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Compete or Avoid? Assessing Brand Competition Strategies with Spatial Colocation Analysis

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Abstract: Spatial competition considerations are important in hotel location selection. This study proposes and demonstrates a method of colocation network analysis to quantify the potential encroaching effect of spatial inter- and intra-competition between units of business brands that seek expansion. The environmental context of the study is a network of the top five budget hotel brands in the Beijing hotel market. The results reveal that brands implement different strategies in their hotel placement, which are subject to different levels of the encroaching effect. However, the method is applicable in a variety of hospitality settings, specifically in those that involve the development strategies of chain brands. The simulation capability of the method can assist hospitality brands in assessing the outcomes of a proposed development and, thus, aid hoteliers in the spatial allocation of new units with the least adverse effects on their existing business networks.

Keywords: brand expansion; budget hotels; colocation analysis; encroaching effect; negative externalities; spatial network

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1. Introduction

Location selection is critical to hotels' performance and long-term operations; however, it is nearly irreversible after the hotel is built. Competition is one of the major factors in the location choice decision, especially for chains with multiple establishments [1]. Chains must not only consider the geographical distribution of their competitors but also evaluate their business network given the potential internal competition from the incumbent units. Upscale and luxury hotels may compete with other accommodation establishments in their segment in terms of location, product differentiation, individual style, and customized service. Meanwhile, budget hotels, with their emphasis on price and a largely standardized package of basic services, face intense competition and severe challenges and are easier to substitute [2].

While the macro-level nationwide locational distribution of hotel chains is relatively well studied (e.g., by Qin et al. [3]), micro-level distributional patterns at up to 10 km distances are less researched. A walking or short-drive distance colocation with similar firms may increase competition for customers and resources and cause negative externalities. The more similar a new entrant is to its competitors, the greater the intensity of competition, thereby lowering the survival rates of incumbent firms. In the lodging sector, more hotel units in an area with fixed demand mean fewer guests per hotel. Conversely, consumers are more likely to be attracted to an area with a large selection of competing services [4]. Therefore, customer demands together with positive externalities from easier access to resources and suppliers, knowledge spillovers, and reduced search costs on the part of consumers [4] spur the growth of new units.

In this growth governed by the attraction and repulsion forces, the new hotels may colocate with competitor brands (inter-firm colocation) or with hotels belonging to their brand (intra-firm colocation). The latter colocation type increases benefits from positive externalities by utilizing cooperation and synergy between hotels in a local neighborhood, thus, gaining from the agglomeration effect. The benefits may include efficiency improvement, economies of scale, knowledge transfer, and reduced uncertainty and costs [5]. However, the danger is the cannibalization of franchisee sales [6]. Hotels no longer just compete with other brands but also compete within their chain brands and units. Therefore, hotel brands need to strategically develop their new units to minimize the encroachment effect leading to cannibalization while still enjoying the agglomeration effect [7].

To assist in tackling this problem, we propose and illustrate the capabilities of colocation analysis in the environmental context of the Beijing market of budget hotel brands. Up to the early 2000s, hotel development in China had been unbalanced with a gap between the upscale market segment unaffordable to most of the population and small individually or state-owned hotels [8]. While in Europe, the budget hotel segment would take 70% of the accommodation market at that time, the budget hotel market in China was severely underdeveloped [8]. With the growing middle class demanding comfortable yet reasonably priced accommodations, the budget hotel industry has grown explosively from just over 50,000 in 2005 to over 2 million rooms in 2018, well exceeding the 50% annual growth at its peak [9]. However, in the 2010s, this early growth has been decelerating, pointing to increasing costs and escalating competition in the developed markets, like Beijing. Consequently, the budget hotel chains had to pay more attention to the encroachment issues than before [3].

In terms of the effect of geographical distance on hotel competition for customers, research has indicated that it is governed by the power law, that is, the probability of being a competitor declines exponentially with distance [10,11]. Hence, several studies used spatial statistical analysis of hotel agglomeration to report the proximity and density structure of hotels [3,5,12,13]. For instance, on a macro-level, hotel chains like 7 Days Inn or Hanting Inn follow a hierarchical diffusion model with a nationwide presence, developing their first-tier locations nationwide first and then percolating into smaller cities. Yet, other chains such as City Comfort Inn follow the contagious diffusion model, concentrating on development in small regions [3].

Despite the existence of literature exploring competition between individual hotels on a macro level, the spatial structure of the two-sided inter- and intra-brand competition is sparsely addressed [14,15]. Hence, this study examines how the micro-level structure of budget hotel networks evolves with time and space using colocation analysis. The observed spatial dynamics are interpreted in terms of the nature of competition among different brands (inter-competition) or individual units of the same brand (intra-competition).

2. Data

To examine the spatial structure of the intra- and inter-competition among hotel brands, this study includes the top five budget brands in the Beijing hotel market. The domestic sector was represented by hotel chains Home Inn, 7 Days Inn, Hanting Inn, and Green Tree, while Super 8 was the top international budget brand [16,17]. The data on each hotel including its precise geolocation was collected from the Ctrip.com travel website using a custom Python script for data scraping. After quality control, the hotel database included 870 hotels in the Beijing area (Table 1). Notably, the data collection period stopped before COVID-19 due to the major disruption it brought to the industry and, therefore, the high likelihood of affecting "normal" brand development.

Table 1. Top five budget hotel chains in Beijing, China. Essential statistics.

Brand	*n* Hotels	Operation Starting Year	Mean over the brand			
			Lowest Rate, USD	*n* Rooms	*n* Reviews	Rating
Super 8	214	2005	40	75	826	3.99
Home Inn	184	2001	55	112	1171	4.57
Hanting	169	2006	60	112	767	4.43
7 Days Inn	190	2006	43	94	1402	4.34
Green Tree	113	2007	42	106	564	4.25

3. Method

In the hospitality industry, the effective distance at which the hotels are perceived as "geographically close" by potential guests and hence compete for their customers depends on their location. For example, different studies reported that air travelers perceive a hotel to be "close" to the airport at a distance varying from as near as 3 km to as far as 16 km [18–20]. Meanwhile, in cities' business districts, customers are much more sensitive to distances [21]. Guizzardi et al. [11] in a quantitative study of competition involving 107 Milan hotels found that, at a 1 km distance, the probability of hotels competing for customers becomes smaller than 0.05, hence, establishing the 1 km radius as an effective "closeness perception" value for hotel competition. Following Guizzardi et al. [11], we use a 1 km radius to evaluate the change in intensity of competition between the hotels over time.

We used the join count statistics to estimate the probabilities of intra- and inter-brand competition between the hotels within the same brand and between different brands, respectively [22]. The join count statistics is a measure of spatial autocorrelation that evaluates the degree of clustering or dispersion of the objects of interest in space. The statistics compute the number of colocating ("join") objects of the same type (BB type of join, e.g., two nearby hotels of the same brand B) and different types (BW type of join, e.g., two nearby hotels of different brands B and W) [23]. The observed results are then compared with the expected values for randomly distributed objects. Formally, the statistics for each type of join (BB or BW) are computed as the difference between the observed and expected values divided by the standard deviation for the expected values: $Z = (O - E)/SD$. For example, a higher-than-expected number of colocated hotels of different brands (competition) will return a positive value of Z for BW colocation: $Z_{BW} > 0$. Similarly, a lower-than-expected number of colocated hotels of different brands (avoidance) will return a negative value: $Z_{BW} < 0$. Finally, in the absence of either avoidance or competition, $Z_{BW} \approx 0$. Finally, a corresponding *p*-value indicates whether the null hypothesis $Z_{BW} = 0$ has to be rejected and, if yes, the strength of the effect.

The join counts depend on how the colocation is defined, that is, at which distance hotel customers perceive hotels as closely located. To ensure the results' robustness, we repeated calculations with (1) colocation distance radii varying from 0.25 km to 2 km and (2) used a discrete and continuous colocation function. The latter assumed that as the geographic distance between two hotels increases by a factor of 2, their distance-related competition decreases by a factor of 4.

4. Results

Over the last ten years of the explosive growth of the budget hotel industry, hotels' colocation increased dramatically (Figure 1). While in 2009, among 125 hotels, relatively few were located within the 1 km closeness perception radius (Figure 1b), in 2018, 870 hotels formed several large agglomerations of colocated units competing for customers (Figure 1d). Evidently, in their growth strategies, all chains escaped intra-brand competition (Figure 2a). The only chain with initially high intra-brand competition, Green Tree, was consistently reducing the percentage of intra-colocated units (Figure 2a). Meanwhile, in inter-brand competition, the chains demonstrated radically different strategies (Figure 2b). Three hotel brands, Hanting, Home Inn, and, to some extent, 7 Days Inn, demonstrated high competitiveness with a steady increase over time, as evidenced by join count statistics ($p < 0.05$) (Figure 2b). Conversely, the Green Tree brand demonstrated increasing competition avoidance in new hotel placement ($p < 0.001$). The new hotel placement of the international chain Super 8, while having the highest number of hotels, did not demonstrate a preference for either strategy.

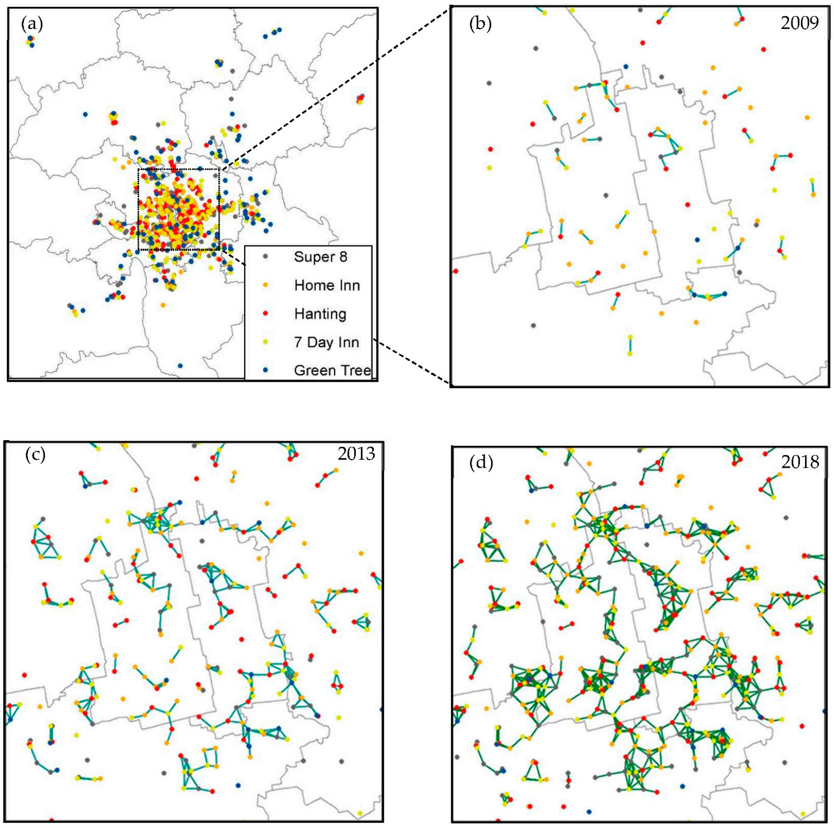

Figure 1. Dynamics of hotel competition network, 2009–2018. (**a**) Beijing Hotels, 2018. The square represents the central area. (**b**–**d**) Networks of colocating competing hotels in the central area in 2009, 2013, and 2018, respectively. Green lines represent colocation links between the hotels (shown as color dots).

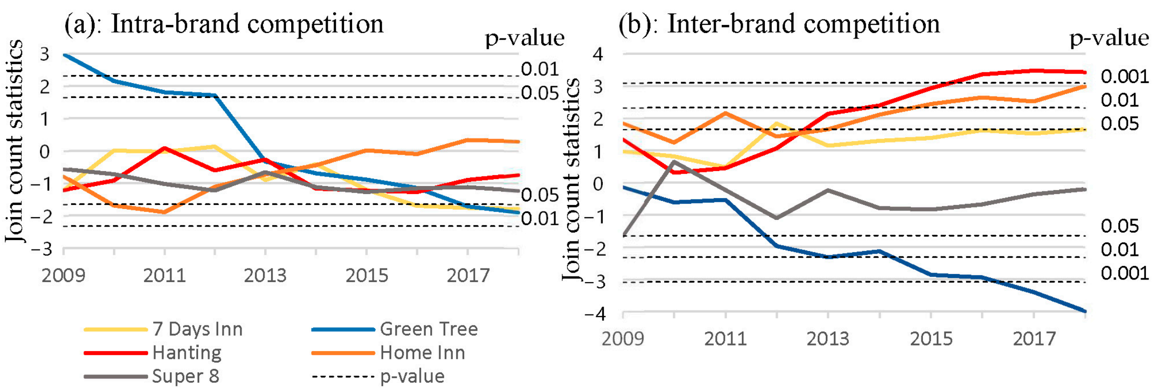

Figure 2. Join count statistics Z for intra-brand (**a**) and inter-brand (**b**) competition. The plots represent join count statistics Z for colocated hotels (left vertical axis) as well as the corresponding *p*-values for null hypothesis Z = 0 (right vertical axis). Large positive Z values represent high competition for intra-brand (**a**) or inter-brand (**b**) competition, while negative Z values represent competition avoidance.

The estimates of hotel competitiveness are robust against the customer distance perception (Table 2). The two most inter-competing brands, Hanting and Home Inn, demonstrate competing behavior at distances varying from 250 to 2000 m (except at 500 m for Home Inn), and also for the quadratic distance function. The 7 Days Inn hotels are marginally competitive with other brands. Meanwhile, Green Tree hotels demonstrate competition avoidance. For intra-brand competition, hotels avoid competition; the most competitive brands, Home Inn and Hanting, colocate competitively within their brands only at the highest distance of 2 km. Similarly, there is no intra-brand competition when the quadratic distance function is used.

Table 2. Observed and expected numbers of colocated hotels within 250 to 2000 m distance of each other in 2019. "Quad" relates to the inverse quadratic function of customer distance perception. Join count statistics Z and the corresponding *p*-values are computed using an empirical distribution function based on 500 perturbations of hotel locations.

Chain	Distance	Number of Colocations with Different Brands					Number of Colocations with the Same Brand				
		Obs.	Exp.	Z	*p*	Strategy	Obs.	Exp.	Z	*p*	Strategy
7 Days Inn	250	78	73	0.70	0.246	-	1	10	−2.90	<0.001	Avoid
	500	186	168	1.50	0.054	-	10	24	−2.60	0.002	Avoid
	1000	560	522	1.60	0.054	-	55	73	−1.90	0.034	Avoid
	2000	1713	1665	0.80	0.228	-	195	233	−1.60	0.05	Avoid
	Quad	371	347	1.70	0.052	-	34	49	−2.40	0.002	Avoid
Green Tree	250	47	48	−0.20	0.44	-	9	4	2.80	0.008	Avoid
	500	93	111	−1.70	0.058	-	9	8	0.20	0.31	-
	1000	255	345	−4.00	<0.001	Avoid	15	26	−2.00	0.032	Avoid
	2000	730	1102	−6.60	<0.001	Avoid	36	82	−3.60	<0.001	Avoid
	Quad	171	230	−4.50	<0.001	Avoid	12	17	−1.60	0.044	Avoid
Hanting	250	95	67	3.80	0.002	Compete	2	8	−2.20	0.022	Avoid
	500	199	154	3.80	0.002	Compete	13	19	−1.20	0.124	-
	1000	562	478	3.60	0.002	Compete	51	58	−0.70	0.254	-
	2000	1671	1527	2.40	0.002	Compete	218	184	1.60	0.048	Compete
	Quad	374	319	4.00	0.002	Compete	34	38	−0.90	0.252	-
Home Inn	250	84	71	1.70	0.046	Compete	6	10	−1.20	0.17	-
	500	178	164	1.10	0.138	-	19	22	−0.60	0.328	-
	1000	577	510	2.90	0.004	Compete	71	68	0.30	0.336	-
	2000	1797	1627	3.00	0.002	Compete	298	218	3.60	0.002	Compete
	Quad	381	339	3.00	0.002	Compete	49	46	0.70	0.228	-
Super 8	250	82	79	0.40	0.322	-	3	13	−2.80	<0.001	Avoid
	500	200	183	1.50	0.066	-	14	30	−2.60	<0.001	Avoid
	1000	562	567	−0.20	0.414	-	78	92	−1.20	0.114	-
	2000	1757	1809	−0.90	0.172	-	296	295	0.00	0.47	-
	Quad	376	377	−0.10	0.418	-	52	62	−1.50	0.062	-

5. Conclusions

Hotel agglomeration leads to both positive and negative effects on hotel brands. The advantages include reduced costs and availability of materials, a larger pool of potential employees, better information availability, and knowledge exchange [24]. The areas with high hotel density also attract more customers due to improved safety, higher availability of services, and reduced search costs [25]. On the other hand, at the level of individual hotels, increased competition may be harmful, which detracts hotel chain expansion from existing agglomeration areas. Indeed, in China's star-rated hotel market, which over the past decade has been experiencing competition from budget hotels discussed in this paper, there is a tendency toward decreasing the agglomeration trend [26].

The method described in this paper, which is based on geographical distance measures, seems to be effective in the quantification of both intra- and inter-brand competition at the micro level. Our analysis of five budget hotel chains shows that it can capture different strategies of hospitality brands concerning new hotel placement in the period of business expansion. Some brands lean towards intensifying inter-hotel agglomeration, increasing the number of hotels colocated with hotels from other brands and thus avoiding intra-brand competition. Meanwhile, other brands prefer a neutral strategy (neither inter- nor intra-competition), and one brand executes a competition avoidance strategy.

When sufficiently validated (e.g., with the use of external financial reports), the method can become a convenient management tool for decision-making regarding the spatial allocation of new business units. The analytical simulation of inserting new business units in two or more proposed locations will result in alternative simulated networks. Then, a comparison between the join statistics for the proposed expansion alternatives will help in making the data-based decision on location selection corresponding to the chain's competition strategy. This strategy can be supplementary to the traditional competition strategies that generally ignore geographical statistics [7].

In terms of the study limitations, the method would further improve its accuracy if the path length of the road network in the city is taken to compute the spatial colocation distance instead of the Euclidean distance adopted in this study. Further, the outbreak of COVID-19 had a significant impact on the hospitality industry in terms of investment in new construction development. This study examined the intra- and inter-brand colocation strategies of budget chain hotel brands excluding that impact since the focus of this research was to demonstrate the effectiveness of the colocation analysis as a decision-making tool in brand expansion strategizing. Future studies can assess the effect of COVID-19 especially the effect of uncertainty expectations on hotel crisis coping behaviors.

To conclude, the method has the potential to be applied not only to hotel networks but also to other business sectors in which network expansion decisions partially depend on competing with colocating businesses, for example, in the food and retail industries. The development in the competition simulation will increase our understanding of business-to-business networks in terms of competitors, suppliers, and customers and ultimately will allow for a more informed choice between alternative solutions.

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