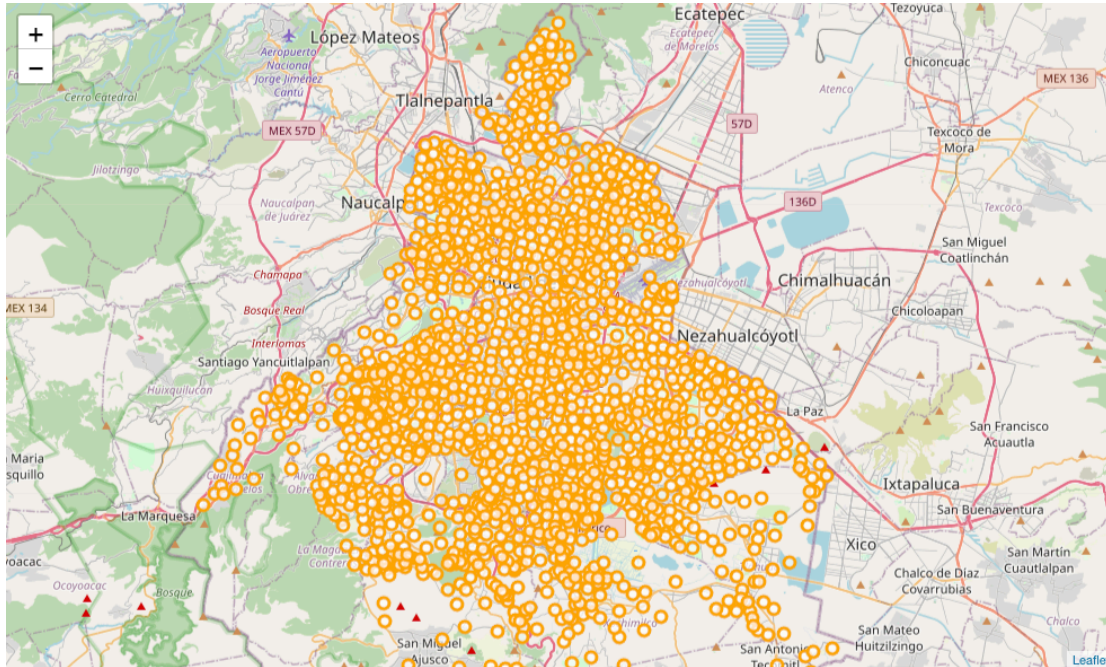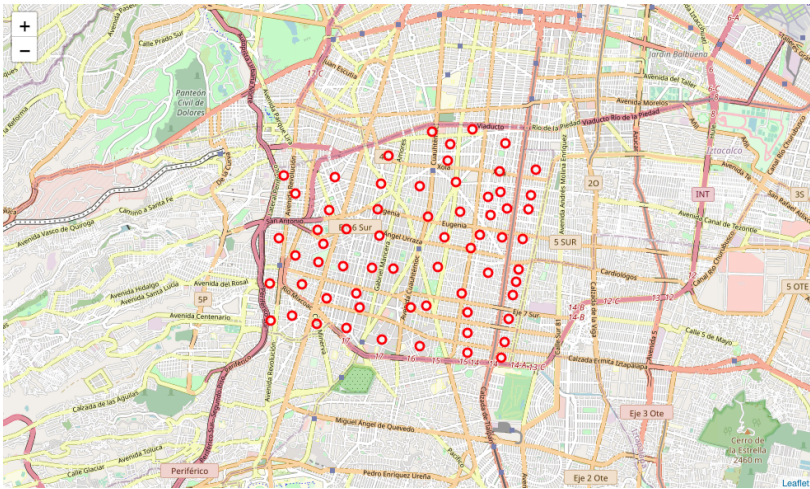

For each borough there are many neighborhoods, being the distribution as follows.

The second report is do determine the Borough with the highest HDI in Mexico City. The selection for this study is Benito Juarez.

The neighborhoods in the borough Benito Juarez look like this.

Using de data form the neighborhoods (Latitude, Longitude), I called the Foursquare API in order to get all the venues located near the center of each latitud and longitude provided.

The first result is that there are: 193 service categories in Borough Benito Juarez

For this repot I decided to use Clustering because it is an unsupervised machine learning scenario, and using the "Kmeans" method in order to find relationships between the many venues of the borough.

KMeans definition: k-means clustering is a method of vector quantization, originally from signal processing, that aims to partition n observations into k clusters in which each observation belongs to the cluster with the nearest mean (cluster centers or cluster centroid), serving as a prototype of the cluster.

"https://en.wikipedia.org/wiki/K-means_clustering"

Using the optimal K to find the number of clusters = 10
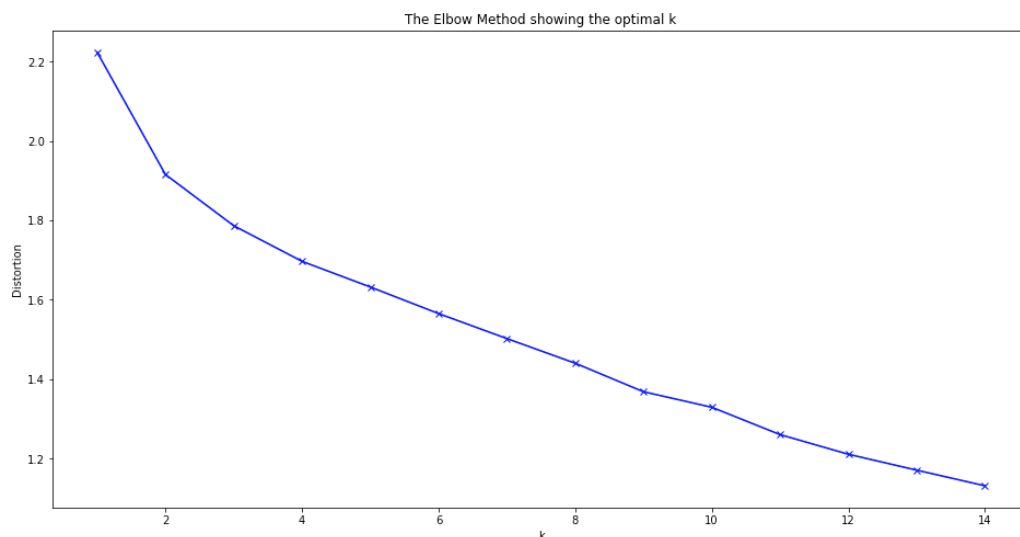
Cluster Map

Results

Cluster 1

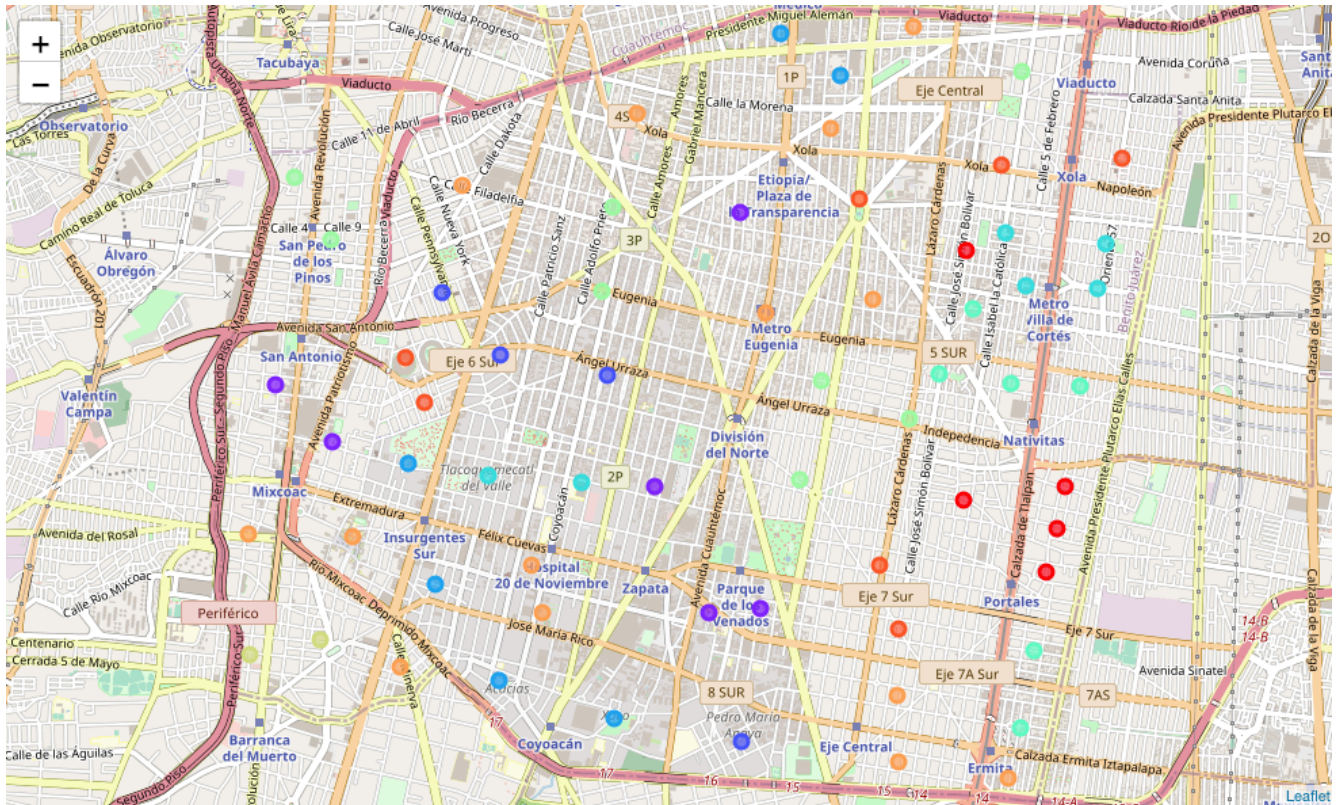|	COLONIA	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
6	ZACAHUITZCO	Mexican Restaurant	Taco Place	Dessert Shop	Breakfast Spot	Bakery	Pizza Place	English Restaurant	Farmers Market	Sandwich Place	Seafood Restaurant
20	MIGUEL ALEMAN	Mexican Restaurant	Burger Joint	Taco Place	Brewery	Park	Food Stand	Music Venue	Breakfast Spot	Fried Chicken Joint	Coffee Shop
39	MARIA DEL CARMEN	Mexican Restaurant	Taco Place	Breakfast Spot	Sporting Goods Shop	English Restaurant	Coffee Shop	Sandwich Place	Food	Burger Joint	Food Stand
53	ALBERT	Mexican Restaurant	Dessert Shop	Taco Place	Pizza Place	Breakfast Spot	Farmers Market	Flea Market	Sandwich Place	Seafood Restaurant	Food Stand
56	SAN SIMON TICUMAC	Mexican Restaurant	Food Truck	Pool	Coffee Shop	Breakfast Spot	Dessert Shop	Argentinian Restaurant	Burger Joint	Farmers Market	Motel

Cluster 2

	COLONIA	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
7	NARVARTE III	Coffee Shop	Taco Place	Bakery	Mexican Restaurant	Gym / Fitness Center	American Restaurant	Café	Salad Place	Restaurant	Steakhouse
27	NONOALCO	Taco Place	Coffee Shop	Pet Store	Mexican Restaurant	Dance Studio	Electronics Store	Food Court	Spa	Pharmacy	Food Truck
40	RESIDENCIAL EMPERADORES	Mexican Restaurant	Taco Place	Bakery	Coffee Shop	Pet Café	Sandwich Place	Candy Store	Brewery	Spa	Restaurant
43	SAN JUAN	Taco Place	Coffee Shop	Mexican Restaurant	Health & Beauty Service	Japanese Restaurant	Performing Arts Venue	Pharmacy	Deli / Bodega	Pizza Place	Health Food Store
44	STA CRUZ ATOYAC	Taco Place	Gym / Fitness Center	Mexican Restaurant	Basketball Court	Chocolate Shop	Residential Building (Apartment / Condo)	Coffee Shop	Lingerie Store	Multiplex	Sushi Restaurant
46	DEL VALLE VI	Taco Place	Coffee Shop	Sushi Restaurant	Yoga Studio	Gym / Fitness Center	Pharmacy	Pet Store	Park	Mexican Restaurant	Italian Restaurant

Cluster 3

	COLONIA	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
3	NAPOLES (AMPL)	Bakery	Ice Cream Shop	Pizza Place	Middle Eastern Restaurant	Taco Place	French Restaurant	Pet Store	Food Truck	Mexican Restaurant	Health & Beauty Service
22	GENERAL PEDRO MARIA ANAYA	Pool	Bakery	Ice Cream Shop	Theater	Candy Store	Exhibit	Bike Rental / Bike Share	Sports Club	Restaurant	Concert Hall
24	DEL VALLE IV	Mexican Restaurant	Ice Cream Shop	Italian Restaurant	Spa	Restaurant	Yoga Studio	Performing Arts Venue	Coffee Shop	Dessert Shop	Pizza Place
29	INSURGENTES SAN BORJA	Taco Place	Pizza Place	Restaurant	Ice Cream Shop	Café	Bakery	Yoga Studio	Dance Studio	Nightclub	Seafood Restaurant

Cluster 4

	COLONIA	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
13	NARVARTE I	Ice Cream Shop	Sporting Goods Shop	Clothing Store	Seafood Restaurant	American Restaurant	Beer Bar	Boxing Gym	Men's Store	Mexican Restaurant	Burger Joint
16	ACACIAS	Cosmetics Shop	Mexican Restaurant	Gym	Health Food Store	Sushi Restaurant	Steakhouse	Boutique	Bowling Alley	Food Truck	Men's Store
36	ACTIPAN	Cosmetics Shop	Burger Joint	Dessert Shop	Coffee Shop	Dance Studio	Hobby Shop	Bakery	Seafood Restaurant	Café	Mexican Restaurant
52	EXTREMADURA INSURGENTES	Park	Coffee Shop	Café	Ice Cream Shop	Taco Place	Mexican Restaurant	Dog Run	Bakery	Steakhouse	Sushi Restaurant
59	XOCO	Ice Cream Shop	Garden	Cosmetics Shop	Pool	Concert Hall	Residential Building (Apartment / Condo)	Candy Store	Music Venue	Men's Store	Sports Club
62	PIEDAD NARVARTE	Sporting Goods Shop	Donut Shop	Ice Cream Shop	Clothing Store	Cosmetics Shop	Mexican Restaurant	American Restaurant	Chinese Restaurant	Salsa Club	Coffee Shop

Cluster 5

	COLONIA	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
9	JOSEFA ORTIZ DE DOMINGUEZ	Ice Cream Shop	Mexican Restaurant	Taco Place	Coffee Shop	Burger Joint	Park	Shipping Store	Food Stand	Seafood Restaurant	Miscellaneous Shop
15	TLACOQUEMECATL DEL VALLE	Park	Ice Cream Shop	Mexican Restaurant	Gym / Fitness Center	Floating Market	Sushi Restaurant	Steakhouse	Multiplex	Butcher	Café
17	IZTACCIHUATL	Mexican Restaurant	Ice Cream Shop	Taco Place	Dessert Shop	Burger Joint	Park	Miscellaneous Shop	Breakfast Spot	Café	Shipping Store
31	DEL VALLE V	Mexican Restaurant	Coffee Shop	Park	Ice Cream Shop	Taco Place	Gourmet Shop	Pool	Recreation Center	Sandwich Place	Camera Store
37	VILLA DE CORTES	Mexican Restaurant	Ice Cream Shop	Taco Place	Park	Coffee Shop	Breakfast Spot	Tea Room	Dessert Shop	Pizza Place	Music Venue
49	POSTAL	Mexican Restaurant	Taco Place	Coffee Shop	Burger Joint	Tea Room	Pizza Place	Park	Fast Food Restaurant	Shipping Store	Café

Cluster 6

	COLONIA	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
5	NIOS HEROES DE CHAPULTEPEC	Mexican Restaurant	Coffee Shop	Ice Cream Shop	Burger Joint	Gym / Fitness Center	Dance Studio	Market	Park	Restaurant	Seafood Restaurant
8	MIRAVALLE	Mexican Restaurant	Coffee Shop	Theater	Performing Arts Venue	Taco Place	Dance Studio	Restaurant	College Arts Building	Liquor Store	Bookstore
41	PERIODISTA FRANCISCO ZARCO	Mexican Restaurant	Food Truck	Gym / Fitness Center	Coffee Shop	Steakhouse	Taco Place	Dance Studio	Spa	Gymnastics Gym	Candy Store
51	AMERICAS UNIDAS-DEL LAGO	Mexican Restaurant	Taco Place	Coffee Shop	Gym / Fitness Center	Ice Cream Shop	Restaurant	Hotel	Pizza Place	Burger Joint	Food Truck
55	NATIVITAS	Mexican Restaurant	Taco Place	Ice Cream Shop	Dessert Shop	Coffee Shop	Pizza Place	Hotel	Bakery	Restaurant	Convenience Store
63	PORTALES ORIENTE	Mexican Restaurant	Taco Place	Coffee Shop	Breakfast Spot	Baseball Stadium	Pizza Place	Dance Studio	Flea Market	Seafood Restaurant	Southern / Soul Food Restaurant

Cluster 7

	COLONIA	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
4	LETRAN VALLE	Taco Place	Bakery	Mexican Restaurant	Ice Cream Shop	Pizza Place	Pet Store	IT Services	Liquor Store	Dessert Shop	Park
10	INDEPENDENCIA	Mexican Restaurant	Coffee Shop	Food Truck	Bakery	Steakhouse	Taco Place	Dessert Shop	Dance Studio	Pool	Farmers Market
32	SAN PEDRO DE LOS PINOS	Mexican Restaurant	Bakery	Ice Cream Shop	Park	Food Truck	Yoga Studio	Café	Bistro	Pharmacy	Burger Joint
34	DEL VALLE II	Mexican Restaurant	Health & Beauty Service	Bakery	Pet Store	Ice Cream Shop	Deli / Bodega	Park	Sushi Restaurant	Taco Place	Tapas Restaurant
45	DEL VALLE III	Mexican Restaurant	Dance Studio	Coffee Shop	Spa	Taco Place	Bakery	Liquor Store	Drugstore	Park	Camera Store
50	OCHO DE AGOSTO	Mexican Restaurant	Bakery	Taco Place	Food Truck	Performing Arts Venue	Hotel	Burger Joint	Motorcycle Shop	Seafood Restaurant	Bistro
58	VERTIZ NARVARTE	Mexican Restaurant	Bakery	Taco Place	Flower Shop	Steakhouse	Russian Restaurant	Coffee Shop	Spa	Southern / Soul Food Restaurant	German Restaurant
60	ALAMOS I	Mexican Restaurant	Bakery	Coffee Shop	Taco Place	Gym / Fitness Center	Pie Shop	Market	Steakhouse	Martial Arts Dojo	Food Truck

Cluster 8

	COLONIA	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
23	SAN JOSE INSURGENTES	Coffee Shop	Ice Cream Shop	Mexican Restaurant	Italian Restaurant	Tapas Restaurant	Fountain	Bakery	Buffet	Seafood Restaurant	Café
28	MERCED GOMEZ	Ice Cream Shop	Bakery	Coffee Shop	Taco Place	Dessert Shop	Furniture / Home Store	Chocolate Shop	Tapas Restaurant	Farmers Market	Tea Room

Cluster 9

	COLONIA	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	NARVARTE V	Coffee Shop	Spa	Seafood Restaurant	Mexican Restaurant	Vegetarian / Vegan Restaurant	Taco Place	Bakery	Lebanese Restaurant	Performing Arts Venue	Health Food Store
1	PORTALES III	Coffee Shop	Bakery	Spa	Restaurant	Burger Joint	Mexican Restaurant	Bar	Dance Studio	Food Court	Seafood Restaurant
2	DEL VALLE VII	Coffee Shop	Mexican Restaurant	Garden	Health Food Store	Seafood Restaurant	Flea Market	Motel	Food & Drink Shop	Soccer Stadium	Pet Store
11	INSURGENTES MIXCOAC	Coffee Shop	Mexican Restaurant	Cosmetics Shop	Diner	Bakery	Optical Shop	Food Truck	Taco Place	Seafood Restaurant	Salon / Barbershop
12	NAPOLES	Japanese Restaurant	Coffee Shop	Spa	Mexican Restaurant	Sandwich Place	Martial Arts Dojo	Spanish Restaurant	Bridal Shop	Café	Music Store
14	PORTALES IV	Bakery	Spa	Mexican Restaurant	Coffee Shop	Restaurant	Burger Joint	History Museum	Park	Café	Food Court
18	CREDITO CONSTRUCTOR	Mexican Restaurant	Sandwich Place	Argentinian Restaurant	Coffee Shop	Café	Movie Theater	Sports Club	Fountain	Steakhouse	French Restaurant
21	CENTRO URBANO PRESIDENTE ALEMAN (U HAB)	Ice Cream Shop	Supermarket	Gym / Fitness Center	Coffee Shop	Seafood Restaurant	Mexican Restaurant	Food Truck	Burger Joint	Soccer Field	Butcher
26	NARVARTE VI	Coffee Shop	Mexican Restaurant	Music Venue	Breakfast Spot	Southern / Soul Food Restaurant	Brewery	Burger Joint	Café	Seafood Restaurant	Health & Beauty Service
30	ATENOR SALAS	Seafood Restaurant	Burger Joint	Taco Place	Mexican Restaurant	Breakfast Spot	Bar	Food Truck	South American Restaurant	Boxing Gym	Coffee Shop
38	ERMITA	Theater	Performing Arts Venue	Mexican Restaurant	Dance Studio	Film Studio	Public Art	Coffee Shop	College Arts Building	Bookstore	Liquor Store
42	MIXCOAC	Taco Place	Coffee Shop	Mexican Restaurant	Cupcake Shop	Seafood Restaurant	Food Truck	Bakery	Bar	Pharmacy	Fast Food Restaurant
48	NARVARTE II	Burger Joint	Coffee Shop	Café	Theme Restaurant	Ice Cream Shop	Seafood Restaurant	Beer Bar	Boxing Gym	South American Restaurant	Brewery
57	DEL VALLE I	Mexican Restaurant	Coffee Shop	Bakery	BBQ Joint	Seafood Restaurant	Supermarket	Martial Arts Dojo	Fast Food Restaurant	Restaurant	Café

Cluster 10

	COLONIA	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
19	CIUDAD DE LOS DEPORTES	Taco Place	Mexican Restaurant	Bakery	Ice Cream Shop	Seafood Restaurant	Kebab Restaurant	Playground	Dance Studio	Peruvian Restaurant	Restaurant
25	PORTALES I	Taco Place	Mexican Restaurant	Flea Market	Burger Joint	Seafood Restaurant	Food Truck	Southern / Soul Food Restaurant	Motel	Café	Pool
33	NOCHE BUENA	Taco Place	Mexican Restaurant	Seafood Restaurant	Bakery	American Restaurant	Peruvian Restaurant	Sushi Restaurant	General Entertainment	Dessert Shop	Park
35	ALAMOS II	Taco Place	Mexican Restaurant	Dance Studio	Park	Restaurant	Coffee Shop	Fast Food Restaurant	Café	Snack Place	Soccer Field
47	PORTALES II	Taco Place	Mexican Restaurant	Seafood Restaurant	Restaurant	Spa	Café	Bakery	Coffee Shop	Gastropub	Flea Market
54	MODERNA	Taco Place	Mexican Restaurant	Ice Cream Shop	Hobby Shop	Lounge	Pet Store	Park	Farmers Market	Rest Area	Restaurant
61	NARVARTE IV	Taco Place	Coffee Shop	Café	Burger Joint	Mexican Restaurant	Breakfast Spot	Pharmacy	Pizza Place	Dance Studio	Restaurant

Most Common Venues

	Venue Category
Mexican Restaurant	216
Taco Place	152
Coffee Shop	117
Ice Cream Shop	89
Bakery	84

Discussion

Given the problem, I found that there is an over saturation of venues in the Borough of Benito Juarez in México City.

This over saturation made difficult to establish a pattern where you could place a new business inside the best borough in terms of HDI.

The k-indicator didn't have a clear elbow point because of this.

I think that a market segmentation data base will provide better results into a specialization business analysis.

Conclusion

Based on the results I can conclude the following:

A. By far the most common venue is a Mexican Restaurant
B. There is demand for food services in Benito Juarez
C. If a business most be opened I would recommend the following:
  • Mexican Restaurant in Cluster 1 or Cluster 2
  • Do not place anything in Cluster 9
  • Taco Place in Cluster 10
  • In all other clusters a Coffee Shop or Ice Cream Shop is a good option.