IOP Conference Series: Materials Science and Engineering

PAPER • **OPEN ACCESS**

Analysis of Bicycle-sharing Operation and Location Selection of Urban Retail Stores

To cite this article: Rui Shang 2019 *IOP Conf. Ser.: Mater. Sci. Eng.* **569** 052090

View the article online for updates and enhancements.

This content was downloaded from IP address 120.25.253.117 on 14/10/2019 at 22:59

IOP Conf. Series: Materials Science and Engineering **569** (2019) 052090 doi:10.1088/1757-899X/569/5/052090

Analysis of Bicycle-sharing Operation and Location Selection of Urban Retail Stores

Rui Shang

University College London, London, wc1e 6bt, England

Abstract: Bicycle-sharing is the product of the new era, which has brought a variety of life styles to the society. Generally speaking, the conventional considerations of retail store location include: urban factors, population factors, traffic factors, competitors and other related factors. Under the circumstance of sharing bicycle operation, the location methodology of retail stores has developed and changed. Besides recognizing Bicycle-sharing, people should carefully analyze the basic characteristics of bicycle-sharing, and then make a location decision suitable for the development of retail stores. In short, the location of retail stores should keep pace with the times and change the way of life in the new era with the sharing bicycle as a corresponding change.

1. Basic Problems of Location Selection of Urban Retail Stores

The location of retail stores in modern cities is a comprehensive problem. A good process of location of retail stores needs to take into account all aspects of the establishment of retail stores. In many problems of retail store location, the core problem is how to choose a good "business circle". The so-called "business circle" refers to a business circle formed by taking retail stores as the center and extending outward. These business circles include customers who may come to retail stores for consumption. Since the main way for customers to buy goods in retail stores is to watch, screen and finally choose from the retail stores, their biggest business circle is undoubtedly the customer group closest to the stores. And those who live or work farther away from retail stores are less likely to shop. That is to say, the nearer the retail stores are, the more purchasing power they contain, the greater the contribution they make to the business income of the stores.

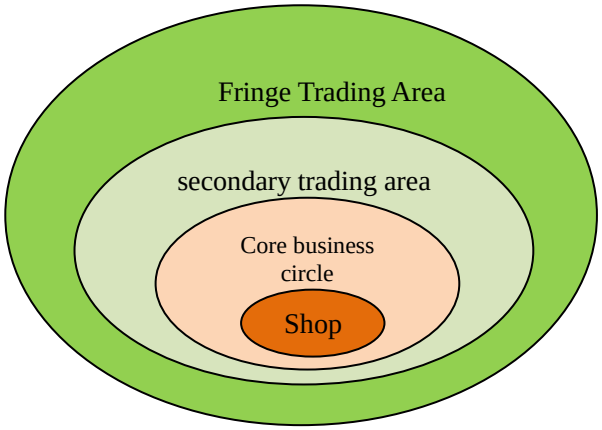


Figure 1. Business circle concept illustration

Content from this work may be used under the terms of the Creative Commons Attribution 3.0 licence. Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI.
Published under licence by IOP Publishing Ltd

There are many factors affecting the formation of business circles, including at least the following points. First: the size and goodwill of the store itself. Some retail stores have a large scale, which can give customers an intuitive shopping experience and comfort. This type of store is often easier to get customers' favor. Conversely, smaller stores tend to be perceived by customers as "unprofessional" and may choose to ignore them. In addition, although some retail stores are small in size, they are also familiar with and accepted by everyone because of their commercial influence, and often go shopping in stores. Among them, there are well-known small shops with big brands such as "familymart", "Meiyijia", "7 eleven". Second, the city. City is a very macro factor affecting the choice of retail stores. The economic development level of a city, its commercial culture, the number of frequent residents, the scientific and rational planning of urban highway, etc. can greatly affect the scale of retail stores. Third, residential factors. In the process of locating retail stores, the most influential factor is undoubtedly the resident factor. Because for retail stores, the most direct and main consumer is the residents next to the retail stores. Then, the basic situation of these residents, to a large extent, determines the operation of retail stores. For example, if most of the residents living around are economically competent groups, then there is hidden consumption power that brings commercial benefits to retail stores. But this is only a certain degree of "possibility", and whether these purchasing power ultimately has the time or preference to buy goods in a retail store is the direct determinant. Fourth, the competitor factor. In the process of locating retail stores, the most important thing that can not be ignored is the problem of competitors. In many cases, competitors in the same industry have taken root and developed before a retail store is chosen in a city area that has been developing for many years. These competitors have accumulated a certain amount of relatively stable customers due to the previous arrival, that is to say, the purchase customers of new retail stores have been partitioned out to a certain extent. If there are many competitors in a certain area, it will cause great disadvantage to the establishment of new retail stores. At this time, the saturation index of the business circle can be used to evaluate the suitability of a local location. Saturation index is a measure of the saturation degree of competitors in a particular region by comparing demand with supply, which can assess potential customer demand in a particular region. The calculation formula is as follows:

$$IRS = \frac{C \times RE}{RF}$$

IRS: Refers to the retail saturation index of certain commodities in a certain region. C: Potential customers who buy certain commodities in a certain area. RE: The average purchase amount for each customer in a certain area. RF: The total business area of similar commodity stores in a certain area. The smaller the retail saturation index, the higher the saturation. In addition to the above four factors affecting the location of retail stores, there are other factors, such as the level of operation of stores, traffic conditions and so on.

2. Characteristics of Bicycle-sharing Operation

Bicycle-sharing is undoubtedly one of the hottest terms in 2007. In recent years, bicycle-sharing have developed rapidly in large and medium-sized cities in China. The most well-known Mobai bicycles and ofo Xiaohuang bicycles are the typical representatives, which has set off a wave of the whole people. Now the development of Bicycle-sharing has come to the third year, and its application mode and basic characteristics have been basically shaped. Therefore, in the process of locating retail stores, it is necessary to fully understand the operation of Bicycle-sharing itself, in order to better give the corresponding analysis and research.

2.1 Analysis of the Use Places of bicycle-sharing

If you look carefully, you can easily find that the use of bicycle-sharing covers almost every corner of the city, which is related to the different destinations of individual consumers. Although it seems that there is no regularity to follow, but seriously summarized, it can be found that the use of several occasions is more common.

2.1.1 Commuting occasions

In every big city, the peak time for commuting is the maximum time for people to concentrate in their daily life. During this time period, the number of people traveling is quite large. Bicycle-sharing use has reached a peak in such commuting occasions. The most typical phenomenon is the use of bicycle-sharing beside Metro stations. For example, during morning commuting hours, there are a large number of bicycle-sharing at the subway entrance. This is because when people leave their homes in the morning, they spontaneously look for bicycle-sharing parked next to their houses and ride to the subway entrance. In this case, bicycles scattered by people are gathered at the subway entrance because of people's cycling. On the contrary, if it is off-duty time, bicycle-sharing at transport hubs such as subway crossings will be ridden by people separately, and then distributed in different corners of the city.

2.1.2 Campus occasions

Cycling is a common phenomenon in University campuses. Because of the specific environment on campus, cycling not only means convenience, but also a kind of romance for many people. College students often need to transfer from their dormitories to classrooms during their schooldays. However, dormitories and teaching buildings on university campuses are often separated by a certain distance. It takes even 30 minutes to walk, so sharing bicycles on campus is in great demand. As one of the two main business entities of sharing bicycles, ofo Xiaohuang bicycle is focused on doing campus sharing bicycles.

2.1.3 Other occasions

In addition to the two typical examples of commuting and school occasions, there are many occasions for sharing bicycles. For example, shopping occasions. When people go shopping, they often like to ride a bicycle, and then when they come to the shop they like, they park it in the back and go shopping, so the bicycle will be parked next to the shop. Tourist occasions are also an important occasion for sharing bicycles. A typical example is Hutong Tour in Beijing. People used to go to Hutong and only choose manpower tricycles or electric sightseeing cars. Since sharing bicycles, people can unlock one anywhere they like and go wherever they like. Particularly suitable for friends who like photography, you can stop at any time to take photos when you see the beautiful scenery you like on the way.

2.2 Users of bicycle-sharing

2.2.1 Young workers

For some workers, especially young workers, sharing bicycles is undoubtedly their favorite way of travel. Because most young workers have just graduated from the campus, they can not raise enough funds to buy real estate and travel vehicles. They can only rent and live near the subway station or bus station to facilitate the next day's work trip. Since no vehicles were purchased, public travel was the only way to get to and from work. So sharing bicycles at this time will undoubtedly be their ideal choice. Among young workers, their preferred way of consumption is simple, convenient and fast. Because when commuters ride bicycle-sharing, they spend most of their time going to and from work. At these times, most of them are in a state of rush, so the time to buy things in retail stores is strictly controlled. And they rush to work in the concentration of places, mainly in the transport hub or office buildings.

2.2.2 Student population

Student groups are also important consumers who use bicycle-sharing. In addition to the need for students to use bicycle-sharing in the process of classes on and off campus, they also choose to use bicycle-sharing when they go out. For example, when students travel from the dormitory area to the subway entrance, they will also choose a faster way to ride than walking. In particular, students use bicycle-sharing in short-distance transfers when they travel, shop, visit friends and other activities

outside school. Students, as a part of the customer group, generally consume in the daily necessities of clothing, food, housing and transportation, and seldom consume products in special fields, which is well suited to the characteristics of products sold in retail stores.

3. Create a Retail Store Business Circle with Bicycle-sharing User Groups

On the issue of retail store location, the above factors have been roughly introduced and sorted out. After combining the use occasions, user groups and their consumption habits in the operation of Bicycle-sharing, we can synthesize the characteristics of the two and create a business circle for the location of retail stores with Bicycle-sharing users as one of the consumers. Therefore, with the following five basic principles and concepts, build a retail store business circle with sharing bicycle users as important customers.

3.1 Target Market Principle

In order to create the goal of sharing bicycle user group business circle, the target market positioning of retail stores in site selection should be very clear, and the location should be selected according to the operation positioning of their own stores. That is to say, before choosing the location of the store, first of all, we should make clear that the target customers of this retail store are all the nearby users who ride bicycle-sharing, so that the business scope and business positioning will be very clear. If we are dealing with daily necessities, we need to consider sharing bicycle users'time, status and needs when riding bicycles, in order to prepare the corresponding supply. In addition, we should also consider that the main target consumer group of this site selection is the sharing bicycle group, which is mainly aimed at the common young working and student groups. Therefore, we should try our best to establish the location in the places where the sharing bicycles are gathered, such as the subway entrance or the University city.

3.2 Traffic flow principle

The core of the traffic flow principle is to find the gathering point. The number of potential consumers in retail stores is large enough only when there are more people to and from. Therefore, it is necessary to ensure that the addresses of the selected retail stores have a large enough number of Bicycle-sharing users. There should be a certain width of parking space in front of the shop for sharing bicycles. In order to facilitate traffic management in many cities, one-way traffic will be set up in some main streets and all vehicles will be restricted. Store location should avoid these places. Also try not to open a shop in a street with a barrier in the middle of the road, because this will limit the flow of people across the street. Even if your shop sign is more eye-catching, sharing bicycle users can not simply cross the street to buy goods in retail stores.

3.3 Principle of Convenience

Transportation convenience is one of the conditions for choosing the location of the shop. It is better to have cheap public transport facilities such as bus and subway entrance near the shop to meet the traffic needs of sharing bicycle users. When choosing the location of retail stores, we should try our best to avoid choosing the location in the traffic congested streets, such as pedestrian streets and the farmer's market areas with complicated traffic, so as to ensure the convenience of sharing bicycles. After all, most of the users choose to ride bicycles instead of walking. They praise the fast-paced life and prefer to solve some problems efficiently and easily. It's like buying goods in retail stores. They also pursue convenience, hoping to buy their own goods quickly and then leave. Therefore, ensuring sufficient space for sharing bicycles parking and access will be an important basic premise for choosing the address of retail stores.

3.4 Principle of stability

The so-called stability refers to the need for business circles, mature community support has been relatively standardized and stable. Through the survey, it is found that the number of bicycle users who

share bicycles at one time is not very large, but they have an important consumption habit, that is, after buying one's goods, they want to ride bicycles to buy other kinds of goods. Therefore, the location of retail stores should be in the place where the commercial price ratio is perfect, so as to make customers feel the need to ride in the process of transfer, thereby increasing the probability of customers buying goods in stores.

3.5 Cost-effective principle

High cost-performance ratio refers to the cost-performance ratio of commodities themselves, that is to say, the selling price is low, but its role can meet the needs of users or even exceed the needs of users. When choosing goods, users who share bicycles often choose goods of general price, and seldom choose to buy luxury goods, because their wealth status has not yet met the requirements. For example, ordinary household appliances, such as household appliances, toiletries, kitchen sauces and other commodities, they will be willing to consume.

3.6 Principle of visibility

Retail storefront itself is the best sign. Choosing a place that is visually easy to find is the key to success. Bicycle-sharing riding in the process, often not too careful observation of the surrounding environment, but simply glance at the street whether there are businesses they need, and then continue to ride. Therefore, the address chosen by the retail store must be located in an open area, so that cyclists can quickly locate and find it.

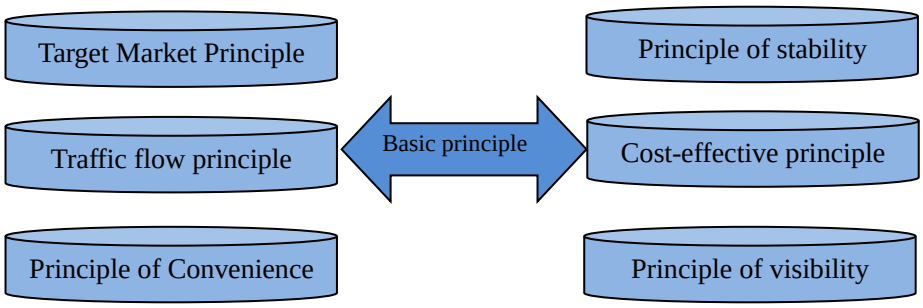


Figure 2. Six Basic Principles

4. Enlightenment of Bicycle-sharing Operation on Retail Store Location

Bicycle-sharing is a new way of travel, which has a certain impact on people's life rhythm and shopping consumption. Because in the past, people used to transfer short distances only by walking, so they could see the relevant information of the retail stores on the roadside more carefully and in detail, but now they transfer short distances by bicycle, because they stay less at a certain place and read less in detail. These factors have a certain impact on the old model of retail store location. Past knowledge of location selection is not necessarily suitable for the new business environment under the current Bicycle-sharing model. As for the location of retail stores, we should carefully combine the characteristics of the Bicycle-sharing operation mode with the characteristics of the consumers who share bicycles. Therefore, we must break the usual way of retail location selection, boldly combine the characteristics of the sharing mode, and make a more scientific choice for the location of retail stores.

Under the impact of Bicycle-sharing, the location of retail stores can consider several specific places: first, the subway entrance. Metro population is one of the places with the largest traffic and the largest share of bicycle users. Under the premise of this commercial basis, if retail stores can choose their location in such places, there is no doubt the possibility of success. Of course, not every subway outlet is suitable for retail stores, after all, we need to see the impact of other factors. 2. University Town Dormitory Area. This is also a consideration of the problem of student user groups, after all, many students have the characteristics of using bicycle-sharing, will be the basic problem of using bicycle-sharing, so we can also consider the establishment of retail stores in the university town area

where bicycle-sharing often appear.

5. Conclusion

Bicycle-sharing is the product of the new era, which has brought a variety of life styles to the society. Generally speaking, the location of retail stores has a variety of conventional ways and principles, such as considering urban factors, population factors, traffic factors and so on. However, under the condition of sharing bicycle operation, the location methodology of retail stores has new development and impact. Besides recognizing bicycle-sharing, people should carefully analyze the basic characteristics of bicycle-sharing, and then make a location decision suitable for the development of retail stores. In short, the location of retail stores should keep pace with the times and change the way of life in the new era with the sharing bicycle as a corresponding change.

References

[1] Yung-Hsiang Cheng, Yi-Chun Lin. Expanding the effect of metro station service coverage by incorporating a public bicycle sharing system[J]. International Journal of Sustainable Transportation, 2018(4):1-12.

[2] Wu L , Bai T , Wang Z , et al. A new Community Detection algorithm based on Distance Centrality[C]// International Conference on Fuzzy Systems & Knowledge Discovery. IEEE, 2014.

[3] Wang F, Chen C, Xiu C, et al. Location analysis of retail stores in Changchun, China: A street centrality perspective[J]. Cities, 2014, 41(41):54-63.

[4] Hemalatha M, Sridevi P, Sivakumar V J. A Decision-Support System application in retail store location model: a case study of hypermarket in emerging markets[J]. International Journal of Business & Emerging Markets, 2017, volume 3:158-176(19).

[5] Erbıyık H, Özcan S, Karaboğa K. Retail Store Location Selection Problem with Multiple Analytical Hierarchy Process of Decision Making an Application in Turkey[J]. Procedia - Social and Behavioral Sciences, 2012, 58:1405-1414.

[6] Shu, Jia, Chou, et al. Models for Effective Deployment and Redistribution of Bicycles Within Public Bicycle-Sharing Systems[J]. 2013, 61(6):1346-1359.

[7] O'Brien O, Cheshire J, Batty M. Mining bicycle sharing data for generating insights into sustainable transport systems[J]. Journal of Transport Geography, 2014, 34(219):262-273.

[8] Lin J R, Yang T H. Strategic design of public bicycle sharing systems with service level constraints[J]. Transportation Research Part E, 2011, 47(2):284-294.

[9] Sabri Y, Micheli G J L, Nuur C. Exploring the impact of innovation implementation on supply chain configuration[J]. Journal of Engineering & Technology Management, 2018:S0923474816302260-.

[10] Feng T J. Analysis on Public Bicycle Traffic Characteristic[J]. Advanced Materials Research, 2013, 694-697:3306-3309.

[11] Su J. A Bicycle Network Analysis Tool for Planning Applications in Small Communities[J]. 2015.