

Branching out in the Restaurant Business:

1. Introduction

Growth is a goal for many businesses in the restaurant sector. However, there is a limit to how much a restaurant can grow at a single location. Most restaurant owners find that each location has a ceiling beyond which it is difficult to increase revenues. Once this ceiling is reached, it might be time for the restaurant owners to branch out into new locations.

But where should they set up their new restaurant? That is the question that this Capstone project will try to answer.

A range of factors can influence whether a location is a good spot for a new restaurant. In this project, we will consider two factors – demand and competition. The presence of a strong demand for the new restaurant's services is crucial for its financial viability. Nevertheless, the new restaurant is likely to experience very different levels of demand at different locations. Some locations are suited for fine dining; other locations are more appropriate for burger joints. On the other hand, the presence of strong competition is a threat against a new restaurant's financial viability. If there are many similar restaurants in a location, the new restaurant might find it difficult to make a profit; conversely, if the new restaurant offers a type of dining experience that is unlike its competitors, it is easier to charge a premium. Again, the new restaurant is likely to meet different levels of competition at different locations. According to this line of reasoning, a good location for a new restaurant is a site where there is:

- Strong demand for the restaurant's services
- Moderate competition from other restaurants

In this Capstone project, we will analyse the branching out strategy of the owners of the fictitious Chinese restaurant, Shípín kēxuéjiā, which is Chinese for 'Food Scientist'. Food Scientist is a family-owned restaurant that is located in the district 'Nordre Aker' in the city of Oslo. Oslo is the capital of Norway and is comprised of 15 official districts, or 'bydeler', in Norwegian. The owners of Food Scientist have experienced great success in the district of Nordre Aker, and they now want to know if their restaurant concept can be equally successful in other districts in Oslo. Hence, they procured this report.

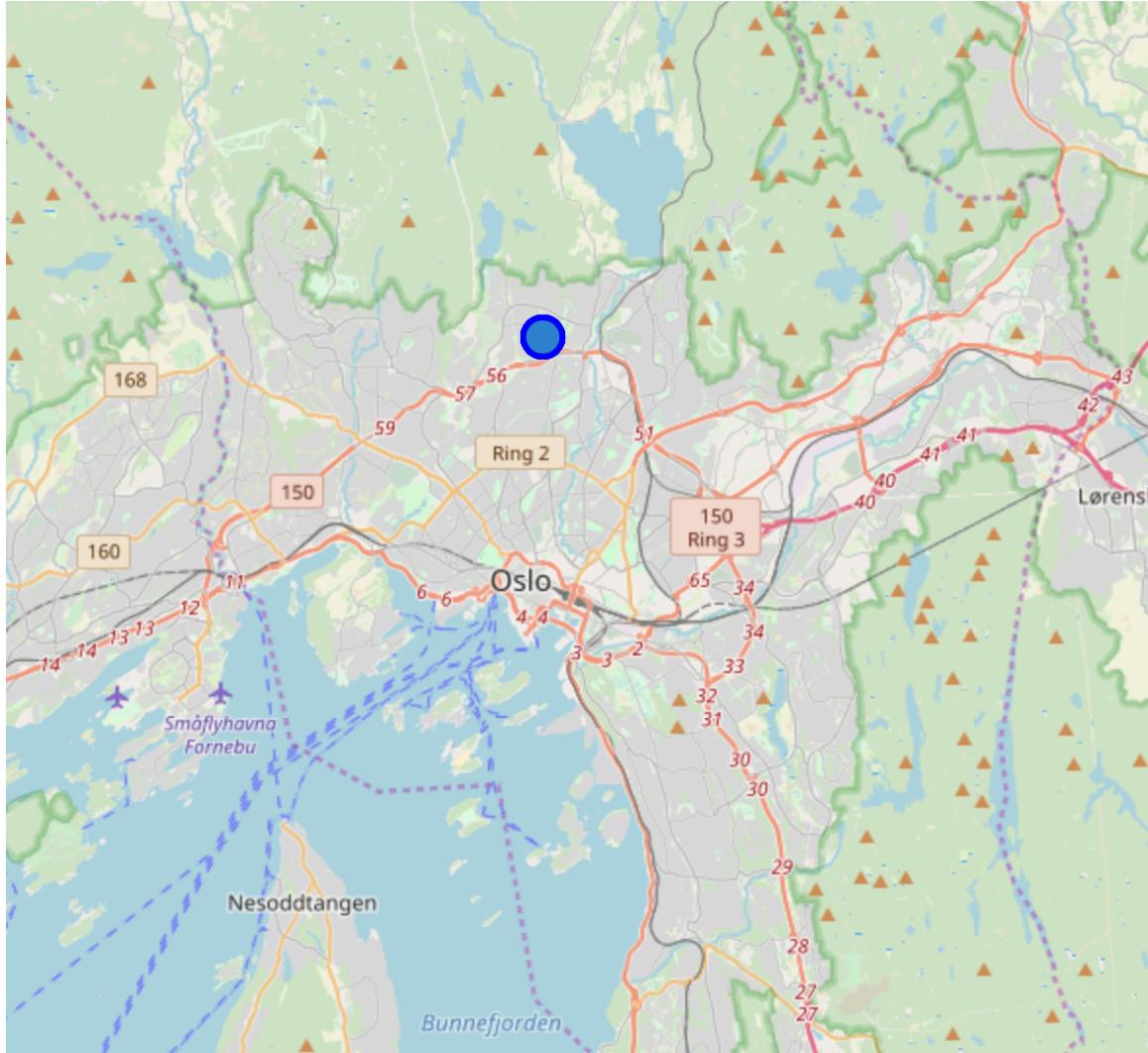
Since concepts such as demand and competition can be difficult to define and measure, the following specification were reached in understanding with the owners of Food Scientist:

Competition: A good indicator for competition is the presence of Chinese and other Asian restaurants. Other Chinese restaurants impart direct competition since their food is essentially identical, while other Asian restaurants impart a more indirect form of competition since their food is similar. An ideal location has only moderate presence of Chinese and other Asian restaurants.

Demand: A good measure for demand is the presence of restaurants and other venues that are similar to those in the district of Nordre Aker. The owners of Food Scientist have developed their

restaurant concept to fit well with the food taste and lifestyle choices of the people in Nordre Aker. Their restaurant concept might not be such a good fit with people from very dissimilar districts. Thus an ideal location is a location that is similar to Nordre Aker in terms of restaurants and other venues.

Figure 1: A Map of Oslo with the location of the Food Scientist restaurant marked with a blue dot



Although the fictitious owners of Food Scientist procure this capstone project, it might still be of interest to other restaurant operators that want to branch out in Oslo or other data scientists that want to carry out similar studies in other cities. The rest of this Capstone project report will be organized as follows: In Section 2 we will describe the data, and in Section 3, the methods. In Section 4, we will describe the results and we will discuss their implications for Food Scientist in Section 5. Finally, we will conclude in Section 6.

2. Data

Three types of data have been important in this Capstone project:

Statistics from Wikipedia: The name of the districts and general information about their number of inhabitants and geographical size was scraped directly from a Norwegian Wikipedia page about the districts in Oslo (https://no.wikipedia.org/wiki/Liste_over_Oslos_bydeler).

Geolocation data from Latitude: Geolocation data was used to find the Decimal degrees (DD) coordinates for the geographical centres of the 15 different districts in Oslo. The coordinates were gathered from Latitude (<https://latitude.to>)

Location data from Foursquare: Location data on venues was accessed through API and downloaded from Foursquare (<https://foursquare.com>). The venues were selected by specifying an area in each district that was the size of a circle with a radius of 2000 meters and with a centre in the middle of the district.

The three data sources were combined to create two datasets. The first dataset included information about all restaurant venues in each of the 15 districts (limited to 100) and the second dataset included information about all venues in each of the 15 districts (limited to 100). Each of the datasets included information about venue characteristics, such as name, location and type of venue. The first dataset was used to measure both competition and demand, where competition was understood as the presence of Chinese and other Asian restaurants in a district and demand was understood as similarities in food venue types between the district of Nordre Aker and the other districts in Oslo. The second data set was used only to measure demand, defined as similarities in (all) venues types between the district of Nordre Aker and other districts in Oslo (similarities in lifestyle).

3. Methodology

To find the ideal district for Food Scientist to establish a new restaurant, two different methods were used – descriptive statistics and k-means cluster analysis. As mentioned in the introduction, this Capstone project bases the recommendation for new restaurant location on the competition and demand that the new restaurant is likely to meet in the different districts in Oslo. To estimate competition and demand, we have employed the following methods:

Competition:

Since Food Scientist is a Chinese restaurant, it is mostly concerned with competition from other Chinese restaurants (direct competition) and somewhat concerned with competition from other Asian restaurants (indirect competition). To measure the level of direct and indirect competition, we employed the following method:

- **Direct competition** = Relative number of Chinese restaurants in the district (Formula: Sum of Chinese restaurants in the district / Sum of restaurants in the district, for all districts)
- **Indirect competition** = Relative number of Asian restaurants in the district (Formula: Sum of Asian restaurants in the district n / Sum of restaurants in the district, for all districts)

This method will tell us how many Chinese restaurants there are relative to other restaurants in the different districts and how many Asian restaurants there are relative to other restaurants in the different districts.

Demand:

Demand is measured by employing k-means cluster analysis. k-means is an unsupervised machine learning method that groups observations according to how similar or dissimilar they are. The k-means algorithm tries to group the observations in a way that the distance is as small as possible

inside the groups and as big as possible between groups. (It is not certain that K-means will find the absolute best grouping of observations).

In our analysis, we will use k-means to:

- (i) Group districts according to the types of restaurant venues that are located there
- (ii) Group districts according to all the types of venues that are located there

Analysis (i) should indicate similarities in food preferences between districts and (ii) similarities in life style choices. In both cases, we will use a sample of the top ten venues (most frequent) in each district to group them. We will group the districts into five distinct groups (that is $k = 5$). The decision to choose 5 groups was based on the reasoning that four or less groups would provide too many possible locations and six or more would provide too few, given that only 15 districts exist.

4. Results

Carrying out the analyses described above, we developed four indicators: Two indicators for competition and two indicators for demand. The two indicators for competition was the number of Chinese restaurants relative to other restaurants in the district – understood as direct competition – and the number of Asian restaurants relative to other restaurants in the district – understood as indirect competition.

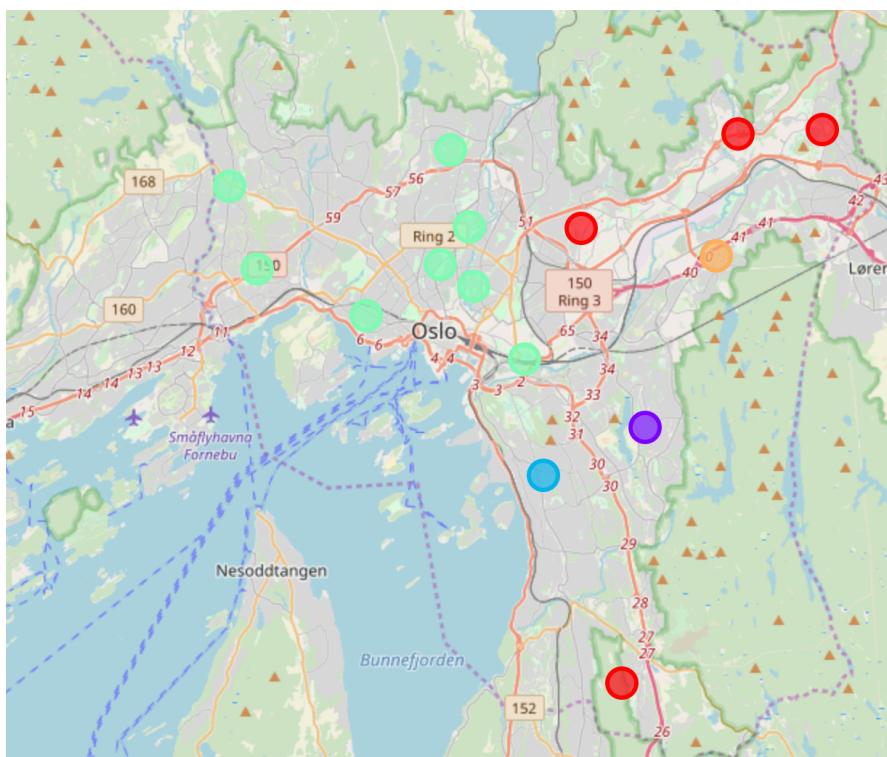
Table 1: Direct and Indirect Competition:

	District	Chinese Restaurant	Other Asian restaurants
0	Alna	0.0000	0.0000
1	Bjerke	0.0294	0.3234
2	Frogner	0.0200	0.2400
3	Gamle Oslo	0.0100	0.2500
4	Grorud	0.0000	0.3334
5	Grünerløkka	0.0200	0.2300
6	Nordre Aker	0.0000	0.2273
7	Nordstrand	0.0000	0.1818
8	Sagene	0.0100	0.2900
9	St. Hanshaugen	0.0100	0.2000
10	Stovner	0.0000	0.4286
11	Søndre Nordstrand	0.1429	0.2858
12	Ullern	0.0000	0.2593
13	Vestre Aker	0.0000	0.2500
14	Østensjø	0.0000	0.5000

In Table 1, we can see the results from the analysis of the competitiveness in the districts. We can see from the table that in several districts – such as Bjerke, Frogner, Gamle Oslo, Grünerløkka, Sagene, St. Hanshaugen and Søndre Nordstrand – there are already Chinese restaurants that Food Scientist would have to compete directly against. We can also see that almost all districts – apart from Alna – contain some Asian restaurants that Food Scientist would have to compete against indirectly. Nevertheless, the relative number of Asian restaurants varies between districts, indicating different levels of competition among the districts.

The two indicators for demand were: similarities between a district and the district of Nordre Aker in terms of food preferences and (ii) in terms of life style choices.

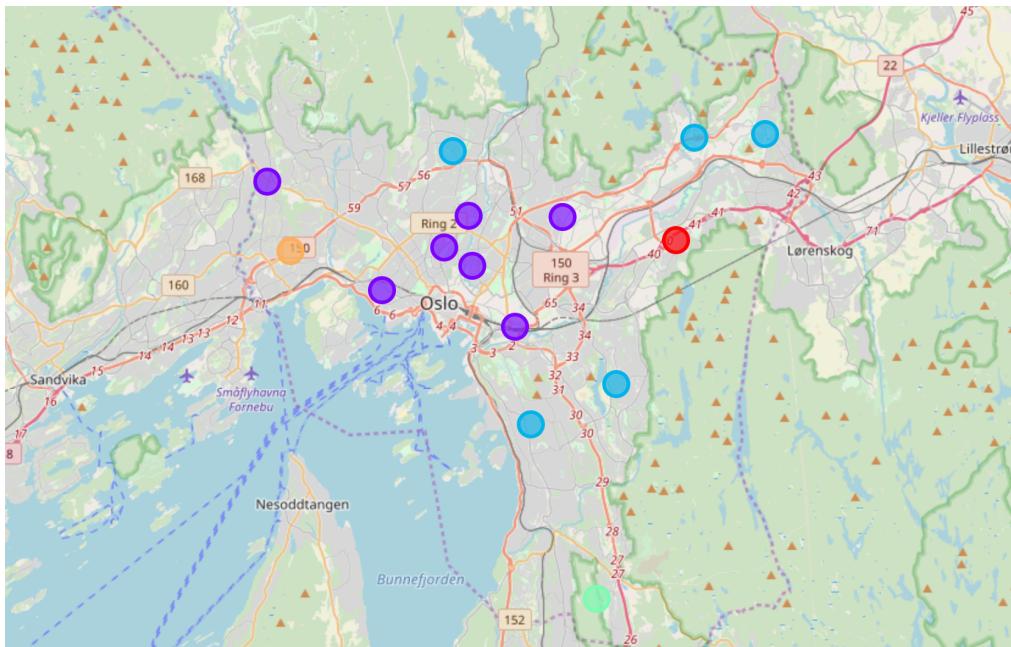
Figure 2: Cluster of districts with similar food taste:



From Figure 2 above and Table 2 below, we can see that the districts Frogner, Gamle Oslo, Grünerløkka, Sagene, St. Hanshaugen, Ullern and Vestre Aker are grouped together. These districts are similar to one another in terms of their restaurant scenes. This indicates that the food preferences within this group of districts should be similar and that the establishment of a new Food Scientist restaurant should be well received within any of these districts.

Nevertheless, from Figure 3 and Table 2 below, we can see that we get at different result when we look at all types of venues. We can see that the districts Grorud, Nordstrand, Stovner and Østensjø are grouped together and are similar to one another in terms of their sites and locations. This indicates that the life style preferences within this group of districts should be similar and that the establishment of a new Food Scientist restaurant in any of these districts should be well received.

Figure 3: Cluster of districts with similar life style choices:



The results of both the demand and the competition analysis are summarized below in Table 2.

Table 2: Results on Competition and Demand:

	District	Chinese Restaurant	Other Asian restaurants	Cluster Labels Restaurant	Cluster Labels Venue
0	Alna	0.0000	0.0000	4	0
1	Bjerke	0.0294	0.3234	0	1
2	Frogner	0.0200	0.2400	3	1
3	Gamle Oslo	0.0100	0.2500	3	1
4	Grorud	0.0000	0.3334	0	2
5	Grünerløkka	0.0200	0.2300	3	1
6	Nordre Aker	0.0000	0.2273	3	2
7	Nordstrand	0.0000	0.1818	2	2
8	Sagene	0.0100	0.2900	3	1
9	St. Hanshaugen	0.0100	0.2000	3	1
10	Stovner	0.0000	0.4286	0	2
11	Søndre Nordstrand	0.1429	0.2858	0	3
12	Ullern	0.0000	0.2593	3	4
13	Vestre Aker	0.0000	0.2500	3	1
14	Østensjø	0.0000	0.5000	1	2

5. Discussion

The owners of Food Scientist must make a difficult choice. None of the districts in Oslo are a better choice of location for a new restaurant in absolute terms. We can see from the summary table below that no other districts are similar to Nordre Aker in terms of both food preferences and life style choices. This implies that the owner of Food Scientist must chose which one is most important. If they choose 'food preferences', they will meet the least amount of competition if they locate in Vestre Aker (0.25 indirect competition) or St. Hanshaugen (0.01 direct competition & 0.2 indirect). If they choose 'life style', they will meet the least amount of competition if they locate in Nordstrand (0.18 indirect competition).

Table 3: Summary

District	Chinese Restaurant	Other Asian restaurants	Cluster Labels Restaurant	Cluster Labels Venue
0	Alna		0.0000	
1	Bjerke	0.0294	0.3234	
2	Frogner	0.02	0.2400	similar
3	Gamle Oslo	0.01	0.2500	similar
4	Grorud		0.3334	similar
5	Grünerløkka	0.02	0.2300	similar
6	Nordre Aker		0.2273	similar
7	Nordstrand		0.1818	similar
8	Sagene	0.01	0.2900	similar
9	St. Hanshaugen	0.01	0.2000	similar
10	Stovner		0.4286	similar
11	Søndre Nordstrand	0.1429	0.2858	
12	Ullern		0.2593	similar
13	Vestre Aker		0.2500	similar
14	Østensjø		0.5000	similar

6. Conclusion

The owners of Food Scientist should establish their new restaurant in either Vestre Aker, St. Hanshaugen or Nordstrand.