STUDY ON A PARKING PLANNING METHOD BASED ON GIS: A CASE ANALYSIS

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Abstract: In this paper the necessity and importance of the studying on the problem of parking is analyzed first, then aiming at the parking problem that exists in China, the main reasons is concluded in four aspects: no adequate parking supply is in a certain area, illegal parking is very familiar in the city, the parking plan can not be ensured to be implemented in actual, and existing parking lots are not well used. After reviewing the parking demand predicting method for the parking planning at present, comparing the application scope of each method and analyzing the advantage and disadvantage of each method, and on the basis of above work, the basic parking planning idea and the method of parking planning which was suitable for China is put forward. In the end of the paper a concrete city -XiaoShan is chosen as a typical case to make a deep study.

Key Words: parking planning, case analysis, suggestion

1. INTRODUCTION

With the figure of the vehicle in the city is becoming larger and larger, the problem that "it is difficult to park" is becoming to engage more and more scholars' attention. The reason why this problem appeared is that in a long time we only pay attention to the planning of the traffic in traffic planning of the city, and have neglected the parking planning. As a part of the urban traffic system, the parking is also playing an important role.

2. NECESSITY OF THE PARKING PLAN

2.1 The Parking System Plan is the Requirement of Realizing the Urban Development Strategy

The level of the parks facilities influences the traffic operational efficiency and quality of the life directly, and the unreasonable layout and the nonstandard management of the park facilities, will exert an unfavorable influence on the synthesized competitiveness of the city.

According to the long-term development strategy of the city, with the adjustment of the city layout structure, building and perfecting the urban parking system in conformity

with the social economic development of the city is very urgent and essential.

2.2 Adjust and Optimize the Relation of Parking Supply and Demand Relation to Meet the Sustainable Development Demand of the City

For a long time, parking facilities building of China is relatively lag the growth speed in motor vehicle, causing and parking contradictorily more serious, the vicious circle "parking difficultly and parking arbitrarily" becomes the difficult and hot problem of transportation management department. The lack of parking plot is it go out inconvenient stopping up traffic , damage afforest , destroy environment , threaten question such as being safe to cause directly, thus influence life quality , raise the production cost , hinder the normal development of social economy, it is endangered self-evidently. If does not take measures early, will be unfavorable to the orderly, healthy, sustainable development of the city. So, must optimize adjustment to the supply and demand relation of parking and bring about a coordinated development in parking system in the city.

3 PREDICTION OF THE PARKING DEMAND

Table 1. Model Characteristic of the Prediction of the Parking Demand

model \ subject	advantage	disadvantage
Attraction model	• The theory is strong • The precision of the model is relatively high	• Materials about Attraction and model split of every zone is difficult to get
Generation model	• The parking demand predicted through the generation rate is comparatively accurate and direct	• It is difficult to get the future land use of every zone and a large number of investigations are needed
Regression model	• the model is very simple • we can get the accuracy of the model via statistical analysis	• the accuracy of the model is relatively low
Traffic-parking demand model	• the model is very simple and convenient and practical when applying to the small area	• When the predicting area is expanded, the relation between the traffic flow and park demand is changed, its veracity reduced correspondingly
Land use-parking model	• The setting-up of the model is simple and rational	• the job opportunity of every zone is difficult to get • the parameter value is not consistent in a long time

Because the vehicle OD is investigated in Xiaoshan city, the attraction of every zone is easy to get in this project, which is the reason we use the Attraction model to predict the parking demand of Xiaoshan city.
The procedure of the predict model is as follows: According to the classified vehicle OD

materials and the result of the parking characteristic investigating, we can predict the social parking need of based on zone. Express with the mathematics formula is as follows:

$$D_{pi} = \left(\sum_{j=1}^{N} T_{pij} \right) \times K_1 \times K_2 \qquad （1）$$

In the formula：

D_{pi} —the social parking demand in peak time in p year and in i zone；

T_{pij} —the attraction value of the type j vehicle in p year and in j zone（the kinds of vehicle is N）；

K_1 —peak time rate value；

K_2 — the produce rate of parking demand。

4 CASE STUDY

4.1 analysis of the current situation

Through the investigating, we think that there was some parking problems existed in Xiaoshan city:

1. According to the total parking berth supplied, the parking berth still can't meet the parking demand. The demand of parking berth is about 11884 while the supply is only 8763.
2. The parking supply structure is unreasonable, park proportion of roadside is too high
3. Underground parking garage and some park facility at roadside are not well and full used
5. Some buildings do not allocate enough parking berth according to the standard
6. There is no a department to management in such respects as the sub-plan , designing , building and using ,etc. to the public parking lot.

4.2 prediction of parking demand
According to the characteristic of Xiaoshan city, we make such assumption:

The taxi is not included in the demand predict because the time of picking-up passenger is very short.

The bus is not included in the demand predict either because the bus has special parking places.

Through the current OD and the characteristic of parking, the current social parking demand of Xiaoshan city is as figure1.

Through the predict future OD and the characteristic of parking, the future social parking

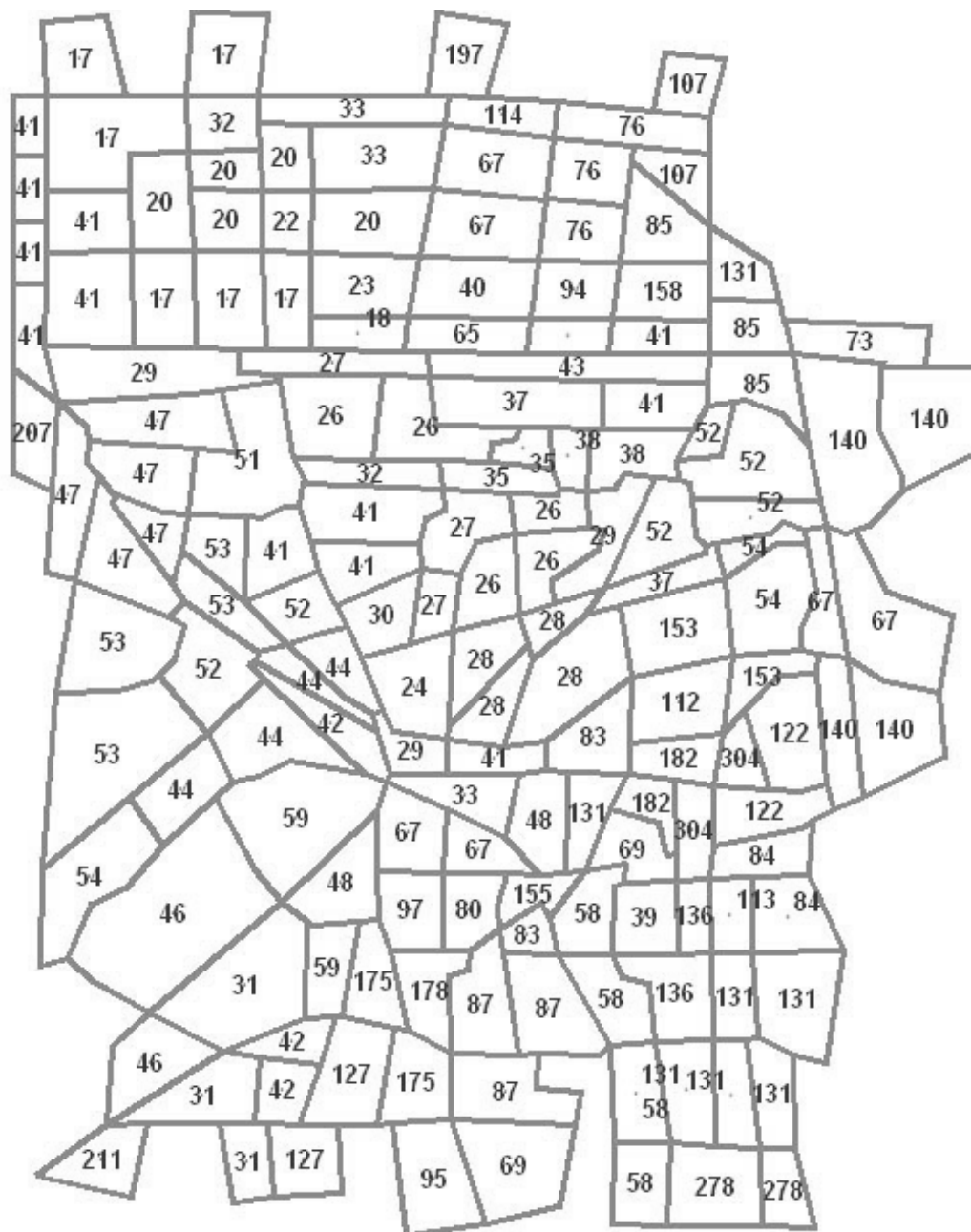demand of Xiaoshan city is as figure2.

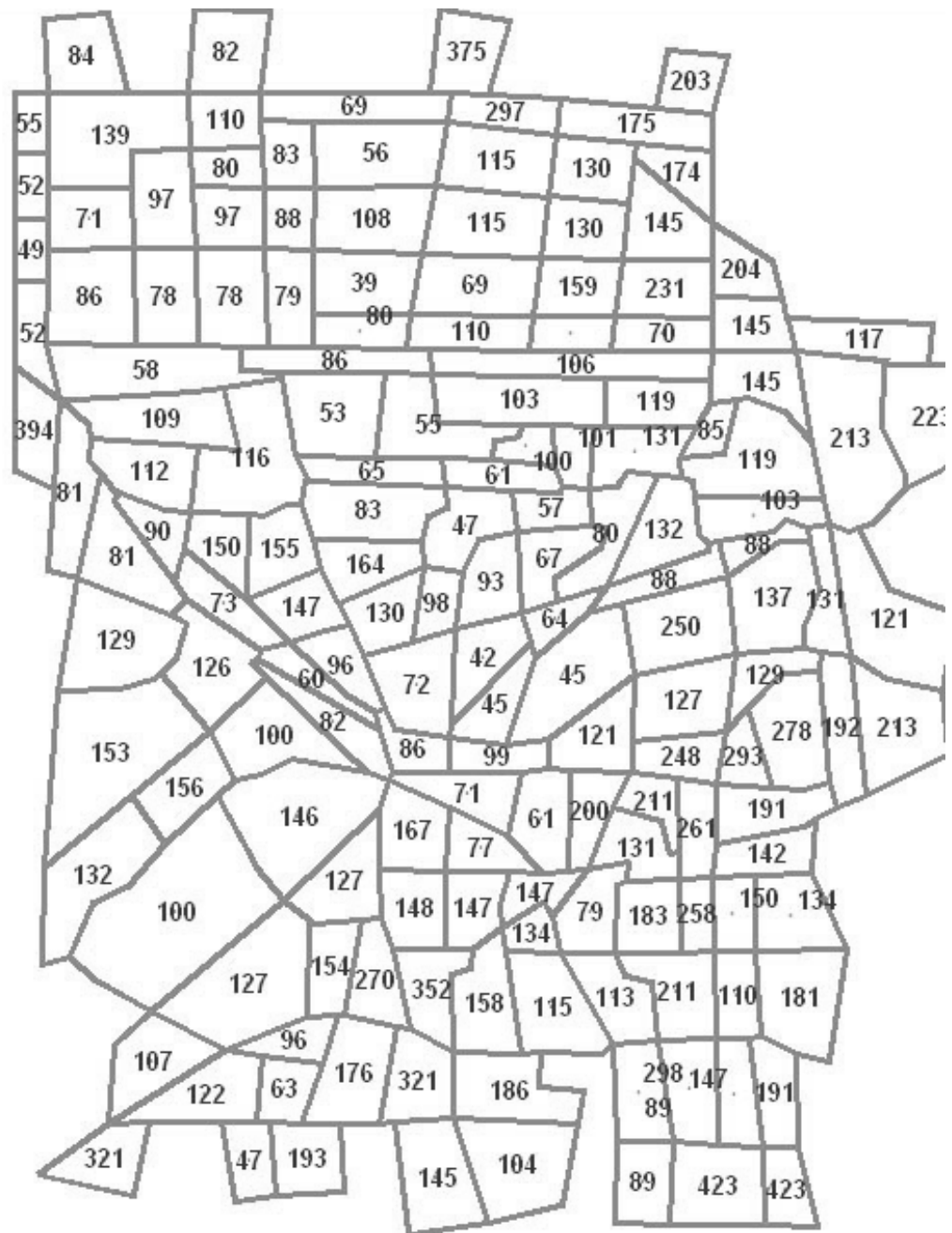Figure 1. Current Social Parking Demand of Xiaoshan City

Figure 2. Future(2010) Social Parking Demand of Xiaoshan City

4.3 quota index standard suggestion for parking

In order to establish a construction quota index standard which suits social and economic development of Xiaoshan city, we have consulted the national standard and related standards of several big cities of china, and make the dependence analysis of these standards with their social and economic index. According to the result and consult park research results both in china and other countries, we establish a set of parking rules which is suitable for Xiaoshan city based on the field investigation and the discussion in Xiaoshan city. According to the prediction parking demand in future, we put forward a standard as seen in table 2.

Table 2. Parking Construct Quota Index Standard for Xiaoshan City (portion)

Building type	Class standard		Construct index standard	
			unit	Parking berth
Hotel	Class 1	Above three star	Every house	0.5
	Class 2	others		0.20～0.3
Restaurant	Class 1	high-grade restaurant	100m^2	3.0～4.0
	Class 2	Common restaurant		2.0～3.0
Office		Administration office	100m^2	1.0～1.5
	Class 1	Top grade business office		1.0～1.5
	Class 2	Common business office	100m^2	0.5～0.8
	Class 3	Science business office		0.5
House	Class 1	villa	house	1.0～1.5
	Class 2	high-grade house		0.8～1.0
	Class 3	Common house		0.5
Commercial service	Class 1	Commercial center of the city	100m^{2}business area	0.5～1.0
	Class 2	Common commercial building		1.5
	Class 3	Large scale retail market		2.0～3.0

4.4 parking charge suggest

Table 2. Charge Standard of the Parking Lot

Parking lot type	standard
roadside	5 yuan/hour, 8yuan/hour if above 1 hour
quota	5 yuan/hour
Social public	5 yuan/hour

4.5 Planning suggestion for parking

Recent planning must fully consider the current park characteristic and the park purpose, and the parking supply is mainly consisted of quota parking lot to solve the society park imbalance of roadside and out of road and the total amount imbalance between supply and demand.

Long-term planning is mainly to suppress the high increasing rate of the holding vehicle in Xiaoshan through the parking supply control policy. At the same time guarantee the rational structure of parking berth supply, cooperate with the long-term road network plan, and improve the comprehensive service level.

Appropriate controlling measure must be adopted to meet the parking demand at the roadside limitedly, and we do not encourage to setup parking lot at the roadside.

4.6 Countermeasure suggestion for parking

1 At the key location, especially the commercial center, plan and construct the parking facilities.

2 Set up parking berth at the roadside at the non-key location, especially to solve the parking at night.

3 Set up and amplify the parking supervision department to improve the management level of the parking.

4 While strengthening the traffic management, strengthen the building of parking facilities.

5 Set up the system of planning, construction, traffic management jointly confirm.

6 Adopt timing charge for the parking lot at the city center.

REFERENCES

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