The art and science of retail network and site location planning

The confluence of micro-market data, socio-demographics data, geographic information system (GIS), Artificial Intelligence and Machine Learning (AI-ML) at scale is a game changer

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Key takeaways

- While perfect information does not exist, the data is lot more available now than ever before

- GIS platforms as well as advanced analytics tools and techniques (Big Data platforms and AI-ML) have matured significantly over the last decade

- Combined with the available data, GIS capabilities and AI-ML techniques present a very potent instrument for retail planners which can sharpen decision making capabilities and thus reduce the risk of failure

- These data-driven techniques can provide retailers with a competitive advantage and help increase market-share as well as profits

- Retailers who can complement the 'art' of locational decision making with the 'science', will be the winners.

The three most important words in retail have always been 'location, location, location'. Identifying such 'right locations' for setting up retail outlets is a key decision for any retailer. However, these are a finite resource and hard to find. The ability of a retailer to identify these locations not only impacts its store revenue and profitability, but also impacts its overall network performance and can be a source of competitive advantage. Although formal techniques have been in existence for over 50 years, many retailers traditionally did not make much use of these data-driven techniques and instead relied on intuition, thumb-rules, and personal experience, thus considering the process as an 'art'.

However, over last several years, increasing competition between retailers and shortage of 'no-brainer' locations, are encouraging many retailers to explore more advanced techniques. This coupled with the increasing availability of retail related data, low-cost computing, increased maturity of GIS technology and advent of AI-ML / data science is disrupting the way the decisions were traditionally made. Over the same period, the focus in location strategy has evolved from preoccupation with new locations (which considered stores as independent entities) to a more balanced approach of store portfolio where interactions between stores is considered. This approach leads to management decisions such as expansion / refurbishment of existing stores, re-branding as well as their re-location and closure[1].

What is location analytics?

Location analytics helps identify the best locations for setting up retail stores, provide estimates of the potential sales, and identifies the underlying drivers which contribute to the potential. It provides suggestions with regards to the interventions which can help the retailer make best out of what is possible (retail store format, size etc.). To generate these insights, location analytics leverages data from disparate sources (data on assets, infrastructure, demographics, transportation, road network along with data on an organisation's operations and customers), applies statistical and analytics techniques to covert the underlying geographic and special data into actionable insights.

Some examples of location analytics are:

A popular burger chain in the U.S. uses location analytics to identify new store locations

A large Oil Marketing Company in India is using location analytics to identify the most suitable locations for setting up fuel retail outlets in India (across cities, villages, highways)

A large global coffee chain uses location analytics to coffee chain to optimise store locations.

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1. Changing methods of location planning for retail companies, GeoJournal, Vol. 45, Methods in Retail Geography (1998)

Benefits of location analytics

Key benefits which businesses can achieve using the right locational data combined with suitable analytics tools are:

- Improve sales – through improved segmentation, targeting and positioning

- Improve profitability – through identification of area which need investments and have potential to provide commensurate returns

- Control costs – through identification of low performing areas and cost centres

- Improve customer satisfaction – by providing customers what they want, where they want

- Enhance customer loyalty – by nurturing richer customer profile and utilizing that to gain a deeper understanding of customer behaviour.

Many companies have realised tangible benefits through the use of location analytics. For the cases cited earlier:

- The popular burger chain realised an **estimated savings of about USD75,000** in what would have been wasted expenses over a two-year window

- The Oil Marketing company bases its capital deployment **decisions worth thousands of crores of rupees** being guided by location analytics system with a bottom-line impact running into hundreds of crores

- The global coffee chain uses location analytics platform as **the starting point for all its new retail location decision across the globe.** The platform has given them scale and speed. The company has been opening two new stores per day on an average over last several years.

Locational decision making

There are three main levels at which location related decisions are made[2]:

Strategic level
(across outlets)

Outlet level
(at individual outlets) and

Tactical level
(within an outlet).

1. Strategic level

The strategic level of decision making is a key aspect of corporate and marketing strategy of a retail organisation. Strategic planning leverages the company's understanding of the profile of the target customer and aims at linking its customers with the locations of its outlets. In terms of location portfolio, the decision-making process takes into account the existing territorial coverage of the business, company's market share across various markets, revenue and profitability of these markets and aims at identifying profitable locational segments where the retail offer matches the target customers. Aspects such as size and format of the retail outlet, product mix and location characteristics at the network level (across the existing and potential outlets) are key decision parameters at this level of decision making.

2. Outlet level decision making

The strategic planning and performance ties to decisions at unique store level which relate to the micro-market of each outlet. The objective of store level planning is to optimise the overall portfolio by planning the store such that each outlet is in sync with the needs of its micro-market.

The key decisions at this level are:

1. Roll-out: opening a new store
2. Extension: expansion of existing outlets
3. Relocation: moving the store to a new nearby location which is more suitable
4. Rationalisation: closure of specific stores which are under-performers and misfits
5. Upgradation: improving the physical attributes of an existing store
6. Remerchandising: altering the merchandising to suit the customer needs.

3. Tactical decision making

While the outlet level of decision making addresses the physical aspects of an outlet, the tactical level deals with the daily operations. While strategic and outlet level decisions are sticky and difficult to change, retailers can rapidly change many of the operational aspects within a store. For example, marketing activities in the neighbourhood of the store such as promotion or flyer distribution, or price changes, discount and offers, can all be quickly altered. This is needed to align the retail outlets with the needs of their local micro-environment. Loyalty and store cards data can provide insights for such tactical level activities.

In this article, we focus on store level decisions, although many aspects of the approach presented are used for other decisions as well.

2. The art and science of retail location decisions, International Journal of Retail and Distribution Management Volume 28, Tony Hernández and David Bennison (2000)

Steps for location analytics

Location Analytics involves the following steps:

1. Data collection
2. Identifying the criteria for Retail Site Selection
3. Sales / potential assessment
4. Network Optimisation
5. Store Configuration Optimisation.

1. Data collection

A wide variety of data can be of use when building Location Analytics solutions. These set of variables capture the socio-demographics, economic and locational aspects of the area of interest. Some illustrative data points are:

- Socio-Demographics data: population, income levels, gender distribution, education levels, vehicle ownership etc.

- Points of interest data: schools, banks, fuel retail outlets, banks, ATMs, restaurants, shopping malls etc.

- Traffic data: traffic on the road in front of the prospective location, traffic in the nearby area

- Competition data: location of competition outlets (and their sales if available)

- Sales data: sales / performance of existing outlets

- Upcoming infrastructure data: upcoming roads, highways, flyovers, residential / commercial / industrial infra

- Road Network: road network and connectivity of the area, type of inter-connecting road (National Highway, State Highway, Major District Road etc.), divided / undivided road, presence of flyover etc.

2. Criteria for retail site selection

Different industries will have different criteria for site selection. A key question then becomes, which variables, and over what geographical coverage provide the best information regarding the potential of retail locations. This leads us to the determination of trading area and area-of-influence. GIS-based analysis along with statistical techniques can be used to answer these questions.

Trading area refers to the area from which the retail outlet draws its sales. Retail outlets compete with other outlets in the trading area. Statistical analysis of drive distance / drive time / aerial distance should be undertaken to decide the geographical span which needs to be considered as the definition of trading area. The definition of trading area may vary between geographies (urban and rural) and by retail format (large format retail, hypermarts and smaller outlets).

Area-of-influence refers to the geographical area over which points of interest (such as schools, banks, restaurants, shopping malls) exerts their influence. The area of influence will vary by the point of interest and also by the type of area (e.g., urban and rural). Spatial statistical techniques can help determine the statistically significant variables and their corresponding area-of-influence. These local points-of-interest impact the relative strength of the various retail outlets. Basis statistical analysis, the variables which have significant impact on the sales of existing outlets can be identified and used for building sales forecasting models.

3. Sales / potential assessment

Once the trading area is defined and list of significant variables is obtained, the next step is to determine the sales forecast of various potential locations using appropriate techniques.

Machine Learning models can learn from the performance of existing outlets and apply that learning to determine sales of new / potential locations.

Clustering of the areas (based on similarity to each other) is recommended prior to building regression models for sales forecast. Multiple regression techniques (SVR, Random Forest, XGBoost, Neural Networks) can be tried to build forecasting models. The forecast model would provide the hypothetical sale if the outlet were existing at that location. These models should also consider:

- Cannibalisation effect
- Impact of retail outlet type (e.g., large format retail)
- Impact of price differentials across geographies (if any).

4. Network optimisation

After we have established the sales across various potential locations, we need to finalise the locations given the budget available with an objective to maximise profits. The costs of setting up and operating the stores can vary across locations. There may be constraints around the supply available in a region (a set of retail locations). Logistic costs and constraints may also play a role in determining the optimal locations at which the retails outlets should be opened. Optimisation techniques can be used for final site selection.

5. Store configuration optimisation

At a given location, fine tuning of the store level facilities can be done to maximise profitability of these outlets. As an example, for a fuel retail outlet, attributes such as canopy, free air, restrooms etc may impact sales. But these attributes also come at a cost. Scenario analysis can be done (basis historical data from existing stores) to determine which facilities should be considered to maximise profitability at a store level.

Summary

Over the last several years, the data and advanced analytics ecosystem have matured significantly. This provides a strong 'data science' based compliment to the traditional 'art' based decision making of the retail organisations. Organisations which can successfully leverage such analytical techniques along with the human intelligence and experience, to confirm or refute intuitions, stand to be more successful than others. There is already a trend that many matured retailers are adopting a more elaborate and data-driven approach to location analytics, a trend which will only become prominent with time.

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