

Python for Business Analytics - Final Project

NYC Restaurant Analysis

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1. Introduction

New York City is one of the world's most popular yet competitive places to open a restaurant. Currently, the City of New York is home to over 27,000 restaurants, with an expected annual growth of 1.8 percent (*IBISWorld*, 2022). Nevertheless, opening a restaurant is a tough choice. CNBC news journalist Bellini (2016) reports that around 60 percent of all new restaurants run bankrupt in their first year. Approximately 80 percent of all restaurants then fail within five years. Bellini (2016) states that the reasons for failure are mainly location and inconsistent food. Besides, low start-up capital and poor staffing can be the reason for failure.

Our client J. Droescher wants to open a restaurant in New York City. His goal is to find a restaurant that he can pass on to his children, thus, a restaurant that sustains long-term. The client has no preferences regarding the restaurant's location, cuisine, or price structure. J. Droescher has consulted us to define these aspects.

The following report aims to provide J. Droescher with different options for opening a restaurant. The options are determined through a two-step analysis. First, we investigate the current competition and its attributes of NYC restaurants. We will mainly focus on the general competition, long-standing competitors, and current trends. To explore the current competition, we conducted a statistical analysis of violation data provided by the NYC government (*NYC Health*, 2022). Second, we will analyze the demographic environment of NYC based on population density, income, age, and ethnicity. The information is drawn from the databases of the NYC government (*U.S. Census Bureau*, 2022). Finally, we formulate three different options and explain the strength and benefits of each.

2. Current Competition

Exploring the environment is one of the most critical aspects when finding a business. External factors such as competition and the legal environment influence a company's success. Therefore, the first part of our analysis aims to identify the current competitors.

We extracted data from the NYC Health Department (2022) to obtain information about the current competition. Then, we analyzed the data statistically using the business intelligence tools SQL and Python.

2.1 General Competition

To obtain an overview of the competition, we analyzed the general competition. That includes all restaurants that are currently registered in NYC. We extracted the data from all restaurants recorded in *NYC Health Department (2022)* and reduced the data frame to 'restaurant description', 'borough', 'longitude', and 'latitude'. The data frame includes 19,505 restaurants. Next, we grouped the restaurant descriptions into cuisine types. We differ between eight cuisine types: American, European, Asian, Latin American, African, Middle Eastern, Coffee, and Others.

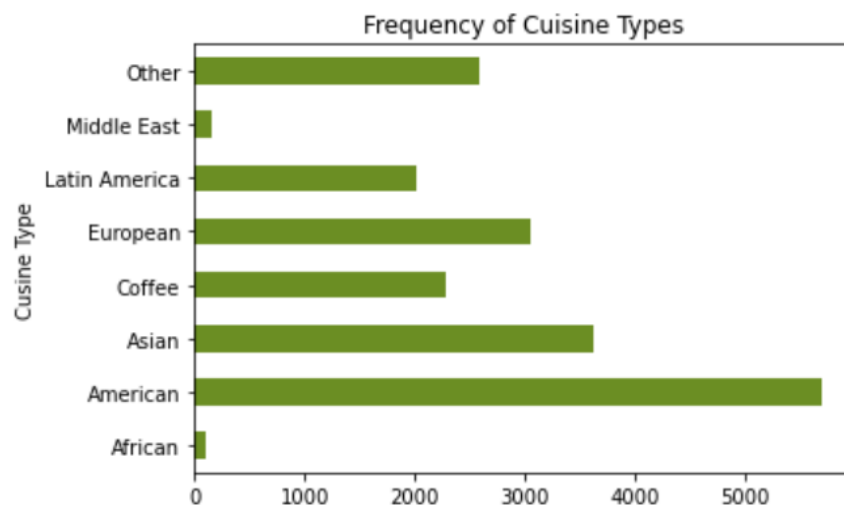


Fig. 1: Frequency of Cuisine Types in NYC

The graph above shows the frequency of cuisine types in NYC. American restaurants are the most common type within the City of New York, with nearly 6,000 restaurants within that field. Asian and European kitchens are also quite frequent, while African and Middle Eastern cuisine is rare.

Coffee places, Latin American Restaurants, and ‘Other’ display a middle ground. The graph concludes that American cuisine has the highest competition in New York City.

Next, we inspected the competitors per borough.

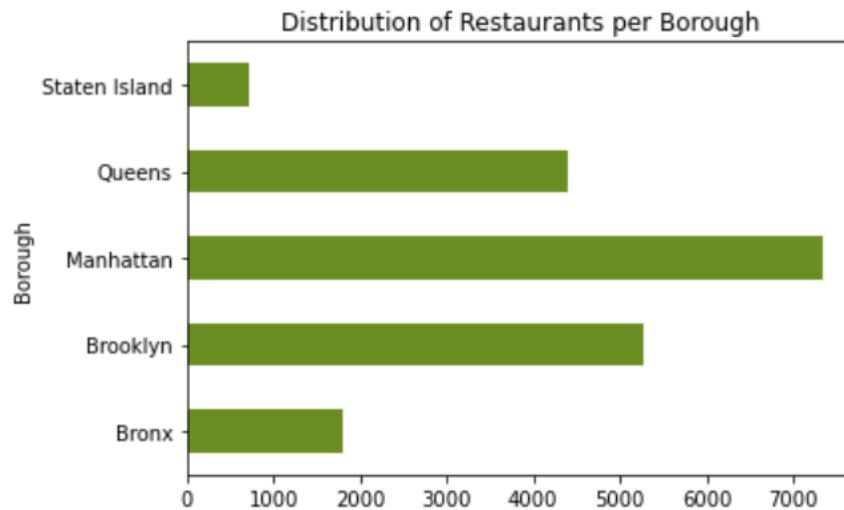


Fig. 2: Frequency of Restaurants per Borough in NYC

The graph above shows that most restaurants are located in Manhattan. Brooklyn and Queens are also popular locations for restaurants. The number of restaurants in the Bronx and Staten Island is relatively low. Thus, the competition between restaurants is the highest in Manhattan.

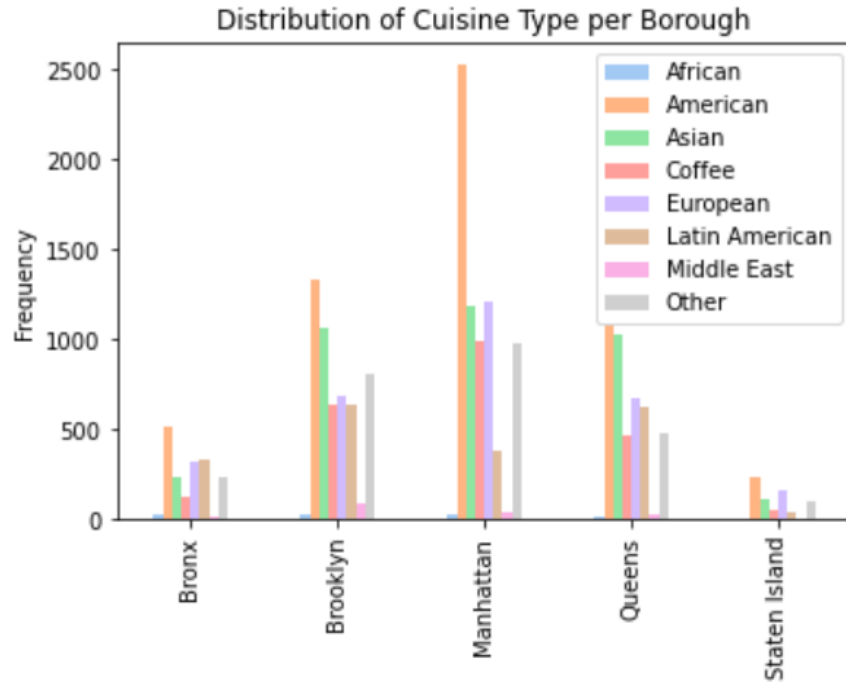


Fig. 3: Distribution of Cuisine Types per Borough in NYC

Figure 3 shows an overview of cuisine types per borough. The results summarize the results from Figure 1 and Figure 2. The highest competition is between American restaurants in Manhattan. American restaurants in Brooklyn and Queens, European restaurants in Manhattan, and Asian restaurants in Manhattan, Brooklyn, and Queens build the middle ground. African and Middle Eastern Restaurants make the bottom, with no African nor Middle Eastern Restaurants in Staten Island.

Next, we inspected the violation scheme of the current competition. The New York City Health Department uses grades to evaluate the sanitary situation of restaurants. The evaluation is based on hygiene, food sources, cooking temperature, food handling, and sanitation practices. Grade A indicates minimal or no food safety violations (School of Public Health, 2022). Grade B indicates minor food violations that require corrections, and Grade C expresses severe violations and risks of being shut down. The violation grades give insight into which of the competitors run at risk of being put out of business. We added the health grade to our current data frame to conduct the analysis. Next, we divided the restaurants into those graded with the letter A and those with the letter B or C. We eliminated all data with missing or pending grades. Then we calculated the percentage of restaurants per cuisine type graded with the letter A.

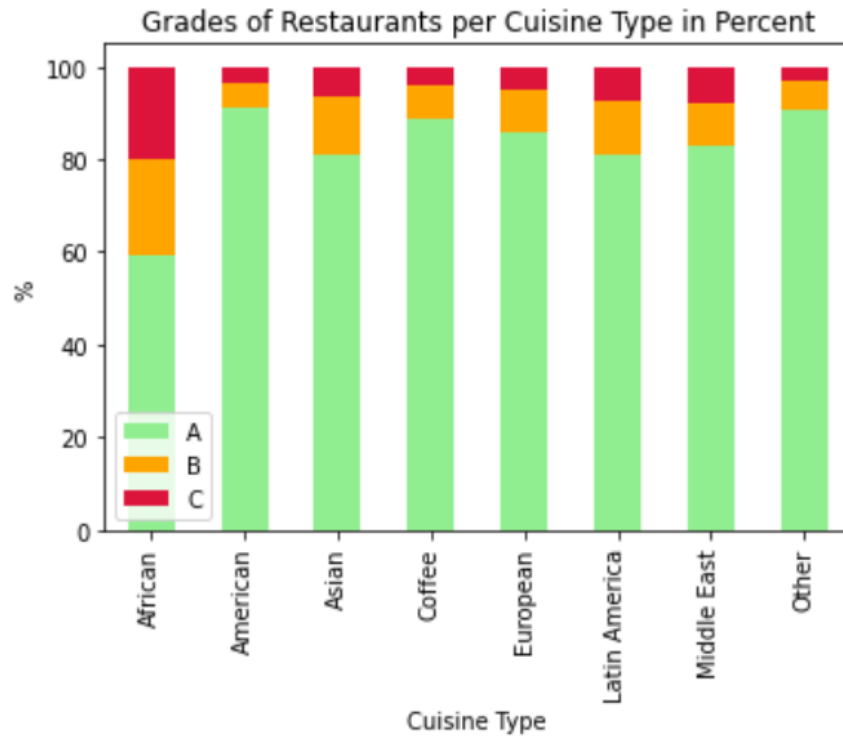


Fig. 4: Grades of Restaurants per Cuisine

The graph above shows the percentage of grades of restaurants by cuisine. American restaurants, with 91 percent, have the highest amount of A-graded restaurants, followed by coffee places and European, Middle Eastern, and Latin American kitchens. With only 59 percent of A-graded restaurants, African cuisine performs the worst. There is also a high relative population of C-rated restaurants within the African cuisine, showing a lackluster approach to hygiene. Thus, the cuisine most likely to be put out of business by the NYC health department is African kitchens, while the other cuisines perform relatively well.

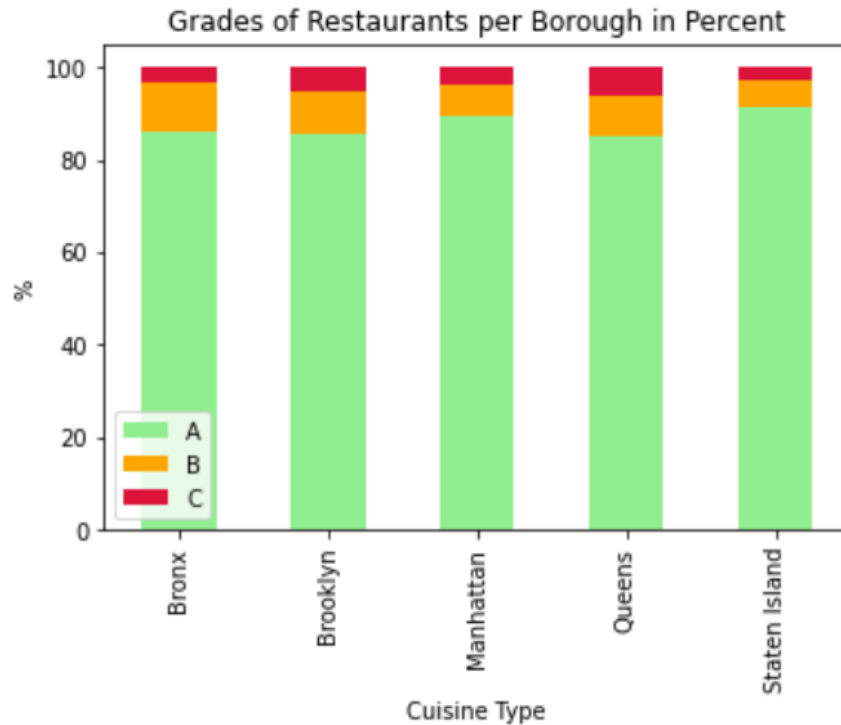


Fig. 5: Grades of Restaurants per Borough

The plot above shows the percentage of grades of restaurants by borough. Restaurants in all boroughs perform equally well when in the NYC health department grading, with all having over 84 percent of A-graded restaurants. A grade of A can be seen as a competitive advantage. However, a B grade is often still seen as acceptable, whereas a C, when encountered twice, results in the forced closure of the business. As can be seen, Brooklyn and Queens display the highest amount of C-rated restaurants, which could, once again, be seen as a possible characteristic to take advantage of and differentiate from the competition.

To summarize, J. Droscher would encounter the highest competition if he opened an American restaurant, particularly in Manhattan. Based on the grading, the restaurants are also unlikely to run out of business. The lowest competition that John Droscher can encounter is in Middle Eastern and African cuisine, especially in Staten Island. The gradings of the restaurant indicate that many African restaurants are at risk of being put out of business soon.

2.2 Long-Standing Competitors

To obtain a more insightful overview of our competition, we have conducted an analysis that was concretely directed towards ‘long-standing’ restaurants. As research has shown, more than 80% of all restaurants fail within the first five years (Bellini, 2016), so we used the 5-year mark as a success metric. Hence, we focused on analyzing the characteristics of these competitors to be able to obtain some characteristics that we could imitate and thereby ensure a more successful launch.

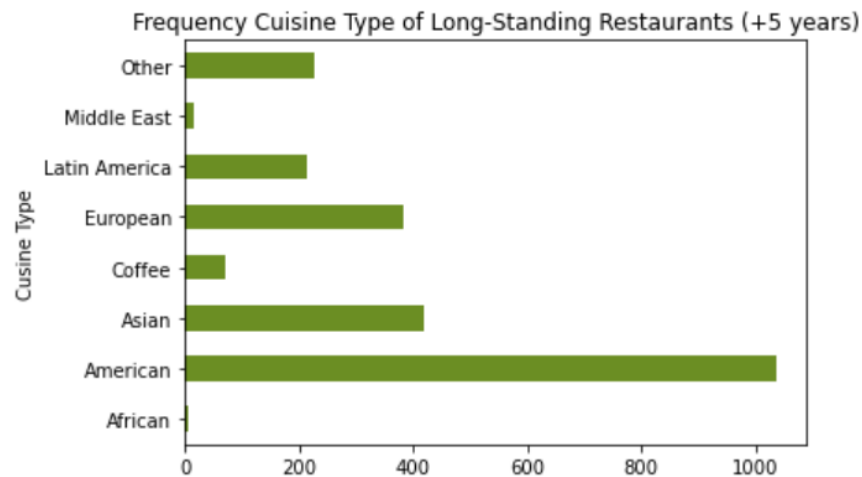


Fig. 6 - Long-standing competitors by Cuisine Type

2370 restaurants of age five years or older, of which few were African or Middle Eastern cuisine. Furthermore, we could deduce that cafés tend to have a shorter life expectancy compared to other cuisines, and American cuisine seemed to dominate the market. Overall, from this analysis, the main conclusion that can be drawn is that Cafés tend to have the worst life expectancy, according to the available data, whereas the other cuisines tend to be relatively equal.

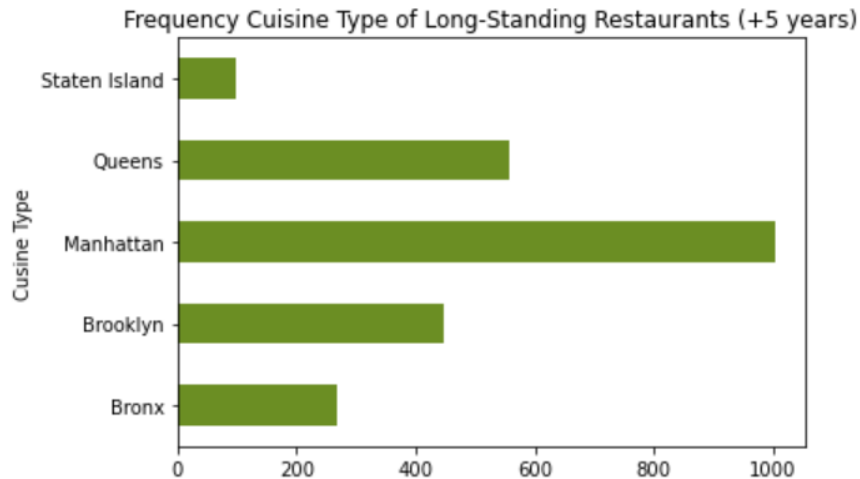


Fig. 7 - Long-standing Competition per Borough

Figure 7 displays the frequency of long-standing restaurants according to the borough. When comparing this data with the distribution of all restaurants, the conclusion can be made that Manhattan has the lowest life expectancy, along with Brooklyn. Staten Island and the Bronx have the highest retention overall. Therefore, we can conclude that the highest probability for longevity is present in the Bronx or Staten Island. However, this should not be given too much weight when deciding on a borough.

When analyzing cuisine type and borough characteristics, we deciphered that American cuisine dominates all boroughs and is generally overrepresented. However, Asian restaurants perform exceptionally well given the proportionate Asian population, which equates to only 15% of the total NYC population.

2.3 Current Trends

To obtain a complete picture of the current competition, it is also important to look at current restaurant trends. The results can be used as a predictor for what area competition will increase within the next couple of years. To analyze the recent trends extracted the data from the restaurants that opened after the 1st of January 2021. 5,348 restaurants opened in that period.

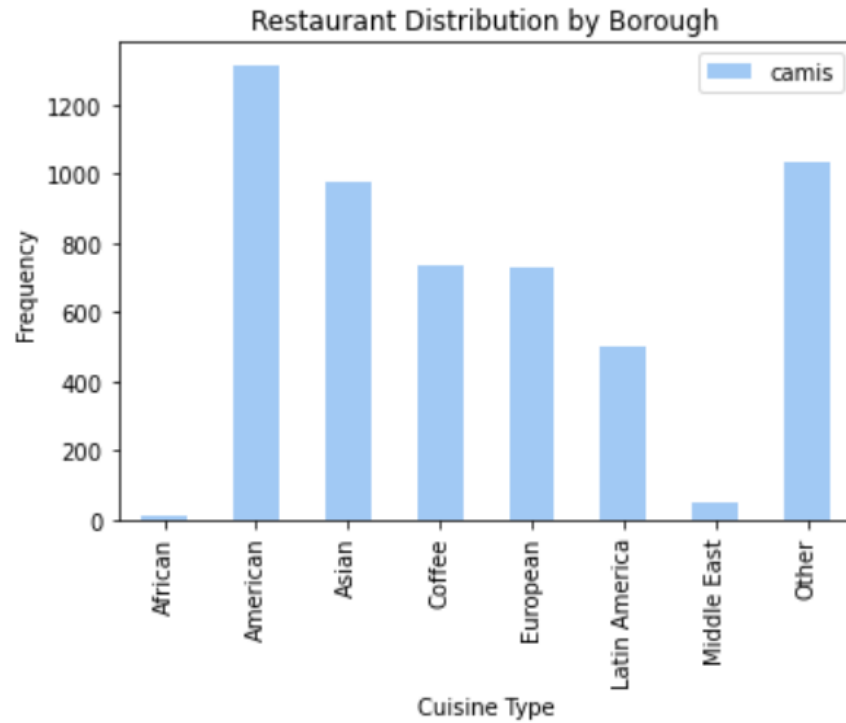


Fig. 8 - Restaurant Openings in the past two years per Cuisine Type

Figure 8 shows that American cuisine has dominated the trends of the past two years. Restaurants in the category 'other' are also relatively popular. African and Middle Eastern cuisines are the least popular.

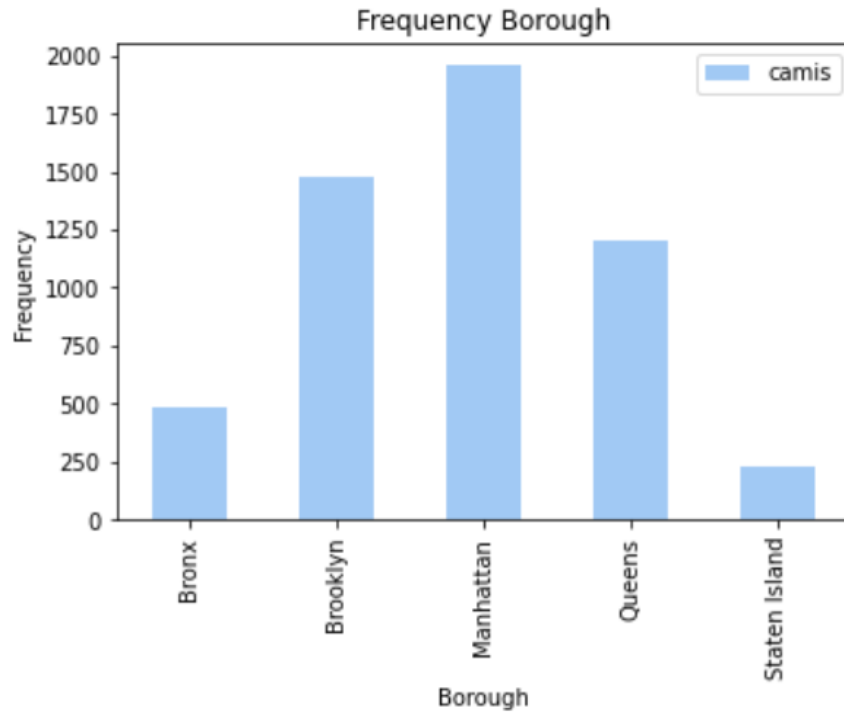


Fig. 9 - Restaurant Openings in the past two years per Borough

The bar plot above indicates that most restaurants in the past two years have opened in Manhattan. Brooklyn and Queens are also quite popular. Staten Island is the least popular place.

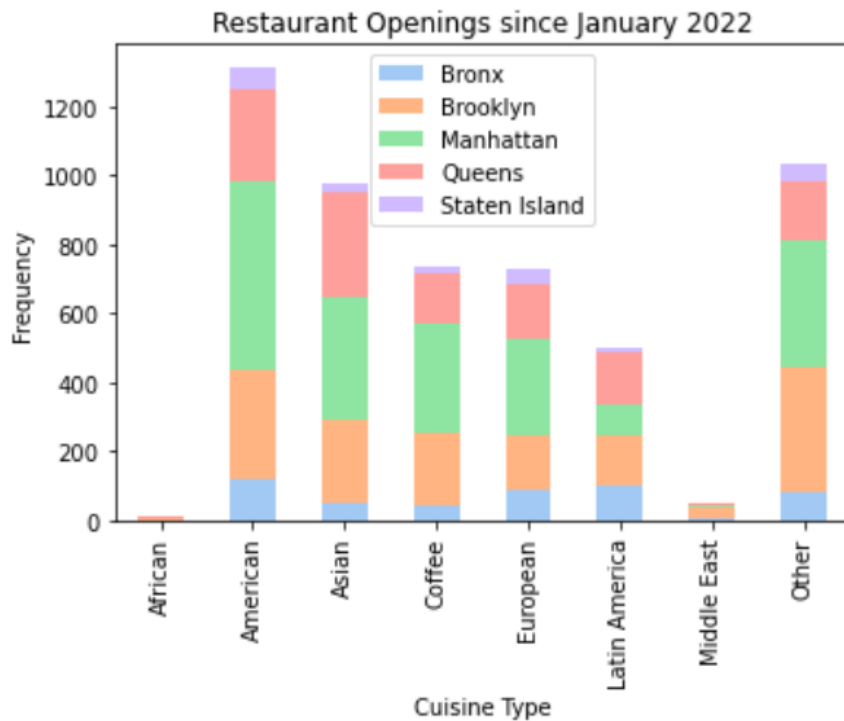


Fig. 10 - Restaurant Openings in the past two years

Figure 10 summarizes the results. American restaurants in Manhattan dominate the current trends. American cuisine is also the most popular in all other boroughs.

2.4 Interim Conclusion

We can draw the following conclusions based on our analysis of the current competition:

The highest competition exists in American restaurants in Manhattan and has the highest expectancy of an increase in competition. Generally, Manhattan is a place with the highest density of restaurants, and American cuisine is the most popular in all boroughs.

The fewest competition exists between African and Middle Eastern restaurants in Staten Island. Staten Island has a very low density of restaurants. Middle Eastern and African kitchens have a low spread throughout New York City. Additionally, African restaurants have the lowest percentage of Restaurants graded with A by the Health Department of NYC. Therefore, the competition might decrease even further in the coming years.

From our analysis of long-standing restaurants, we have concluded a high presence of American cuisine, which displays the possibility of longevity with this cuisine. Furthermore, we have identified the short lifespan cafés seem to display, as they are heavily underrepresented among long-standing restaurants, especially compared to current trends. In terms of location, the boroughs of Staten Island and the Bronx have displayed the highest restaurant retention, giving another indication of possible characteristics for the proposed restaurants.

3. Environment in NYC

Another critical factor of the external environment is the demographic surrounding. A business needs to be aware of what kind of customers it is dealing with. Population density, income, ethnicity, and age play an essential role in companies' success and failure.

Using the data of the *U.S. Census Bureau* (2022), we collected information about the demographic distribution in NYC per borough. We processed the information using the business intelligence tool Excel.

3.1 Population Density

We started by analyzing the population density per borough. Areas with higher population density also have a higher demand for restaurants.

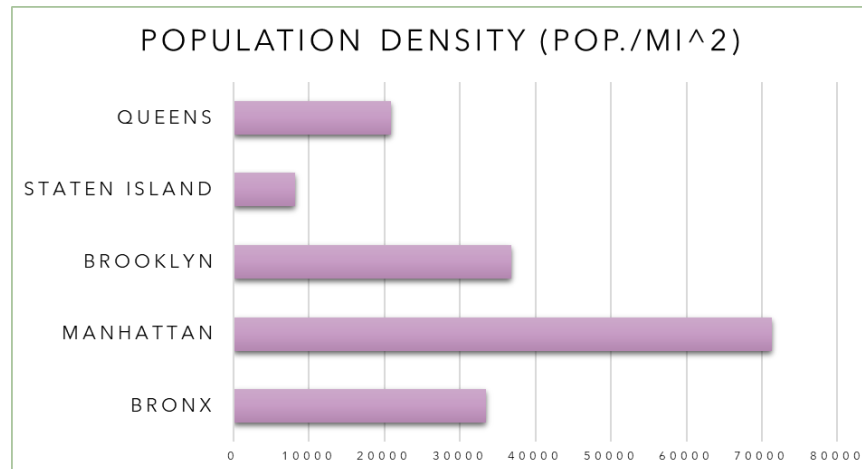


Fig. 11 - Population Density (population/mile²)

Figure 11 presents us with the population density per square mile. Manhattan has over 70,000 inhabitants, the highest population density. Brooklyn and the Bronx, with over 30,000 residents per square mile, are in second place. Queens, with around 20,000 people per square mile, and Staten Island, with less than 10,000 residents per square mile, have the lowest population density.

Thus, according to population density, the place with the highest restaurant demand is Manhattan, while Staten Island has the lowest need.

3.2 Income Distribution

Next, we inspected the average income per capita. The income per capita plays an important role when opening a business. A business must know what income classes it deals with when developing its pricing structure. Areas with high income have a high demand for restaurants, while regions with low income might not have the capacity to eat out.



Fig. 12 - Income per capita

With over US\$80,000, Manhattan has the highest income per capita. Brooklyn, Staten Island, and Queens have a similar income per capita, between US\$35,000 and US\$40,000. Bronx builds at the bottom with an income per capita of around US\$22,000. The results indicate that people in Manhattan can afford to eat out the most and thus have a higher demand for restaurants. Meanwhile, people in the Bronx might not be able to eat out that often. Brooklyn, Staten Island, and Queens build the middle ground.

3.3 Age Distribution

The age distribution is important to determine how likely potential customers are to try something new and follow food trends. The older population tends to stick to 'what-they-know' while younger people are more prone to follow trends.

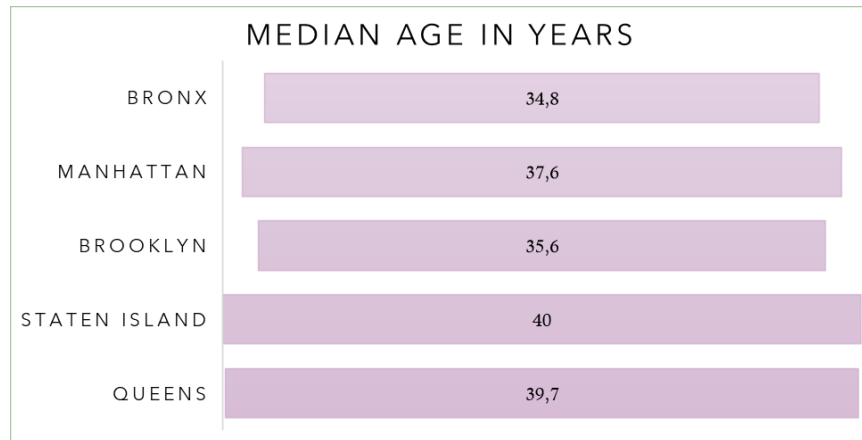


Fig. 13 - Median Age per Borough

Figure 13 shows the median age per borough. The graph reveals that the median age in the boroughs varies between 34 and 40, with the Bronx having the youngest population and Staten Island has the oldest. Thus, the population in all areas is relatively equal.

3.5 Interim Conclusion

The demographics show that Manhattan's environment provides the best surroundings to open a restaurant. Having the highest population density and income, the demand for restaurants is the highest in that area. Staten Island also has a high income per capita. However, population density makes opening a restaurant more difficult. Brooklyn, Queens, and the Bronx are performing similarly in population density. However, the income per capita is relatively low.

Thus, Manhattan provides the best demographic environment to start a restaurant, followed by Queens and Brooklyn, and the Bronx and Staten Island make the bottom.

4. Options

4.1 Option 1: Niche

The first option we have identified is labeled as 'Niche'. This recommendation entails the opening of an African restaurant in Staten Island, specifically in District 49. There are only two other African restaurants in that area, with a lot of potential due to the high volume of commuters passing along the Staten Island ferry daily, also located in District 49. Furthermore, there is the possibility of differentiation via sanitation grading, as a grade of A among African restaurants is a less frequently seen occurrence compared to other cuisines. Staten Island has the second-highest income

per capita in New York City, providing a reasonable amount of disposable income to spend on eating out.

4.2 Option 2: Power House

The second recommendation is labeled ‘Power House’, as we are proposing the adoption of American cuisine within the borough of Manhattan, more specifically District 8. Manhattan is the borough with the highest income and population density and already has many successful long-standing restaurants. Therefore, when opening a restaurant, one can use those restaurants as an indicator or inspiration for the own practices. The main disadvantages or challenges that can be expected are the high competition, as well as the complication of creating differentiation from the leading competitors. However, we have chosen District 8, as there the frequency of American restaurants is lowest, while being in one of the wealthiest areas of New York City (Upper East Side).

4.3 Option 3: Middle Ground

The final recommendation coined the ‘Middle Ground’ is the Asian cuisine in Queens. Asian cuisine is attractive to many different ethnicities and income levels, and the possibility of differentiation via a Grade of A is also provided, similar to African cuisine. Queens has the largest Asian population of the boroughs, wherefore the restaurant is conveniently located next to the largest target market, ideally increasing projected traffic. However, Asian cuisine remains considerably competitive, albeit substantially less than American cuisine, and has a smaller target market than American cuisine.

5. References

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