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Location does not matter in the informational age? – a case study on the distribution of restaurants listed in ‘dazhongdianping’ in Beijing

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ABSTRACT: This paper analyzes the relationship between the spatial parameters calculated by space syntax and the data from dazhongdianping Beijing, a popular website for choosing and reviewing restaurants by Chinese people. The result suggests that the use of informational technology is strengthening the spatial distribution logic of these restaurants instead of weakening the role of physical urban space. Furthermore, this paper focuses on the actual uses of shopping and catering spaces in the Wangfujing area and three major shopping malls. This study explores the potential and limitation of “big data” from Dazhongdianping in customer behavior research. It also illustrates the spatial logic for the distribution and use of catering spaces in architecture scale.

Key words : Big data, restaurant, Dazhongdianping, Space syntax.

1 Introduction

Recent development in the informational technologies has great impact on people’s everyday life in big cities. From the 1990s, one popular issue in the field of urbanism and architecture is how informational technologies can affect the locational logic of regional economic structure and customer behavior in local places. With the rise of ‘global market’ and further intensification of the economical networks supported by these new technologies, some scholars predicted that the proximity of places will eventually become not relevant and ‘the demise of geographical space’ [1].

However, more and more scholars are against this pessimistic viewpoint. At the regional or global scale, they believe that in the information age, the centrifugal and centripetal force co-existed as two sides of a coin [2][3]. On the one hand, the advance of informational technologies lead to dispersion of manufactory activities towards marginal places. On the another hand, management and advanced services are becoming more and more concentrated in few global cities [4].

At the urban scale, the booming online shopping has some influences on the way people choosing, purchasing and reviewing the commodities. For some experience-based commercial functions such as restaurants, the online browsing and reviewing also provide new possibilities for both customers and shops. On some of these very popular websites, such as ‘dazhongdianping’ in China, the user can easily select the restaurants based on several filters like the location, cost, popularities and ranks evaluated by other customers. Together with the use of GPS system in cars and mobile phones, it seems the location of restaurant should not matter any longer, at least not as much as before.

On the other hand, some scholars hold alternative viewpoints. Read pointed out that when the

informational accessibility is no longer a problem, the role played by actual spatial accessibility will rather be enhanced [5]. In this line of thinking, the value of real place experience is even more valuable and influential than before.

Furthermore, the huge amount of data on these information platforms opens up new possibilities for conventional urban models. For the space syntax research, it can reduce the field work and help to choosing the appropriate spatial parameters.

2 The data and research methods

2.1 About Dazhongdianping

Dazhongdianping Company is founded in 2003 in Shanghai. Its website (www.dazhongdianping.com) is one of the first Chinese web forum and service platform which provides information for the convenience of people's daily life. In 10 years dazhongdianping develops into a leading website in this field of service and to a large extent it changes the way people use catering functions in cities. A user can make his choice based on many characters such as the style of flavor, quality of environment and service. It also shows the reviews from previous customers and the average rank of certain restaurant based on the customer feedbacks.

The data collection of this research started from May 2013. The research area covers 5 main administrative districts, dongcheng, xicheng, chaoyang, haidian and fengtai. Within each district, there are 10 to 20 smaller sub-area listed on the website. Figure 2 shows the distribution density of restaurant within each of this sub-area listed on the website.

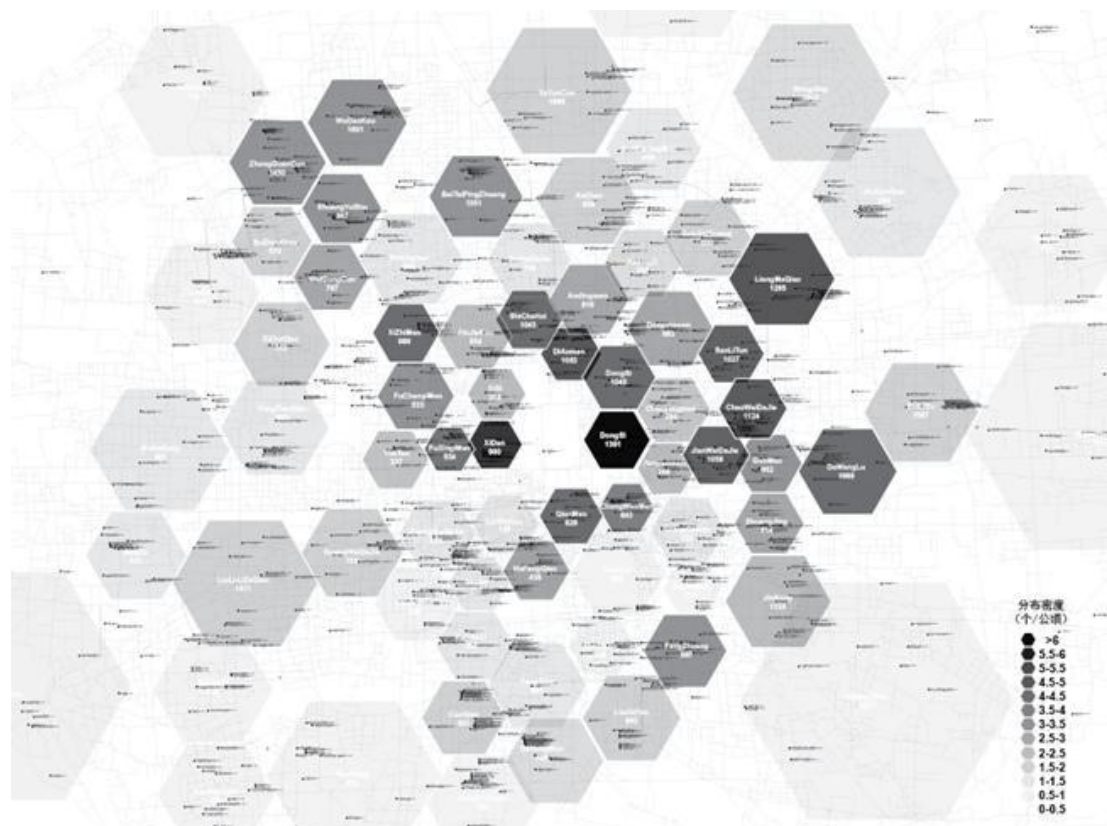


Figure 1: number of restaurants and density in each sub-area listed in dazhongdianping.

For each sub-area, we select top 15 restaurants in the default ranking filter. After delete some restaurants which are listed by multiple sub-areas, there are in total 1123 restaurants selected as samples. In the default setting of the website, each page can show up to 15 restaurants in one page, practically the restaurant listed in the first page are the most visible ones. For each restaurant, this

research records three types of data, the average cost per meal per person (in RMB), the number of reviews from previous customers and the average rank based on their reviews (0-5 stars). Among these data, the number of reviews could be understood as comparable with the number of visits in a comparative study between these restaurants. As mentioned before, although food delivery is an emerging new service provided by many modern restaurants, face to face service is still a dominant sector in their business. The average cost per meal per person can reveal not only the economic status, but also the scale of customer of each restaurant. Normally, expansive restaurants are visited by customer from larger region. Therefore, these two sets of data are related with the actual movement in urban space. All these data are illustrated in a map in figure 2. The regression analysis shows very low correlation between these three sets of data (R-square value lower than 0.078). This research will focus on if the spatial location of these sampled restaurants reveals certain underlying logic.

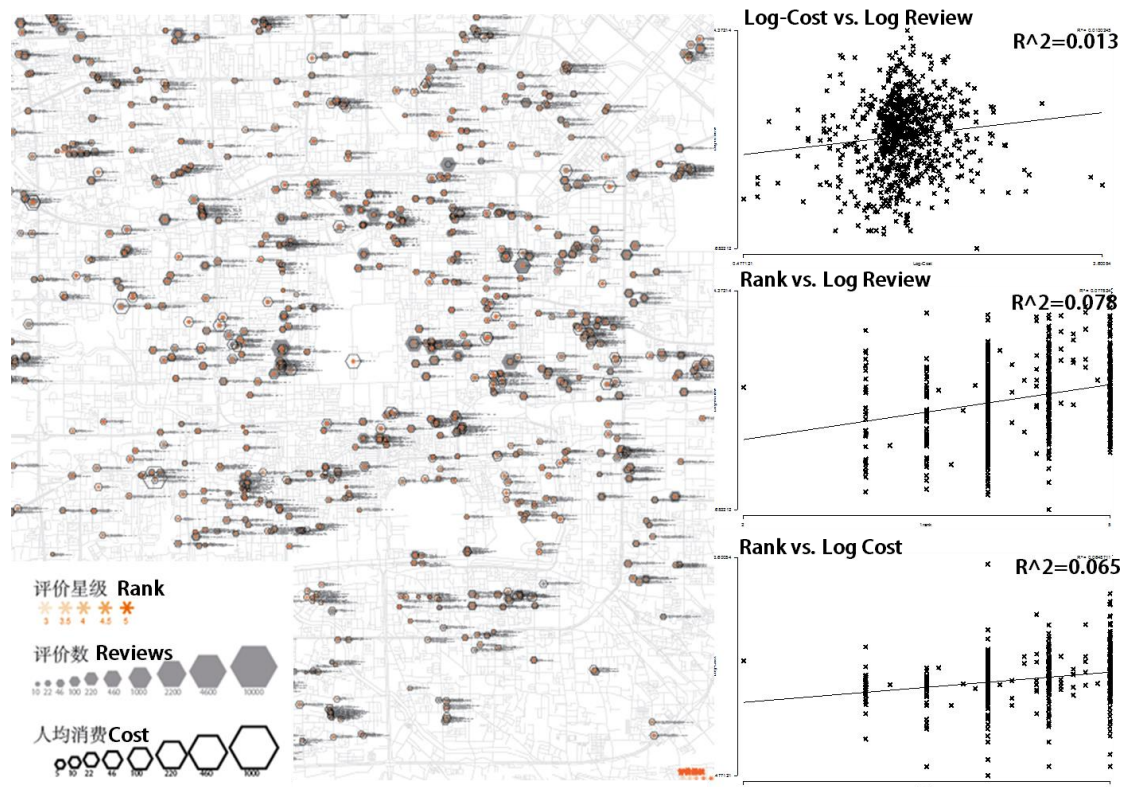


Figure 2: number of reviews, average cost per meal per person and ranks of the sampled restaurants.

2.2 Integration and Choice value in space syntax

The area of space syntax analysis covers the whole metropolitan region including the satellite towns such as Changing, Shunyi, Tongzhou and Mentougou. The analysis is mainly focusing on two types of parameters in the angular analysis mode: integration and choice value.

Integration is an old spatial parameter could be traced to the origin of space syntax tool. It measures the topological distances of each street segment in relation with other segments in certain range. The choice value (normalized angular choice) used in this research is a new development of space syntax in 2012[6]. Based on the empirical study of 50 cities, this measurement proved to strongly related with the automobile traffic.

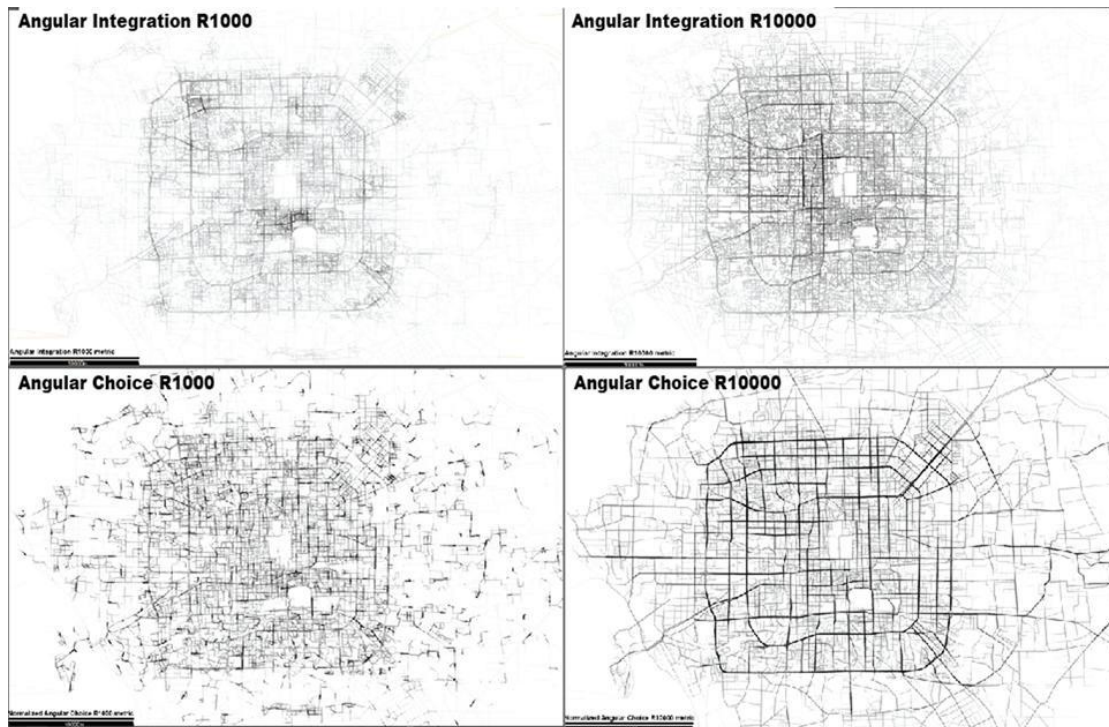


Figure 3: Integration and choice value of Beijing in radius 1km and 10km.

Figure 3 shows integration and choice value in 10km and 1km radius. Integration can reveal different scales of central places. The choice can show different scales of movement networks. In terms of shopping behavior, integration and choice value can reveal two different kinds of spatial potentials: integration shows the potential of a place (or a shop inside a shopping mall) being visited as a target of the trip. While choice shows the potential of a place being passing-by by chance. Using these two parameters, this research will explore how they can influence the shopping behaviors in different scales.

3 Urban-scale analysis on Dazhongdianping data

This research starts with analyzing the relationship of 3 sets of data (reviewing number, average cost and rank) with the spatial parameters. Table 1 lists their locations' integration and choice value in different radius. The darker the background color means the higher dependency of certain group of data on certain type of spatial parameters. For instance, in the list of reviewing number, the 77 restaurants with top 20% number of reviews tend to be influenced by 50km radius choice value most. Their location's choice value in 50km radius is above the average rate by 45%.

评价数 Review	NodeCount	NACH1km	NACH2km	NACH5km	NACH10km	NACH20km	NACH50km	INT1km	INT2km	INT5km	INT10km	INT20km	INT50km
		0.892106	0.891377	0.87704	0.863679	0.848731	0.820673	69.3338	209.023	1049.41	3530.9	9851.6	16258.2
top20%review	77	1.10456	1.18803	1.22583	1.22733	1.21205	1.1974	134.976	442.461	2136.34	6889.58	16857.8	21674.8
		123.81%	133.28%	139.77%	142.10%	142.81%	145.90%	194.68%	211.68%	203.58%	195.12%	171.12%	133.32%
top20-40%review	219	1.16499	1.21273	1.22063	1.20463	1.18478	1.17624	131.28	416.673	2010.06	6351.53	15713.5	21087
		130.59%	136.05%	139.18%	139.48%	139.59%	143.33%	189.34%	199.34%	191.54%	179.88%	159.50%	129.70%
top40-60%review	316	1.13333	1.18467	1.18753	1.17254	1.14927	1.13302	121.907	391.501	1898.49	6051.23	15175.9	20612.6
		127.04%	132.90%	135.40%	135.76%	135.41%	138.06%	175.83%	187.30%	180.91%	171.38%	154.05%	126.78%
top60-80%review	147	1.10623	1.15365	1.15105	1.12795	1.10383	1.08311	108.515	338.519	1603.55	5268.17	13766.9	19648.9
		124.00%	129.42%	131.24%	130.60%	130.06%	131.98%	156.51%	161.95%	152.80%	149.20%	139.74%	120.86%
bottom20%review	53	1.06994	1.11407	1.10267	1.08068	1.06247	1.04644	95.9451	274.991	1322.26	4429.57	12220.8	18746.7
		119.93%	124.98%	125.73%	125.13%	125.18%	127.51%	138.38%	131.56%	126.00%	125.45%	124.05%	115.31%

人均消费 Cost	NodeCount	NACH1km	NACH2km	NACH5km	NACH10km	NACH20km	NACH50km	INT1km	INT2km	INT5km	INT10km	INT20km	INT50km
		0.892106	0.891377	0.87704	0.863679	0.848731	0.820673	69.3338	209.023	1049.41	3530.9	9851.6	16258.2
top20%cost	87	1.13807	1.18952	1.19334	1.17532	1.15451	1.13932	121.086	395.721	1922.75	6248.63	15558	20825.4
		127.57%	133.45%	136.06%	136.08%	136.03%	138.35%	174.64%	189.32%	183.22%	176.97%	157.92%	128.09%
top20-40%cost	190	1.13084	1.17367	1.17241	1.15312	1.13143	1.11359	123.689	388.308	1860.93	6048.71	15183.3	20578.2
		126.76%	131.67%	133.68%	133.51%	133.31%	135.69%	178.40%	185.77%	177.33%	171.31%	154.12%	126.57%
top40-60%cost	286	1.11632	1.17745	1.18954	1.17882	1.15764	1.14475	121.557	384.625	1864.44	5855.76	14770.2	20599.3
		125.13%	132.09%	135.63%	136.49%	136.40%	139.49%	175.32%	184.01%	177.67%	165.84%	149.93%	126.70%
top60-80%cost	122	1.11252	1.1637	1.16416	1.14765	1.12522	1.10806	108.799	349.417	1749.42	5632.29	14422.6	20063.3
		124.71%	130.55%	132.74%	132.88%	132.58%	135.02%	156.92%	167.17%	166.71%	159.51%	146.40%	123.40%
bottom20%cost	53	1.19496	1.22514	1.21626	1.19091	1.16778	1.15707	125.159	388.924	1808.02	5873.62	14963.6	20101.7
		133.95%	137.44%	138.68%	137.89%	137.59%	140.99%	180.52%	186.07%	172.29%	166.35%	151.89%	123.64%

评价星级 Rank	NodeCount	NACH1km	NACH2km	NACH5km	NACH10km	NACH20km	NACH50km	INT1km	INT2km	INT5km	INT10km	INT20km	INT50km
		770	0.892106	0.891377	0.87704	0.863679	0.848731	0.820673	69.3338	209.023	1049.41	3530.9	9851.6
Rank 5	233	1.14196	1.18134	1.1774	1.15875	1.13108	1.11352	128.573	409.383	1995.86	6550.92	16218.1	20713.2
		128.01%	132.53%	134.25%	134.16%	133.27%	135.68%	185.44%	195.86%	190.19%	185.53%	164.62%	127.40%
Rank4.5-4.9	227	1.14723	1.19838	1.2092	1.19603	1.17791	1.16652	126.005	408.463	1984.12	6271.66	15517.3	20982.8
		128.60%	134.44%	137.87%	138.48%	138.78%	142.14%	181.74%	195.42%	189.07%	177.62%	157.51%	129.06%
Rank4-4.4	286	1.14353	1.19618	1.20021	1.18027	1.15899	1.14578	115.71	359.569	1700.64	5373.02	13916.6	20127.2
		128.18%	134.19%	136.85%	136.66%	136.56%	139.61%	166.89%	172.02%	162.06%	152.17%	141.26%	123.80%
Rank 3.5-3.9	52	1.00467	1.08023	1.07827	1.07521	1.05859	1.0449	100.15	316.594	1604.39	5142.9	13388.4	19940.7
		112.62%	121.19%	122.94%	124.49%	124.73%	127.32%	144.45%	151.46%	152.88%	145.65%	135.90%	122.65%
Rank0-3.4	39	1.05988	1.13117	1.14442	1.12318	1.10549	1.07509	102.563	300.742	1364.96	4459.79	12274.8	19111.5
		118.81%	126.90%	130.49%	130.05%	130.25%	131.00%	147.93%	143.88%	130.07%	126.31%	124.60%	117.55%

Table 1: the relationship between reviewing number, average cost and rank with spatial parameters.

As the table shows, the reviewing number is more influenced by spatial parameters than rank and average cost. The top 20% reviewed restaurants tends to located on the street segments with high 50km radius choice value and high 2km radius integration value. In fact, the table shows that other levels of reviewing numbers reveal the similar tendency.

It is necessary to point out that the regression analysis on each restaurant's data from dazhongdianping with the spatial parameter of each street segment the located on leads to a very low correlation. The highest R-square value turns to be the relationship between reviewing number and 5km integration value (only 0.131). One of the possible reason is the characteristics of catering function. Later research at architecture scale shows that they tend to locate in relatively low visible space comparing with retail functions. Therefore, instead of analyzing the spatial condition of the street segments they directly connected, this research take the local area as a group of streets. Furthermore, because the previous part of the research indicates influences of 2km integration and large scale normalized angular choice, this part of research focuses on the total number of restaurants listed in each small district in dazhongdianping and the spatial condition of that particular area.

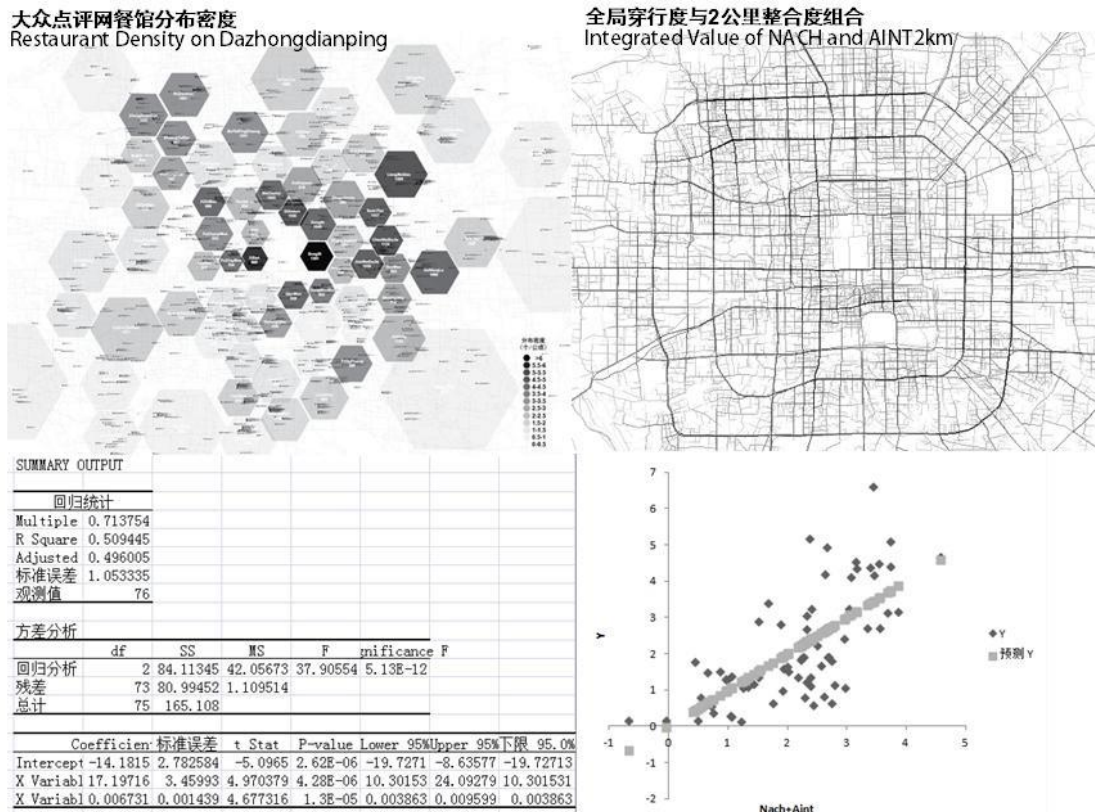


Figure 4: the regression analysis of distribution density of restaurant on dazhongdianping and the integrated spatial parameter.

Using the tool of regression analysis with two factors (2km integration and 50km Choice), the R-square value of distribution density of the restaurants on dazhongdianping and integrated spatial parameter can reach 0.51 (see figure 4). The weight between Choice and 2km integration is 4.613:1.

What does all of these findings mean? First, it indicates that in the information age the spatial condition still plays important role in the distribution of catering functions. Second, this spatial condition could be understood as an integration of two main aspects: how local area is connected in the whole city (50km Choice) and how it is connected in local street fabric itself (2km integration). Furthermore, the connection in city as a whole is more important than its local connections. All of these finding indicate the restaurant which is better connected in the whole city and local street fabrics can benefit more from dazhongdianping. They tend to be visited more often and get more reviews.

Can these preliminary findings be tested in smaller scale? Is there a relationship between the number of customers and the reviewing numbers on web? These questions will be explored in a detail case study in Wangfujing area in Beijing.

4 Block scale and architecture scale analysis: case study in Wangfujing area and the Malls at New Oriental Plaza

4.1 data collection and fieldwork

Wangfujing area is the district on dazhongdianping which has highest number of restaurants. Previous study shows that the reviewing number has strong correlation with the spatial parameters. In this part of the research top 60 restaurants with highest reviewing numbers are selected as

samples. Their ranks and average cost data are also visualized in figure 5. The dash line marks out three major shopping malls in Wangfujing high street. They are the Malls at New Oriental Plaza, Beijing Department Store and New Dong'an APM.

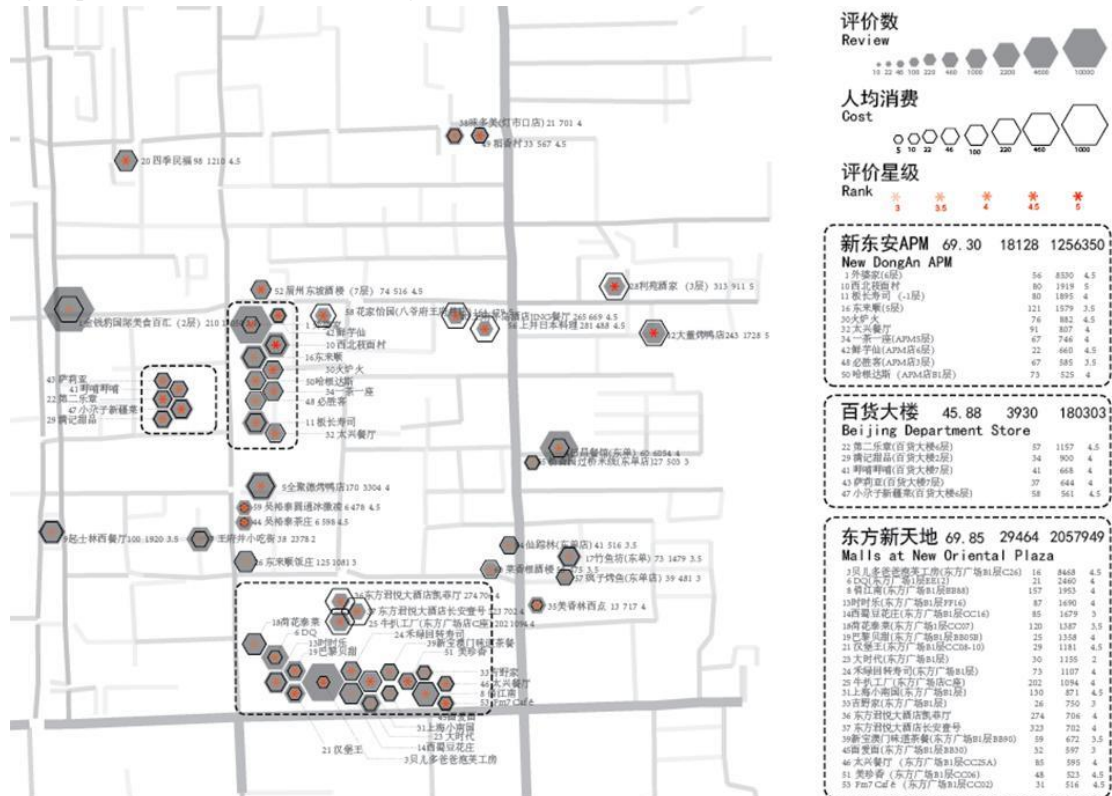


Figure 5: top 60 restaurants with highest reviewing numbers in Wangfujing area and their location in relation with the three major shopping malls.

From the result, the Malls at New Oriental Plaza have 20 out of the top 60, New Dong'an APM have 10 and Beijing Department Store have only 5. The total number of reviews and estimated profit (average cost multiply the reviewing number) of these three shopping malls are in the same order, but the New Dong'an APM rank first in average number of reviews per restaurants and average cost. The rest 25 restaurants are distributed in the street segments in the whole area. But only 3 of them are located directly on Wangfujing high streets. Comparing with other retail functions, catering functions tend to stay away from the busiest street.

A fieldwork is organized to compare the web data with the actual use of space on the streets and inside the buildings. There are 72 observation points on the streets. Pedestrian flows are measure four times in a day. The fieldwork inside shopping malls was done in two days (one weekday and one weekend day). There are 346 observation points inside the three shopping malls, the flow passing those points were also measured four times a day. The instant number of customers inside 893 shops or restaurants inside 3 case shopping malls were noted down three times a day (morning, lunch time and afternoon).

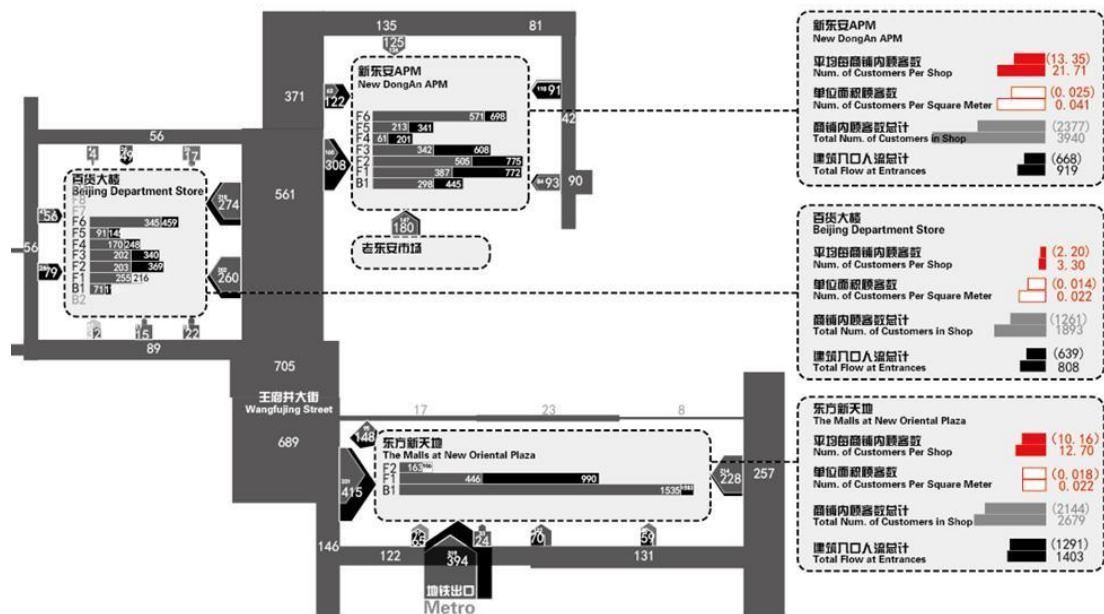


Figure 6: the flow intensity in Wangfujing area and number of customers in three shopping malls (weekday and weekend day).

Figure 6 visualizes the flow intensity on the streets and at the entrances of 3 shopping malls, it also shows the number of customers inside shops in each floor in weekday and weekend. The flow at the entrances shows the Malls at New Oriental Plaza has highest number of people coming in and out of the building, Beijing Department Store has lowest number. Comparing the number in weekday and weekend, the malls at the New Oriental Plaza tends to run a very stable business while the New Dong'an APM tends to benefit most from the weekend or holiday.

4.2 Spatial analysis on Wangfujing area and case shopping mall

This part of the research will use space syntax tool to analyze the spatial parameters of the Wangfujing area and the case shopping malls. It will compare the actual spatial condition and usage with the virtual visibility. Furthermore, a more detail study in the Malls at New Oriental Plaza will be presented.

At the urban block scale, a detail pedestrian network including the ground level of major shopping malls are mapped based on the field work. Figure 7 shows the observed pedestrian flow intensity with the space syntax analysis result of 3km integration. The R-square value is 0.612. Furthermore, the average 3km integration and choice value of three major shopping malls are also listed.

人流量叠加
Total Pedestrian Flow



线段模型分析(整合度)
Segment Analysis (Integration3km)



A 百货大楼 平均选择度 (Average Choice) : 0.799 平均整合度 (Average Integration) : 736.0	B 新东安市场 平均选择度 (Average Choice) : 0.831 平均整合度 (Average Integration) : 819.3	C 东方新天地 平均选择度 (Average Choice) : 0.880 平均整合度 (Average Integration) : 893.0
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Figure 7: pedestrian flow intensity in Wangfujing area and the spatial analysis of 3km integration value.

The result shows the Malls at New Oriental Plaza has the highest integration and choice value while the Beijing Department Store ranks the last. This ranking fits with the statistical data from dazhongdianping and the field work very well.

A detail study on the case of New Oriental Plaza starts with the analysis of observed flow on the corridors (see figure 8). Using the ‘unlink’ tool in space syntax, a 3D model of the mall is established. 1km choice value is strongly correlated with the observed flow inside the building (R-square=0.623).



Figure 8: the flow intensity and 3d spatial analysis of the Malls at New Oriental Plaza.

When focusing on the catering functions inside the building, most of them are located on the least visible and least accessible part of corridors with the Macdonald’s as the only exception. They locate on the underground floor, at the east and west end of the building and a sideways in the south part which is parallel with the main corridor. This distribution is both a design strategy and a natural logic for the catering function because they are only visited in certain times of a day. Similar distribution pattern can also be found in previous study in block scale.

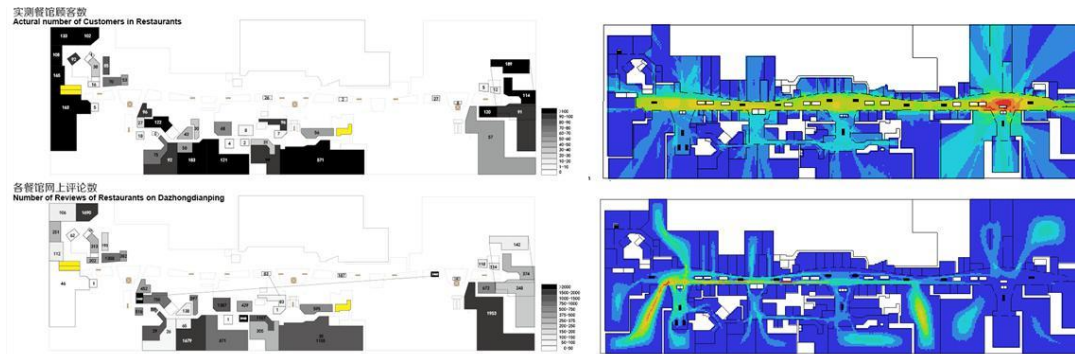


Figure 9: the comparison of observed number of customers, reviewing numbers on web and the visibility and agent simulations in space syntax.

Furthermore, when comparing the actual use of these restaurants with the reviewing numbers, there is almost no correlation ($R\text{-square}=0.03$). There are two possible reasons: First, fast food or snack shops have very limited space for eating therefore the observed number of customers appears to be very low. Second, some restaurants or cafes like Macdonald's and Starbucks have high number of customers in most time of a day, but they have relatively very low number of reviews on web. Obviously the standard food and beverage they serve make them less necessary to be reviewed. However, from the spatial analysis and the agent simulation we can see the restaurants with more visible front and larger space tends to be more popular.

5 Conclusions and discussions: If the wine is good, does it still matter how deep the bar located?

It seems that any kind of claims underestimated the impact of the information technologies on our contemporary urban life is so powerless. Indeed, without dazhongdianping, it is very hard to get the similar set of data in this research. Especially at urban scale it will be a mission impossible. Dazhongdianping greatly changed our ways of eating out in cities. With the dissolving of the information barriers, it seems that the role of geological space should be weakened. However, catering functions or some other type of commercial functions like theater still depends on the physical experience in actual space. For this type of experience-based functions, the location still matters. A good location can guarantee more customers, and tend to be reviewed more often on web.

In detail, this research can give us some preliminary empirical findings: at urban scale most popular restaurants on web are located in the area which is well connected in the city as a whole and also topological centered in the local street fabrics. At urban block scale the well connected shopping malls tend to have more popular restaurants and therefore the study shows a clear spatial logic. But in the architecture scale there is a clear difference between the observed number of customers and the reviewing number. This result suggests that a target consumption based on web depends less on the spatial configuration inside the building, but more on the location of the building in its urban context. The limitation of this research so far is lack of further empirical data and the improvement of the survey. Noting down the instant number of customers enlarges the influence of shopping area. A better method is to measure the flow coming in and out of each individual shop.

As a summary, virtual space is a tool to facilitate the shopping behavior by increasing its information accessibility. In this sense, it is just as the transportation technologies which can increase the physical accessibility of these shops. As tools they are normally being implemented in an already successful area while leave some other less successful area by-passed. Although there is an ancient Chinese poem said "if the wine is good, it does not matter how deep the bar is

located”, it seems the location still matter a lot in the informational age.

Reference:

- 1.Manuel Castells, The Information Age: Economy, Society and Culture [M], The Rise of the Network Society , Blackwell, 1996;
- 2.Liu Weidong. Development of the Internet in China: spatial characteristics and implications [J]. Geographical Research, 2002, 21(3): 347-356.
- 3.Gillespie A, Richardson R, Cornford J. Regional Development and the New Economy, Research paper of the Center for Urban and Regional Development Studies [J], University of Newcastle Upon Tyne, UK, 2000.
- 4.Sassen. S., The Global City: New York, London, Tokyo.[M], Princeton: PrincetonUniversity Press, 2001.
- 5.Read, S. Another Form: From the ‘Informational’ to the ‘Infrastructural’ City [J], in Footprint, 2009, 5: 5-22.
- 6.Hillier, B., Yang, T., Turner, A., Advancing DepthMap to advance our understanding of cities: comparing streets and cities, and streets to cities[C]. in Eighth International Space Syntax Symposium. 2012. Santiago de Chile: PUC.