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Article

Spatial Distribution and Platform Attention of Ctrip Hotels in Tianjin

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Abstract: This study examines the spatial distribution, attraction and satisfaction signals of hotels on Ctrip in Tianjin, China, based on the data collected on August 15, 2026. The original data set contains 993 hotel listings and 155,258 review entries; the geographical coordinates from the hotel information pages were converted from BD-09 to WGS84 and summarized into 983 unique positions. The average nearest-neighbour index of 0.318 ($z = -40.89$) indicates a high degree of clustering. Kernel density analysis reveals a peak in the central city near 117.195°E, 39.115°N and another peak in the Binhai New Area near 117.687°E, 39.018°N. Hotel scores show weak but significant spatial autocorrelation (Moran's $I = 0.070$), whereas the total number of cumulative reviews exhibits a stronger spatial pattern ($I = 0.329$). An exploratory two-stage least-squares model with 696 complete cases indicates a positive effect of hotel scores (coefficient = 0.201) and a high spatial lag of platform attention (0.745). Reviews about family and business travel account for 52.3% of all comments; however, defects like maintenance and noise are commonly found in the less satisfactory reviews. The hotel market in Tianjin is polycentric: the supply is mainly concentrated in the downtown area, Binhai and Jizhou, whereas the online visibility is more geographically focused than the actual quality perceived. Taking into account the restriction of data acquisition and the spatial residuals, these findings are considered as tentative associations rather than certain causal relationships.

Keywords: hotel distribution, spatial econometrics, geographic information systems, Tianjin

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1. Introduction

Online travel agencies not only sell hotel inventory: they also arrange the search ranking, sort, collect accumulated reviews, use labels and location descriptions to improve the visibility of the hotels, and electronic word-of-mouth has become an important marketing resource in the hotel industry [1]. Research on big-data and text-analysis indicates that online reviews contain experience signals which can be measured at large scale [2], while comparative studies of the platform show that the review systems vary systematically among different agencies [3]. These platform mechanisms affect the already uneven urban geography.

Tianjin includes a concentrated historical and commercial area, the port-based Binhai New Area, transportation routes, suburban districts and the tourism market of Jizhou. As a polycentric urban structure is a well-known characteristic of metropolitan areas [4] and of Chinese cities in particular [5], a single-centre

model cannot adequately represent both the hotel supply and the platform attention.

Research on hotel locations has developed theoretical, empirical and practical models [6]. Previous investigations describe the formation of hotel clusters near the tourism and business activities in metropolitan areas [7] and the relationship between hotel positions and tourist movements in cities [8].

In China, hotels in Beijing balance agglomeration with accessibility and land rent [9]; the Beijing–Tianjin area is considered a national hotel centre [10]; and agglomeration economies influence the location of both graded and budget establishments [11], as shown in the lodging industry [12]. The locational investments of multinational hotel companies in China are related to the market size and infrastructure [13], and chain hotels exhibit different regional distribution patterns [14]. Recent GIS studies have verified the effect of road-network arrangement on the hotel layout in Shanghai [15], and the demand analysis of Ctrip travel routes in Guilin reveals multi-point accommodation structures near transportation hubs and tourist sites [16].

A parallel literature indicates that online reviews affect the bookings and the performance of hotels [17] and that review information can be rearranged and extracted to evaluate the level of satisfaction and dissatisfaction [18]. However, the current Chinese studies on hotel-location do not confirm if the popularity of the platform and the ratings of the hotels show the same spatial distribution as the physical supply [19].

This paper also puts forward three points. Firstly, how closely are the Ctrip listed hotels concentrated and where are the main dense areas? Secondly, does the rating and the total number of reviews show spatial relationship after taking into account the observable quality and accessibility? Thirdly, what can the traveler types and the review topics indicate for the hotel management on the platform? The aim is to distinguish three things which are usually mixed up: the position of the supply, the geographical distribution of the perceived quality and the geographical distribution of the accumulated platform attention [20].

2. Materials and Methods

The document includes 993 Tianjin hotel entries and 155,258 review entries; the hotel IDs and standardized names are distinct, and 984 hotels have both general and four sub-scores. The review records range from stay dates of 2023-05-01 to 2026-08-01 and publication dates from 2023-08-15 to 2026-08-15 [21].

The extracted review contains about 200 records per hotel (median = upper quartile = maximum = 200), therefore the review-text summarizes the available data, whereas the hotel-level count indicates the total popularity. The IP-attribution field is considered only as the posting place, not as the visitor's source.

Table 1. Data layers and analytical samples

Hotel attributes	993	993	984 rated; IDs and names unique
Guest reviews	155,258	155,258	No exact duplicates; capped near 200 per hotel
Direct coordinates	993	991	2 Ctrip pages unavailable; BD-09 converted to WGS84
Spatial point sample	991	983	8 extra rows removed from exact coordinate collisions
Spatial 2SLS	983	696	Complete cases for rating, rail and metro fields

Source: Author's calculations from the supplied Ctrip workbook and Ctrip hotel-detail coordinates.

Directly the coordinates of 991 listings were obtained from the Ctrip hotel-detail pages and transformed from BD-09 to WGS84 by using GCJ-02. Then these coordinates were checked in a Tianjin bounding box and address text. There were seven groups which had exact-coordinates collision and contained eight

superfluous listings; in each collision group, the one with the highest total number of reviews was kept, resulting in 983 different places. The point pattern analysis included the average nearest neighbour index, Gaussian kernel density estimation (with a bandwidth of 8.3 km), global Moran's I [22] and distance-based spatial association statistics [23]. The maximum density in the whole city determines the principal core; a second surface is estimated based on the hotels in Binhai only and represents the secondary core in the east. The distances are calculated to the nearest peak.

The spatial-econometric specification follows Anselin's framework [24] and LeSage and Pace [25], with related spatial-econometric applications in tourism [26]; permutation-based inference (999 permutations) follows Anselin's local-indicators tradition [27].

Review texts were coded with a Chinese and multilingual dictionary covering room/cleanliness, service/staff, location/transport, facilities/maintenance, breakfast, value, noise/sleep, and family/pet needs; a theme is counted once per review (non-exclusive incidence), and low-score reviews are defined as ≤ 3.0 .

The exploratory spatial-lag model uses $\ln(1 + \text{cumulative review count})$ as the dependent variable with standardized rating, core distance, $\ln(1 + \text{rail distance})$, a metro- ≤ 2 km indicator and a Binhai indicator; the endogenous lag is instrumented with X , WX and W^2X ; $n = 696$.

$$\ln(1 + \text{Reviews}_i) = \rho W \cdot \ln(1 + \text{Reviews}_i) + \beta_1 \text{Rating}_i + \beta_2 \text{CoreDist}_i + \beta_3 \text{RailDist}_i + \beta_4 \text{Metro}_i + \beta_5 \text{Binhai}_i + \varepsilon_i$$

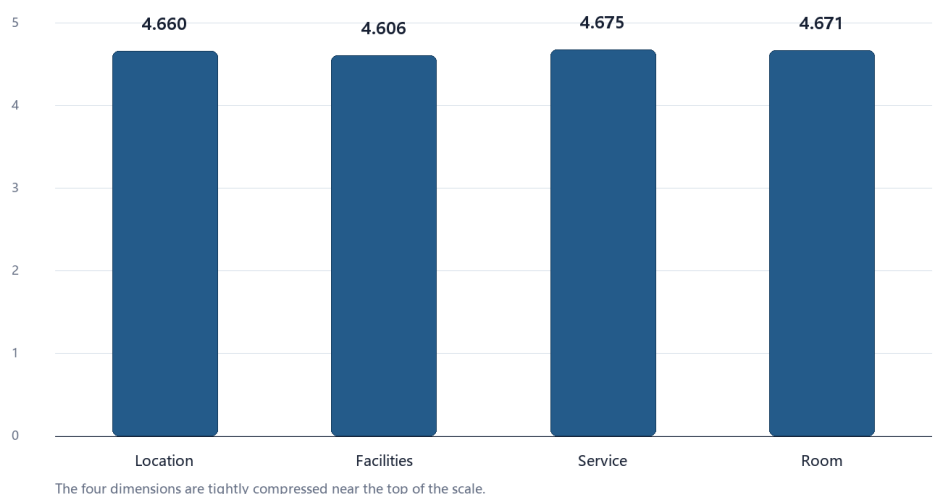
3 Results

The mean rating is 4.653 (SD = 0.232; median 4.7); sub-score means are service 4.675, room 4.671, location 4.660, facilities 4.606 (range only 0.069). Cumulative reviews are strongly right-skewed (mean 983.8; median 569; max 10,588). Family travel is the largest category (29.0%), followed by business (23.2%), friends (15.0%), couples (11.8%) and solo (10.7%); the sum of the two rounded leading categories (52.2%) differs from the unrounded 52.3% by rounding. Posting-IP shares are Tianjin 52.6%, Beijing 15.6%, Hebei 8.4% (Figure 1).

Figure 1. Mean Ctrip hotel sub-scores in Tianjin

Mean Ctrip hotel sub-scores in Tianjin

Five-point scale; $n = 984$ rated hotels



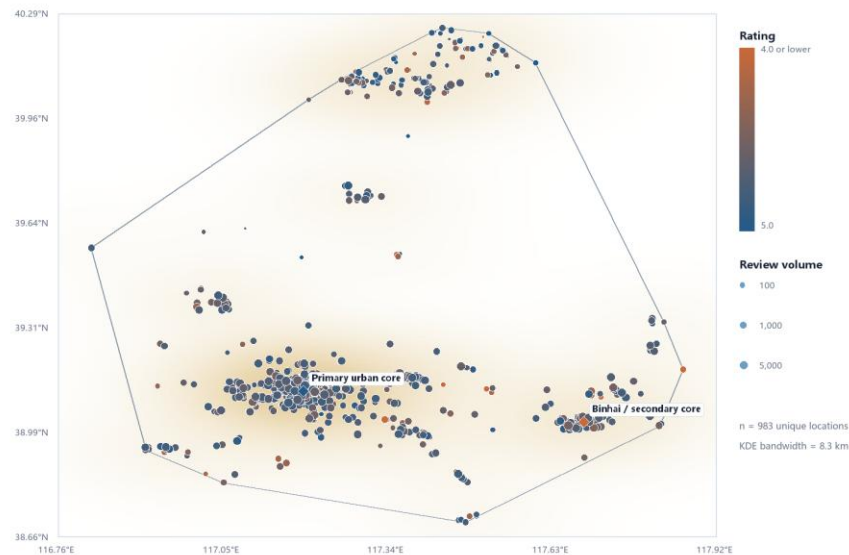
Source: Ctrip hotel table; $n=984$ rated hotels

The observed mean nearest-neighbour distance (0.513 km) is far below the random expectation (1.613 km); $NNI = 0.318$ ($z = -40.89$, $p < 0.001$). Kernel-density peaks locate the central-city cluster near 117.195°E, 39.115°N and the Binhai cluster near 117.687°E, 39.018°N; a large northern concentration in Jizhou is separate from both metropolitan cores (Figure 2, Table 2).

Figure 2. Spatial distribution of Ctrip-listed hotels in Tianjin

Ctrip-listed hotels in Tianjin

Validated Ctrip coordinates; size = cumulative reviews; color = rating



Source: Validated Ctrip coordinates; n=983 unique locations. Point size represents cumulative reviews and color represents rating.

Table 2. Leading districts in the validated spatial sample

Jizhou District	151	15.4%	4.709	58
Binhai New Area	121	12.3%	4.594	713
Hexi District	110	11.2%	4.659	745
Heping District	97	9.9%	4.673	1216
Nankai District	97	9.9%	4.670	793
Hedong District	83	8.4%	4.563	262
Dongli District	64	6.5%	4.662	766
Xiqing District	59	6.0%	4.681	727
Hebei District	48	4.9%	4.654	1120
Jinnan District	41	4.2%	4.624	608

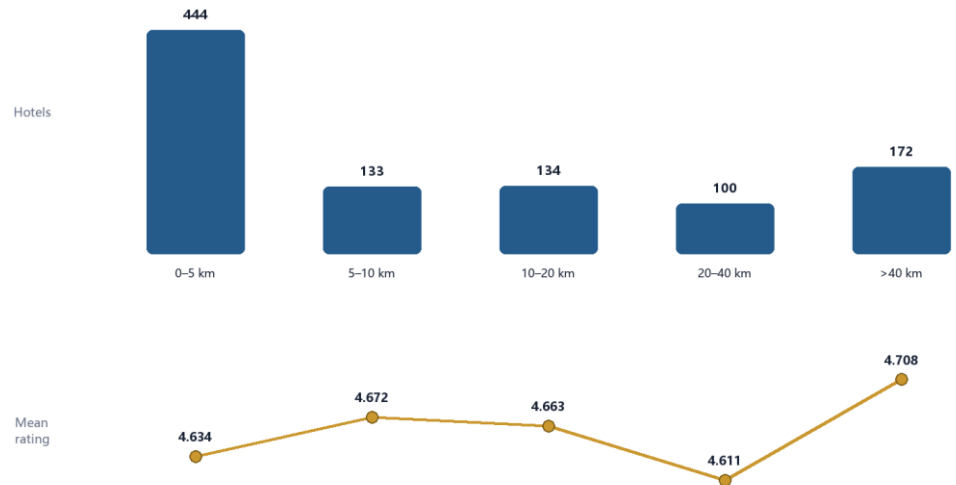
Source: Validated coordinate sample; ratings exclude missing values.

Quality is weakly spatial; attention is strongly spatial. Rating Moran's $I = 0.070$ ($p = 0.001$) versus $I = 0.329$ for log cumulative reviews ($p = 0.001$), almost five times larger. Spearman correlation with core distance is 0.168 for rating but -0.370 for popularity; hotels within 5 km of a core have a median of 838.5 cumulative reviews versus 65 beyond 40 km, despite higher mean ratings in the outer band (4.708) (Figure 3, Table 3).

Figure 3. Hotel supply and rating by distance to the nearest core

Hotel supply and quality by distance to the nearest urban core

Distance to the primary central-city or secondary Binhai KDE peak



Source: Distance to the nearer of the central-city and Binhai KDE peaks.

Table 3. Spatial profile by distance to the nearest core

Distance to nearest urban core	Hotels	Percentage	Mean rating	Weighted mean rating
0-5 km	444	45.2%	4.634	838.5
5-10 km	133	13.5%	4.672	746.0
10-20 km	134	13.6%	4.663	760.5
20-40 km	100	10.2%	4.611	591.5
>40 km	172	17.5%	4.708	65.0

Source: Author's spatial calculations; n=983 unique locations.

Spatial 2SLS yields $\rho = 0.745$ ($p < 0.001$); a one-SD rating increase is associated with 0.201 higher $\ln(1 + \text{reviews})$; core distance, rail distance, metro proximity and the Binhai indicator are not individually significant. The first-stage R^2 is 0.295 and residual Moran's $I = -0.100$ ($p = 0.001$), indicating weight-matrix sensitivity and possible over-correction; ρ is therefore evidence of spatial structure, not a causal peer effect (Table 4).

Table 4. Spatial 2SLS model of cumulative review volume

Variable	Hotel rating (z)	Core distance (z)	Rail distance (z)	Metro ≤ 2 km	Binhai	Spatial lag ρ
Hotel rating (z)	0.201	0.054	3.74	<0.001		
Core distance (z)	-0.057	0.070	-0.81	0.417		
Rail distance (z)	-0.018	0.066	-0.28	0.781		
Metro ≤ 2 km	-0.056	0.181	-0.31	0.757		
Binhai	-0.065	0.170	-0.38	0.701		
Spatial lag ρ	0.745	0.136	5.48	<0.001		

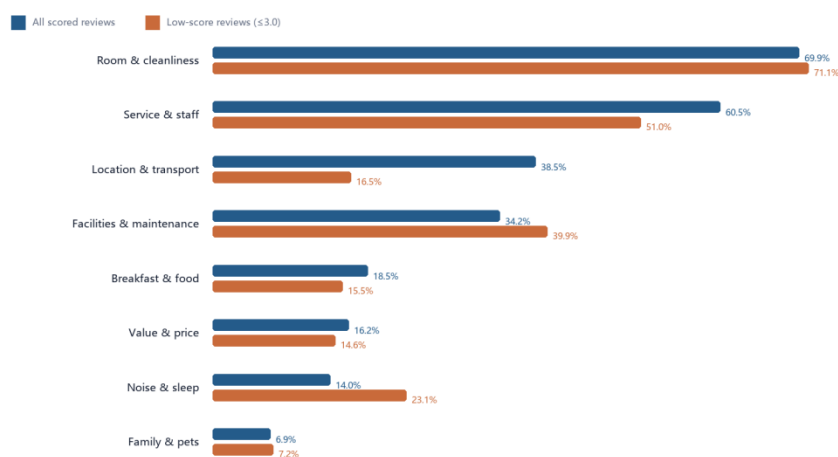
Source: Complete-case sample n=696; outcome $\ln(1 + \text{cumulative reviews})$; kNN=8.

Room/cleanliness appears in 69.9% of scored reviews (71.1% of low scores); service/staff falls from 60.5% to 51.0%; location/transport falls from 38.5% to 16.5%; facilities/maintenance rises from 34.2% to 39.9%; noise/sleep rises from 14.0% to 23.1%. Platform tags show 'enthusiastic front desk' (71.0% of hotels), 'elegant environment' (59.6%), 'great breakfast' (49.5%), 'convenient transport' (44.5%) (Figure 4).

Figure 4. Guest-experience themes in Tianjin Ctrip reviews

Guest-experience themes in Tianjin Ctrip reviews

Share of non-empty review texts; themes are non-exclusive



Source: Dictionary-based review incidence; themes are non-exclusive; low score ≤ 3.0 .

3. Discussion

The results reveal three superimposed geographies. The supply geography is highly clustered and polycentric, consistent with agglomeration evidence from lodging markets and with Tianjin's multi-core urban form. The quality geography is only weakly spatial remote scenic hotels in Jizhou match or exceed core ratings, echoing findings that hotel location and tourist activity only partially overlap.

The attention geography is mainly spatially arranged and decreases with the increase of the core distance. The single-distance coefficient being weak in the multivariate model is due to the fact that Binhai is an independent business, port and leisure market instead of only an outer area, and because the core distance combines several market systems. The strong spatial correlation is in agreement with common visibility and demand routes, but it also indicates unobserved capacity, price and platform history; the cross-sectional data cannot decide whether the reputation comes before the attention or the other way around.

5. Conclusion

Ctrip presents Tianjin as a polycentric hotel market where the physical supply, the perceived quality and the platform attention have different spatial structures: 983 unique places are located around the central city, Binhai and Jizhou; the rating autocorrelation is small; the cumulative reviews are mainly organized in a spatial manner. For the management, the central and Binhai hotels should maintain a high market visibility by improving the service quality, especially dealing with malfunction, odor and noise complaints according to the escalation rules; while the peripheral scenic hotels should transform the high customer satisfaction into better discoverability and itineraries' integration, providing different product contents for the major family and business markets. For the planning, the transportation and the wayfinding facilities are common resources, but the quality management should be carried out separately by each hotel. Data availability and ethics are taken into consideration. The analysis is carried out on the research data and public hotel information supplied by the author. We study the review texts together but do not copy the reviewer's names or individual comments. The working dataset will not be passed on again; in any publication, the direct identifiers should be deleted and the platform rules and institutional ethical standards should be observed.

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