

TJHSST Computer Systems Lab Senior
Research Project
Simulation of Marketing Mix - Placement of
Business
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Abstract

Companies often spend a lot of resources on research to determine the optimal location to place a store in order to maximize profits and market share. This location problem is part of the last aspect of the distribution channel. The purpose of this project is to find the optimal store location, or the last section of the distribution channel based simply on a few variables such as population density and location of competition. For testing, *ceteris paribus* conditions are assumed (other variables in the marketing mix and distribution channel is assumed constant). The project will feature a GUI aspect created in Java to display the optimal location of a business. The optimal location will be found using a fluid heuristic to evaluate possible locations.

Keywords: Optimization, Heuristic, Distribution Channel, Marketing Mix

1 Background

The research can be classified as a location problem. Location theory was first introduced in 1909 by Alfred Weber, when he tried solving a problem to minimize the total travel distance for his customers. My program expands upon this type of problem by incorporating the location of competition and possibly other aspects to create a more complex model that uses more variables.

Finding the optimal location is currently done through professional advisors. The advisors take into account many variables of marketing mix and distribution channel such as location of the store, advertising, price, etc. Many programs have been written to model the process, although few have succeeded because of the many variables involved. Models tend to focus on the placement aspect of the marketing mix as it is the aspect that can be more easily measured quantitatively. The variables included in the placement aspect include population density, ease of access, and location of competition. A heuristic is then developed to evaluate the data and to find the optimal location, based on market share and profitability. However, many previous models have failed to accurately find the optimal location because the significance of placement varies depending on the placement. For example, gas stations place more emphasis on location than a store such as Costco. The object is to create a model where the heuristic can be easily adjusted based on the emphasis placed on the placement aspect.

2 Procedures and Methodology

The model will be coded in Java with the occasional use of Python for various tasks. For example, Python is used to copy the data from a population density map into a usable text file. The program will include separate aspects including a GUI and a heuristic class to allow for easier editing. The GUI displays a map of Fairfax County (test region) and display the location of local competition along with the optimal location. A rating will also be given for possible business locations.

The primary focus of the project is to locate a reasonable location for a possible business. This will be tested by finding the newest store that has been opened in the area, and running the program to locate the possible locations and determining if the calculated results coincide with the location

of the actual store. The secondary focus is to develop a good heuristic that can be easily adjusted through the GUI to deal with particular situations.

3 Results

3.1 Current Conditions

The current version of the program includes the completed GUI to display the optimal location. The current GUI includes the map of the location of the business and marks the competition along with the optimal location. Raw data for the population density has been prepared and a basic heuristic is up and running. Lastly, the results display is working and marks the optimal location given the basic heuristic.

3.2 Ideal Results

The program may not necessarily replace the work of financial analysts and advisors, but the program should give a good approximate of which locations are good for opening new businesses. The program could be used by analysts as a starting point as the program will eliminate the blantly bad options. The program and the heuristic can also be expanded upon in the future by adding more accuracy to the heuristic and possibly incorporating more factors for a more accurate prediction.

4 Discussion

The project incorporates an easy to use GUI to model the optimal store location as part of the last section of a distribution channel. The program also includes aspects of a fluid and open heuristic to better model the situation. The heuristic allows for the emphasis placed on the location aspect of distribution channels to be easily altered and also allows for additional variables to be easily added.

5 Bibliography and Appendix

References

- [1] Brandeau, Margaret L., Chiu, Samuel S. 'An Overview of Representative Problems in Location Research.' *Management Science.*, pp. 645-674, 1989.
- [2] Constantinides, Efthymios. 'The 4S Web-Marketing Mix model.' *Electronic Commerce Research and Applications.*, pp. 57-76, 2002.
- [3] Huang, Leo, Chen, Kaung-Hwa, and Wub Ying-Wei. 'What kind of marketing distribution can maximize revenues: The wholesaler travel agencies perspective?' *Tourism Management.* San Francisco, pp. 733-739, 2009.
- [4] Ulaga, Wolfgang, Sharma, Arun, and Krishnan, R. 'Plant location and place marketing: understanding the process from the business customers perspective.' *Industrial Marketing Management.*, pp. 393-401, 2002.
- [5] Westerbeek, Hans M., Shilburyl, David. 'Increasing the Focus on Place in the Marketing Mix for Facility Dependent Sport Services.' *Sport Management Review.*, pp. 1-23, 1999.