Distribution Centre Location Planning

Pratik Khadse

June 27, 2019

1. Introduction

1.1 Background

With competition amongst businesses at an all time high and various market forces at play, it is essential to build on relevant parameters and functionalities of an organisation. Combining different analytical techniques to optimize at the elementary levels of operation transforms to significant achievements and advantages at the macro level. Supply Chain Management enlists diverse categories at several executive and planning strata to offer this advantage, one being warehouse location planning. The objective of this report is to address certain fundamental aspects for choosing the right location for a warehouse pertaining to the retail industry.

1.2 Literature Review: Distribution centres

Distribution centres and efficient supply chain network is the backbone of any retail industry business. It is a principal part, the order processing element, of the entire order fulfilment process. Distribution centres are usually thought of as being demand driven. Distribution centres are the foundation of a supply network, as they allow a single location to stock a vast number of products. Some organizations operate both retail distribution and direct-to-consumer out of a single facility, sharing space, equipment, labour resources, and inventory as applicable. A typical retail distribution network operates with centres set up throughout a commercial market, with each centre serving a number of stores. Large distribution centres for companies such as Wal-Mart serve 50–125 stores. Suppliers ship truckload of products to the distribution centre, which stores the product until needed by the retail location and ships the proper quantity. Since a large retailer might sell tens of thousands of products from thousands of vendors, it would be impossibly inefficient to ship each product directly from each vendor to each store. Many retailers own and run their own distribution networks, while smaller retailers may outsource this function to dedicated logistics firms that coordinate the distribution of products for a number of companies.

1.2.1 Distribution centre scale

A large distribution center might receive and ship more than ten thousand truckloads each year, with an individual store receiving from only a couple trucks per week up to 20, 30, or more per week. Distribution centers range in size from less than 50,000 square feet (5,000 m2) to the largest approaching 3 million square feet (300,000 m²). This makes it important to have distribution centre located at sites allowing for feasible operation and expenses.

1.2.2 Distribution centre location suitability

There are many factors to take into consideration when opening a new warehouse facility. From location and build to storage requirements and labor force availability, making the right choices in regards to both warehousing and distribution methods could make all the difference for your company. While the below are what we consider the most important, this list is certainly not all-inclusive:

- Physical location
- Build/Lease considerations
- Storage requirements
- Labour force availability
- Proximity to Major Linkages
- Zoning and desired Customer Base

Note: Our focus will lie more on the desired customer base aspect of these parameters

competitive strategies affecting distribution centre locations

How a company designs its supply chain and where it locates it's facilities will depend on the factors we just described above as well as firm's competitive strategy. Post the 2008 economic and financial turmoil, the intense cost pressures led to development of low cost outsourcing and promoted significant attention to logistics aspects. For low labour costs, many businesses operate their warehouses overseas at China, India etc. Apart from labour, the firms focusing of market growth also employ competitive practices of locating overseas to enhance their local market exposure (eg. North America, Mexico are consider key locations for spring boarding). Thus it is essential to study location strategies.

1.3 Business problem and objective

A retail firm seeks to expand its business in Malaysia. The objective is therefore, to select the best venue to open up a distribution centre. Although there are many parameters which define a best location, this report will cover the shopping mall distribution frequency using data clustering.

1.4 Reason for choosing this project

Since 2016, there has been a significant concern for the oversupply of retail space and failed shopping centres in the world. Brick and mortar centres are replaced by e-commerce businesses. In the current scenario, it thus becomes all the more important to enter into retail business with careful scrutiny and a clear picture of the market. The country of 30 million is expected to have close to 700 malls by the end of 2019. Analysts have voiced concern they are fighting a losing battle; that the double-whammy of rising e-commerce and an uncertain economic outlook will be enough to land them in dire straits permanently. But Malaysia's malls aren't giving up without a fight – and with another 140 in planning to be built

nationwide – they realise they need to get creative if they want to hold on to customers. In the current scenario, it thus becomes all the more important to enter into retail business with careful scrutiny and a clear picture of the market.

2. Data Acquisition

Wikipedia data and Foursquare API will be used to consolidate data on Toronto are shopping centres. This includes shopping malls, department stores, etc. For sourcing data from Wikipedia (https://en.wikipedia.org/wiki/Category:Suburbs_in_Kuala_Lumpur) we will use web scraping using Python requests and beautifulsoup packages. Geographical coordinates of the neighbourhoods would be extracted using Python Geocoder package. Subsequently, foursquare api shall allow us to gain venue listings and data. The techniques used in this project can be surmised as data cleaning, wrangling, k-means clustering and data visualization using Folium (to generate map)

3. Methodology

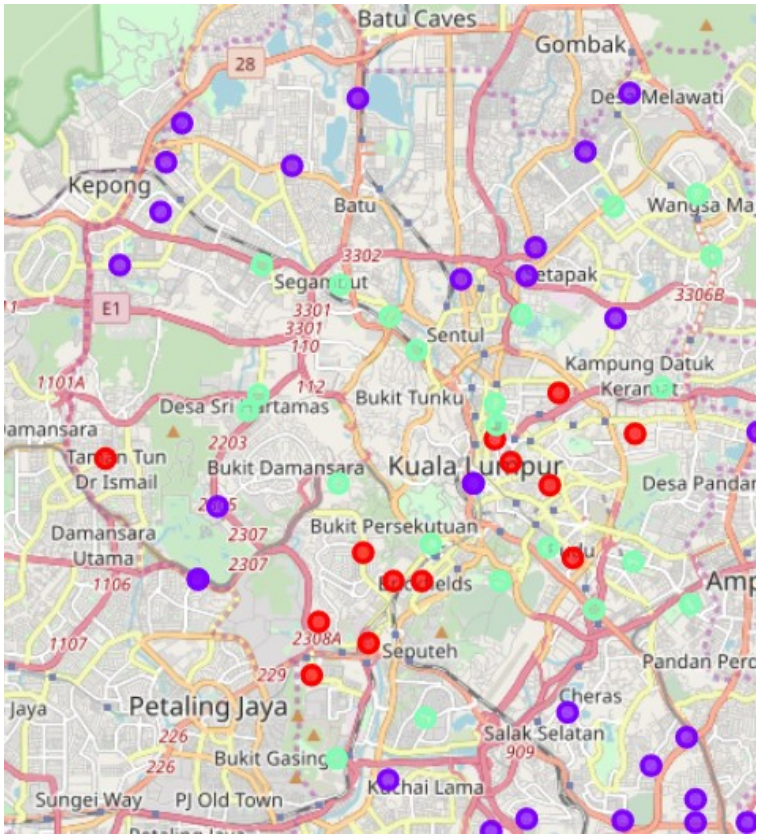
The data is obtained from the Wikipedia page (https://en.wikipedia.org/wiki/Category:Suburbs_in_Kuala_Lumpur). It contains of list of data with 70 neighbourhoods. We extract data by web scraping using Python libraries and beautifulsoup package. Further geocoder is used to obtain coordinate data. We the populate the data in pandas dataframe and visualize the preliminary map using folium.

The next step is to obtain venue data. This is accomplished using Foursquare API. Python looping is used extensively in this step to append dataframes.

Lastly, K- Means Clustering is used to analyse data and segment them into 3 groups based on frequency.

4. Results

The following can be observed



- Cluster 0 (red) has the lowest number of malls.
- Cluster 1 (purple) displays moderate number of malls.
- Cluster 2 (green) displays the majority in number of malls.

5. Discussion

The noted observation is that the density is highest in the central area. This might make it a preference for the distribution centre location if proximity were only to be considered. Cluster 0 has the lowest number of observation and therefore may not be suitable. Though cluster 1 has moderate number of observation the spacing are far apart, hence if one were to adapt to this cluster, optimum freight allocations would be required and this would be a subject of further analysis. Malls belonging to cluster 2 seem dense as well as high in number. This leads us to believe it will be the suitable target while constructing the distribution centre. One can also consider that cause these malls are located close enough, there will be other businesses too that will be competing for sales. Hence, the retail firm in question may have to lower its rates and further cut operation costs to profit. On the other hand, the cluster 1 malls are far apart and this may lead to less concentration of competition. Although freight costs will rise, exclusivity can be obtained to make up for the lost revenue or even make further profit. This leads to the question of brand importance, how well established brand the firm in question is to get preference over other dealers, although, this discussion is out of the projects scope.

6. Conclusion and future directions

The report thus suggests for the distribution centre, on the basis of density distribution and proximity alone, to target cluster 2 malls. Though, further subject of freight allotments are not taken into consideration. The question of brand image and population density is also not taken into account (note: population density is considered synchronous to the mall density for the purview of this report). The parameters of demographic would play a significant role like employment levels (if job opportunities were needed to be created), subsidies, other businesses, etc. Only frequency was used as an aspect to develop this model. Other facets could provide further insight and more intricate results.