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How Location Matters in Restaurant Success?

Research-in-Progress

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Abstract

Location has an impact on business success and comprehensive location analysis is critical for location decision making. Based on agglomeration and competition effects, performance-related pattern analysis is helpful for location selection. However, few studies have investigated whether the performance-related patterns vary with different regions. In this paper, we explored the restaurants' performance-related characteristics in different areas using Getis-Ord G_i^ statistic. We found that there is a performance-pattern difference of hot/cold clusters between different regions. For the high and low revisit intention region, there are statistically significant clusters of restaurants with high revisit intention ("hot" clusters) in the northeast and west, as well as a cold cluster in the center. Nevertheless, there are no cold or hot clusters in the medium revisit intention region. The results of this study are helpful for deep understanding of restaurant performance in terms of different locations and have consulting value for restaurants on siting problem.*

Keywords: Location analysis, restaurant performance, online reviews, Getis-Ord G_i^* statistic

Introduction

Location has an impact on restaurant success (Kim et al. 2009) and the sites are costly to change (Alarcón Lorenzo 2011). Therefore, location selection is a critical decision for restaurant owners. Accordingly, comprehensive and solid location analysis is necessary for finding a proper location to open a new restaurant. Many techniques have been conducted for location analysis, such as statistical analysis, geographical information systems (GIS), etc. Researchers have analyzed location pattern of various retail stores (Wang et al. 2014), retail pattern changes (Luo 2016), etc. However, few studies have analyzed the performance-related patterns. The related restaurant performance indicator is sales while the information of sales is valuable for restaurant owners and very hard to be obtained by others. With the development and widespread adoption of electronic technologies, there is a chance to find an alternative indicator of restaurant performance (i.e. revisit intention) in online information.

According to agglomeration and competition effects, business success is influenced not only by their own locations, but also by their neighbors (Li et al. 2012). Their interaction results may vary with different regions and appear different patterns. For example, central business district (CBD) and suburban may have different population, accessibility, and economic stability. Hence, as a result of agglomeration and competition effects, the patterns of business performance may vary with different regions. Moreover, these patterns should be taken into consideration when restaurant owners make decision for opening a new site. However, few studies have investigated whether the performance-related patterns are different between different regions.

This paper aims to explore the restaurants' performance-related characteristics in different areas using the Getis-Ord G_i^* statistic. The rest of the paper is organised as follows. We first review the literature on location and restaurant performance, location analysis, as well as related location theories. We then explain the research methodology and present our empirical results. Finally, we discuss our results and conclude our paper with future research direction.

Literature Review

Location and Restaurant Performance

One of the marketing principles is that existing customers are much profitable than new customers (Bitran et al. 1997). In restaurant industry, customer revisit intention is an important indicator of restaurant performance and these repurchase activity is positively influenced by customer satisfaction on convenience (Qu 1997). Meanwhile, Liu et. al. deemed that location is important for restaurant, as the landmarks are displayed on a map (Liu et al. 2013). Ljunggren held that an important challenge for the restaurant owners is to nurture a uniqueness that is based on location but which can attract customers and create a competitive advantage (Ljunggren 2012). Hence, the location is important for restaurant owners to gain profits. As Taneja said, no matter how good its offering, merchandising, or customer service, every retail company still has to contend with three critical elements of success: location, location, and location (Taneja 1999).

Location Analysis

There are two main topics in location analysis, location selection and location evaluation. For location selection, location-planning techniques include experience, checklist, statistical analysis, geographical information systems (GIS), etc. According to the study of Hernández and Bennison, people use their experience most in locational decision making and the use of GIS is growing (Hernandez et al. 2000). As is widely known, location-planning techniques have been combined used. For instance, Roig-Tierno et al. used GIS and the analytical hierarchy process (AHP) in the retail site location decision process (Roig-Tierno et al. 2013). In terms of location evaluation, the tasks include not only estimate the potential sales of a store (Li et al. 2012), but also evaluating competitiveness (Dock et al. 2015), closeness, betweenness, straightness (Sevtsuk et al. 2011), etc. On this basis, Wang et al. analyzed the location pattern of various retail stores in Changchun, China (Wang et al. 2014). They found out that specialty stores favor closeness most while department stores and supermarkets value betweenness most.

Location Theories

The principle of minimum differentiation is one of the most important theories in retail location analysis (Brown 1989). It is the main idea of retail agglomeration (Hotelling 1990). Hotelling suggests that retailers providing similar products/services tend to cluster in the business center. However, the bid rent theory suggests that the nearer to central business place, the higher rent is (Johnston 1973). Not all retailers can have stores in the center of the marketplace. According to the central place theory, distance is the fundamental factor behind the demand for markets (Öner 2013). Hence, competition exists as well. The competitive advantages may decrease with the increase in distance to the business center. On the other hand, the spatial interaction theory holds that the influence of distance can be offset by the attractiveness of store (Kivell et al. 1980). That means the competitive advantages are able to be strengthened by the attractiveness of retailers. Therefore, agglomeration and competition exists among stores at the same time, and the results of the interaction may lead to different business performance in different regions. Accordingly, we proposed a hypothesis that the performance-related patterns vary with different regions.

Research Methodology

This paper aims to explore regional restaurants' performance-related characteristics. The proposed research framework consists of three sub-systems, including restaurant clustering, location segmentation, and regional business performance analysis.

Because both location and business performance are our concerns, the restaurant-clustering sub-system divides all the restaurants into different groups based on those two factors. Here, customer revisit intention is an important performance indicator; therefore we use location and customer revisit intention to perform restaurant clustering. The location-segmentation sub-system analyzes the locational difference between acquired restaurant clusters and identifies different regions. In the regional business performance analysis sub-system, we use the Getis-Ord G_i^* statistic (Getis et al. 1992) to analyze restaurants' performance-related characteristics in different regions. Getis-Ord G_i^* statistics are useful to identify cold/hot spots where their values are significantly low or high and be surrounded by other low or high values as well (Truong et al. 2011).

Empirical Results

Data

Information of all the restaurants in Harbin had been collected from Koubei website (<http://www.koubei.com>) that is one of the largest online communities in China and it covers all the aspects in our daily life. The information includes online reviews, revisit intention ratios, names, addresses, categories, etc. Each online review contains two parts: customer satisfaction ratings on four dimensions and an open-ended comment. The four dimensions are food quality, service quality, atmosphere, as well as price and value. In terms of revisit intention ratios, when consumers wrote online reviews, they need to answer a question besides ratings and comments. The question is “would you like to have a dinner in this restaurant again”. For each restaurant, its revisit intention ratio has been calculated according to the answers (Yes/No) by dividing the number of reviewers who would like to revisit the restaurant by the number of all its reviewers. The categories of restaurant include western food, Korean food, etc. Each restaurant belongs to one category. In order to obtain the geographical information of restaurants, we used Baidu Maps API to download their latitudes and longitudes through their addresses. The restaurants without any reviews have been removed (Wang et al. 2016). Finally, we got 794 restaurants and the time range of their online reviews is from October 2006 to April 2010. The descriptive statistics are shown in Table 1.

Variable	Mean	SD	N
Customer Satisfaction on Food Quality	4.044	0.754	794
Customer Satisfaction on Service Quality	4.150	0.691	794
Customer Satisfaction on Atmosphere	3.989	0.806	794
Customer Satisfaction on Price and Value	3.973	0.805	794
Total Reviews	11.640	29.996	794
Revisit Intention Ratio	0.778	0.249	794

Reliability and Validity

According to DINESERV scale, food quality, service quality, atmosphere, as well as price and value are evaluation dimensions of customer satisfaction (Kim et al. 2009). Hence, we checked the reliability and validity of these four items of DINESERV before analysis. The Cronbach's alpha (Cronbach 1951) was calculated and the value is 0.957. It indicates that the scale of four items is highly reliable ($0.957 > 0.6$). Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (Kaiser 1970) and Bartlett's test of sphericity (Bartlett 1950) were also calculated. The KMO measure was 0.843 (>0.5) and the Bartlett's test of sphericity is significant ($\chi^2 = 3722.082$, $P < 0.01$). The results indicate that the scale of our study has a good validity.

Restaurant Clustering

We used two-step clustering within SPSS to cluster restaurants into different groups. Because we focus on the location and performance-related characteristics, we used geographic information of restaurants (latitude and longitude) and revisit intention as the variables for clustering. The best cluster has the largest value of ratio of distance measures (2.082) and its descriptive statistics are shown in Table 2. It indicates that there are four clusters and the number of restaurants of fourth cluster is much less than that of each other three clusters. In order to know how these restaurants are located in reality, we used ArcGIS to represent the whole view in Figure 1.

In Figure 1, gray points belong to the first cluster, yellow points refer to the second cluster, blue hits consist of the third cluster, and red hits are in the fourth cluster. Because the number of hits in the fourth cluster is only six and they are located far from the hits of the other three clusters, we dropped these six outliers and focused on analysis of the first three clusters. Table 2 indicates that the first cluster (gray points) has the highest revisit intention, the second cluster (yellow points) has the lowest revisit intention, and the third cluster (blue points) has medium revisit intention.

Table 2. The Descriptive Statistics of the Best Cluster					
Cluster	N	% of Total	Revisit intention ratio		
			Mean	Std. Deviation	
1	358	45.1%	98.648%	4.396%	
2	303	38.2%	54.386%	17.377%	
3	127	16.0%	74.756%	22.942%	
4	6	0.8%	86.167%	22.094%	
Total	794	100.0%	77.841%	24.861%	

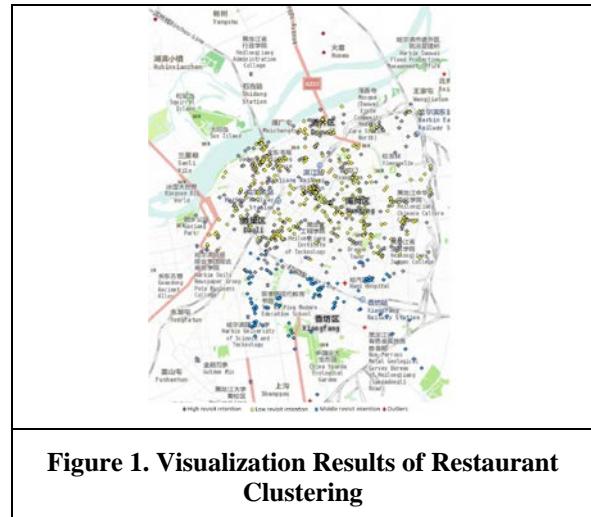
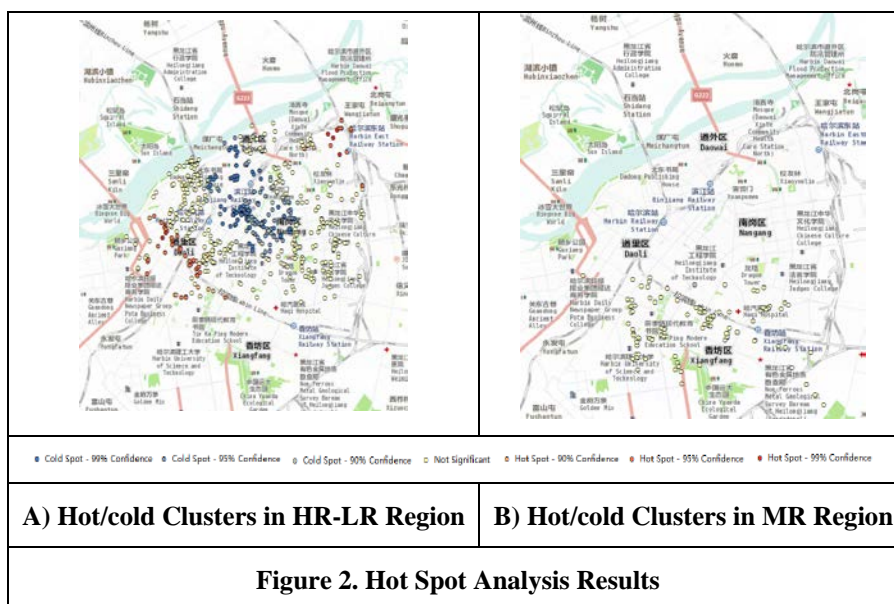


Figure 1. Visualization Results of Restaurant Clustering

We used one-way analysis of variance (ANOVA) to investigate whether there is a significant difference among cluster 1-3 in terms of revisit intention. The result indicates that the difference in revisit intention among these clusters is significant ($P < 0.05$). Based on the mean of revisit intention for each group, we called the first cluster as high revisit intention group (HR, $Mean_{HR} = 98.648\%$), the second cluster as low revisit intention group (LR, $Mean_{LR} = 54.386\%$), and the third cluster as medium revisit intention group (MR, $Mean_{MR} = 74.756\%$).

Location Segmentation

Figure 1 shows that gray and yellow points distribute in the same area, and blue points distribute next to them. In other words, HR and LR restaurants seem to be located in the same area, but MR restaurants are located in another area. An independent samples t-test was conducted to verify whether HR and LR restaurants are located in the same area. The result indicates that there is no significant difference in longitude ($t = 1.150, P > 0.05$) and latitude ($t = -1.960, P > 0.05$) between HR and LR. That means HR and LR restaurants distribute in the same area. Then we run a One-way ANOVA analysis of longitude and latitude among HR, LR, and MR restaurants. The result shows that there is a statistically significant difference in the mean value of geographic information between the different clusters. Hence, compared to the locations of HR and LR restaurants, MR restaurant distribute in a different region. In the following section, business performance analysis will be performed on these two different regions, HR-LR region and MR region.



Regional Business Performance Analysis

The Getis-Ord G_i^* statistic within ArcGIS was conducted for hotspot identification on restaurants' customer revisit intention in HR-LR region and MR region respectively. The results are shown in Figure 2. Figure 2A) suggests there are statistically significant clusters of restaurants with high revisit intention ("hot" clusters) in the northeast and west of HR-LR region. A cold cluster (or areas where the customer revisit intention of restaurants was relatively low) occurred predominantly in the center. Figure 2B) shows that there are no cold or hot clusters in MR region. Hence, the pattern of hot/cold clusters in HR-LR region is different from that in MR region.

Discussion

The population factor is paramount in evaluating store sites (Cohen and Applebaum 1960) and is associated with urbanization economies (Lambert et al. 2006). Accordingly population is related to location and business performance. Hence, we infer that population factor is a main factor that reflects regional difference, which leads to the difference of spatial patterns of restaurants' customer revisit intention clusters between HR-LR region and MR region. According to the study of Cohen and Applebaum (1960), population density is an aspect of the population factor. Hence, we collected the population density information in these two regions during the same time period with our data (i.e. 2006 to 2010) in order to test population difference. Fig. 2 shows that HR-LR region is in Nangang, Daoli, and Daowai districts in Harbin, China. The population density of HR-LR region is calculated by averaging the population density across these three districts. MR region is located in Xiangfang district in Harbin. The population density of MR region is that of Xiangfang district. Then an independent samples t-test was conducted to test whether there is a difference of population density between HR-LR region and MR region during 2006 to 2010. The result suggests that the population density of HR-LR region during those five years (Mean= 3492.946) is significantly ($P < 0.01$) larger than that of MR region (Mean= 2194.470). Hence, the hot/cold clusters are more distinct may because of larger population density. Furthermore, Nangang and Daoli districts are central business districts in Harbin. Cold clusters in Figure 2A) are located around the core of the city center and tourist attractions in Harbin. The mobility of people is relatively higher than that in other places. Hence, the revisit intention of restaurants was relatively low. Meanwhile, hot clusters distributes on the edge of the city center. Compared to the restaurants that are located in the core of city center, restaurant owners have to keep a higher revisit intention ratio in order to gain profits.

Conclusion

In this paper, we explored regional restaurants' performance-related characteristics. We clustered all the restaurants into four groups on both location and restaurant revisit intention factors. Then we used ArcGIS to visualize the result. Because the number of restaurants in the fourth group is only six and they are located as outliers, we then focus on the first three groups. Since the difference in revisit intention is significant among three groups, we got three clusters as HR, LR, and MR restaurants based on the mean values of revisit intention ratios. Then we compared the geographic difference among these three clusters and segment the areas into two regions, HR-LR region and MR region. We analyzed the difference in restaurant performance-related characteristics between these two regions using the Getis-Ord G_i^* statistic and find out there is a pattern difference of hot/cold clusters between HR-LR region and MR region. For HR-LR region, there are statistically significant clusters of restaurants with high revisit intention ("hot" clusters) in the northeast and west, as well as a cold cluster in the center. Nevertheless, there are no cold or hot clusters in MR region. The paper makes contributions by analyzing the cluster pattern difference of restaurant performance among different regions using the Getis-Ord G_i^* statistic. The results of this study are helpful for deep understanding of restaurant performance in terms of different locations and have consulting value for restaurants on siting problem. Future work includes validating this pattern difference using sales information because not all the customers who have revisit intention will have meals in the restaurants. We also plan to examine the relation between location and revisit intention after controlling for customer satisfaction on food quality, service quality, atmosphere, as well as price and value.

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