

## 2. Study of Parking System in Hanoi and Strengthening Its Effectiveness

### ハノイにおける駐車システムとその改善に関する研究

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**Abstract:** The Parking System is the important component of Transportation System. At present, Parking is inadequate in many cities in Vietnam. The Thesis evaluates parking system in Hanoi and provides approach to strengthen it. Learning about characteristic of parking system and studying from experience, in this study, the Parking Generation Rate, Obligated Parking Requirement and Shared Parking will be mentioned. The gap between parking supply and demand in the future is estimated and then its cause and the solution to reduce it are discussed.

#### Introduction

Vietnam is being in development process. In recently year, economic development quickly brings about development of many other fields. The numbers of vehicle increases while the infrastructure as road, parking...has not caught yet. The vehicles often park illegal on street because of insufficient parking. This situation expects research about parking system to improve it.

#### The Objectives of Thesis

The purpose of the Thesis that willing to take is strengthening effectiveness of Parking in Hanoi. The Research Questions make out to be answered in this Thesis as follows:

- What is the problem of parking in Hanoi?
- How the balance between supply and demand?
- How to improve parking system in Hanoi?

#### I. Evaluation current Situation

##### 1. Parking Problems

Currently, parking supply does not meet parking demand. The whole city Hanoi has more than 1.56 million motorcycles and 163.000 automobile (2005). The Hanoi Parking Company is currently managing 138 parking lots (with a total area of nearly 26

hectares) only to meet more than 7 thousand cars. Remarkably, only 8 parking lots are to be in planed location with area of nearly 19 hectare, with a capacity nearly 3 thousand cars. Remain 130 other parking lots are temporary lots, vehicles parks on sidewalks and traffic land with a total area of more than 7 hectares, containing the 4.5 thousand cars. In terms of percentage of land area for parking in the urban, Hanoi only reach 0.45% (in the standard in modern urban-level capital of a country is from 5 -- 6%).

##### 2. Survey

To understand the characteristic of Parker, questions that are provided are When, Where, Why do people park? The Interview survey and Observation Survey was conducted at two Districts in core area are Hoan Kiem and Dong Da to answer these questions.

- Interview People has vehicle parked around survey area by ask directly.
- Counting number of entering and exiting vehicle was conducted at parking lots. Technique is when a vehicle enters or exits, a line will be marked in form that was prepared and total will be recorded every one hour.

The Result of Survey as follow:

- When and how long they parked

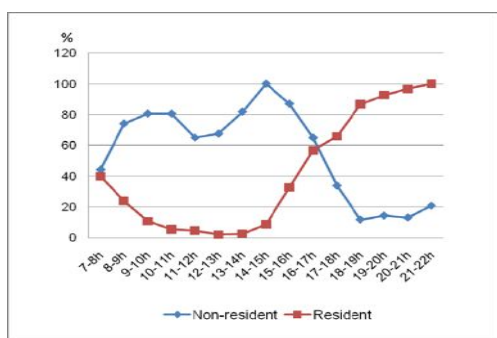
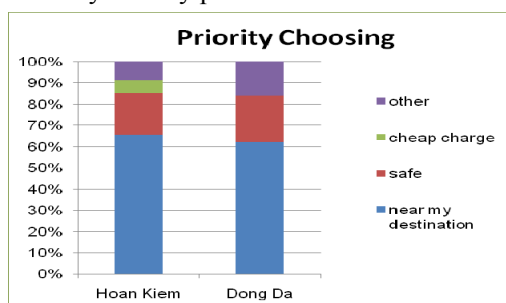


Figure 1: The different of peak hours between resident and non-resident.

From data of the observation survey, there are large different of peak hours between resident and non-resident.

- Why do they park at there?



Almost people want to park near their destination.

Figure 2: Priority choosing when park vehicles

- How long they walk from parking space to the Destination Building

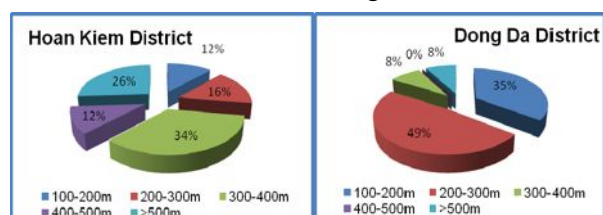


Figure 3: The Distance from Parking space to the Destination

In Hoan Kiem District, the most common distance is from 300 to 400m. While in Dong Da, the distance from parking space to destination is smaller with the most common distance is 200-300m make up 49%. So, Hanoi People’s Committee should consider to the distance from parking to their service are when has plan to construct public parking. If the distance is so

far, people do not want to use it.

## II. Study on Parking management

### 1. Parking Generation Rate

Parking Generation Rate was calculated from Parking Demand and total Floor Area by land use type. Parking demand for 2000 was calculated from trip person survey of The Comprehensive Urban Development Program in Hanoi Capital city (HAIDEP). Total floor area of each land use type in 2000 was summarized from “The detailed planning for Districts to 2020”.

After calculating, the result is as follow:

In order to calculate the Parking demand rate, it is needed to have the total floor area data. Among relevant reports, the total floor area data is found only for the Hai Ba Trung District. So, it is decided to estimate the parking demand for Hai BaTrung District. Also, the total parking demand written in the HAIDEP report is used as a control total.

Comparison with the HAIDEP report, the parking demand of 2W vehicles is larger. So the parking demand for 2W will be discounted by factor 1/1.2. Thus, the parking demand for Hai Ba Trung District is as follow:

Table 1: The Parking demand in 2000 in Hai Ba Trung District (supported)

	2W	4W
Residence	204780.3	7083
Office	49751.41	5490
Wholesale/retail shop	47207.35	1425
Restaurant/Entertainment	9692.77	450
Medical	10555.62	0
School/University	85099.64	237
Public administrative Office	28463.91	771
Other	30448.96	3220
Total	466000	18676

Result shown that the parking Generation Rate of 4W for Office and Restaurant/ Entertainment are 1,07/100m<sup>2</sup>space and 0,82 /100m<sup>2</sup> space in turn. Thus, it can be adjusted this number is 1space /100m<sup>2</sup> for

both.

Regarding to School University and Public Administrative office, because of parking Generation Rate is low, so they will combined and has value is 0,2 space/100m<sup>2</sup>. Although parking demand for Medical is the zero but cause of the number of sample is small so it could be not exactly and Parking Generation Rate for Medical will is the same with School/University and Public Administrator Office.

Table 2: Parking Generation Rate by types of Land use –Hai Ba Trung District

Types of Land uses	Parking Generation Rate (Space/100m <sup>2</sup> )		
	2W	4W	4W (supported)
Residence	1.7	0.0621	0.06
Office	9.7	1.0687	1
Wholesale/retail shop	14.6	3.4598	3.5
Restaurant/Entertainment	17.5	0.8161	1
Medical	6.8	0	0.1
School/University	23.5	0.0654	0.1
Public administrative Office	4.2	0.1132	0.1

## 2. Obligate Parking Requirement

From experience of literature review and characteristic of Hanoi, parking requirement of Hanoi should have improved as follow:

- As the Japan case, these building have total area less than 1000 m<sup>2</sup> do not have require for obligated parking requirement. So, Hanoi can apply a lower limit of total area that have require about obligated parking requirement. According experience, regard to buildings have small area, the best way is use public parking.

In fact at Hanoi, many building and new urban are required that have to have parking but they still contravene it, do not construct parking, so many place do not implement follow regulation.

- Learn from Ordinance of Japan, focus on local rules.

Regarding to District where difficult to establish

parking by high-volume ratio, shopping area, as Hoan Kiem District, can establish collective parking facility in large building lots.

Additional, parking requirement of Hanoi should more detail, cover more types of land use.

Hanoi also apply Joint use parking: joint use of required parking spaces may occur where two or more uses on the same or separate sites are able to share the same parking space because their parking demand occur at different times.

## 3. Shared Parking

One rule was found out to reduce parking spaces that may be useful for parking system in Hanoi. That is Shared parking. Shared Parking means that parking spaces are shared by more than one user, which allows parking facilities to be used more efficiently. From the original survey, it is found that there is different peak demand between different land uses, so number parking requirement can be reduced.

There is example was carried on to check effect iveness of Shared parking. The example apply at specific area in Hoan Kiem District. I can calculate parking spaces for each land use and get total parking spaces –not shared parking. From HAIDEP survey entering and existing vehicles in 29 parking lot, I found the different peak parking demand and calculate total parking requirement with Shared parking. And the result is spaces that are saved by Shared parking are 32 – 5% of total.

## III. Improve Pakring System

### 1. Future Gap between Parking Demand and Supply

#### 1.1. Parking demand

In order to know parking demand in 2020, the total floor area by each land use types was summarized from many report of Hanoi Government. The total floor area of four center districts as follow:

Then, the parking demand ratio was applied to total floor area to get parking Demand.

$$PDid = PDRi \times TFAid$$

$$PDd = \sum Pdid$$

When:

PDid=Parking Demand by land use type I in zone d

PDRi=Parking Demand Ratio by land use type i (trips/m2)

TFAid=Total Floor Area by land use type I in zone

Also, future parking demand FPDd is available From HAIDEP survey that takes modal split change into consideration.

So, Future parking demand by land use type i in zone d FPDid is calculated:

$$FPDid = PDid \times (FPDd/PDd)$$

Future Peak Parking Demand = Future Daily Parking Demand x 30%.

The result of Future Parking Demand is shown in the table 3.

Table 3: Future Parking Demand by each type of land use-Urban core area

Types of Land use	Districts				Total
	HBT	BD	HK	DD	
Resident	5002	1347	1332	2430	10111
Office	3485	1601	1852	4011	10950
Wholesale/retail shop	3021	2926	4559	601	11107
Restaurant/Entertainment	757	2364	1090	1383	5593
Medical	130	25	37	142	335
School/University	341	125	60	623	1149
Public administrative Office	466	306	125	160	1057
Other	1935	240	567	2202	4944
<b>Total</b>	<b>15138</b>	<b>8935</b>	<b>9622</b>	<b>11551</b>	<b>45246</b>

HBT: Hai Ba Trung; BD: Ba Dinh;  
HK: Hoan Kiem; DD: Dong Da

## 1.2. Parking Supply

Base on data from many sources, changing among parking types from 2002 to 2020 was assumed.

Regarding to on-street parking, for 2002, the data from HAIDEP and “The planning for parking system in Hanoi to 2020”; for future it is assumed from policy of City Government. After ban parking on 56 streets, the on-street parking decrease but when off- street

parking have not increase yet, assume that illegal parking will break out (illegal parking was crossed out nearly all at Hoan Kiem district after implement “entrustment model” and is becoming apply to other districts) because parking demand is very large compare with supply.

Regarding to public off-street parking, parking projects that be operated or under construction or have just approved with their area and capacity was done statistic and data in “The planning for parking system in Hanoi to 2020” was referred. So, assume that projects was on schedule so to 2010, urban core area will has 25 ha public off-street parking, but until now, almost projects was delayed.

Regarding to off-street parking private, the data of current was taken from “The planning for parking system in Hanoi to 2020” and data to estimate for 2010 and 2020 was calculated by apply Parking Requirement Rate to new building Projects.

Table 4: Approach to assume Parking Supply for 2020

	2002	2010	2020
Public on-street Parking	The Planning of Parking System in Hanoi to 2020	Assumed from policy of City Government	
Public off-street parking	Department of Transport and Public Works	Summarize from Parking Projects (if all Projects are complete d on time)	Assume that Public off-street Parking is continue increase but not much (cause of delay of many parking projects)
Private parking	The Planning of Parking System in Hanoi to 2020	Calculate by apply Parking Requirement Rate to new building Projects	

## 1.3. Gap between Supply and Demand

After analysis, the assumption of parking area for each types of parking as follows:

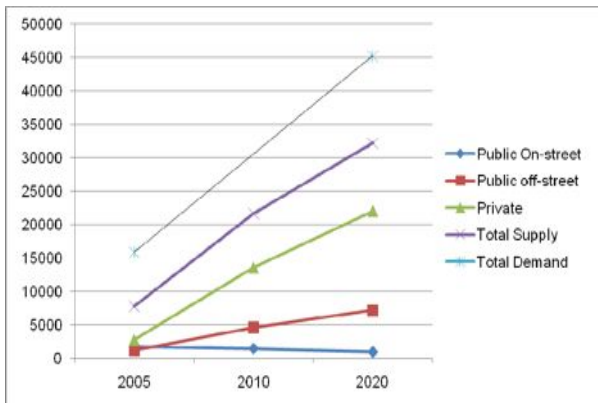


Figure 4: Estimate Changing of Parking Demand and Supply from 2005 to 2020 by types of Parking

Although there are many projects to help supply met demand, but the Gap between Supply and Demand in the 2020 still remain, even larger than 2002.

## 2. Parking System to reduce Gap

From two points 1/the gap between supply and demand in 2020 is larger than the gap in 2002 but not much. 2/the public parking supply increase but not much (now, public parking is limited and many new parking projects have been delayed compare to schedule). Then, guesstimate that the shortage in 2020 is from the increase demand of old buildings (cause from the increasing of cars) and demand of new buildings under the cut-off line.

So, the Government needs to have preferential policy to encourage investors to increase public-off street parking supply.

There are many small building in Japan that have area less than 1000 m<sup>2</sup> are apply the cut-off line and less than 6000 m<sup>2</sup> is apply reducing requirement. Then, because there are many small building in Hanoi and the cut-off line is useful in Hanoi also. For the small building, the best way is use public parking.

All high-grade buildings has area rather large, so they are over the cut-off line buildings

Apply the Parking Requirement Standard in Vietnam, the Parking space required for new high-grade building was gotten.

The cut-off line will be considered to the other buildings with the obligated parking requirement is smaller. However, the number of new buildings that has small area is few.

Regarding to the parking demand of under cut-off line buildings, public parking was required. So, if can apply shared parking to public parking then the cut-off line can reduce parking demand for under cut-off line buildings. In areas that have high traffic density, it is better to use public parking and then the cut-off line should be high.

Because there are many new mixed-use buildings of commercial, office and resident, so apply the occupancy rate has considering of the different between resident and non-resident types can help reduce number of parking spaces in each building.

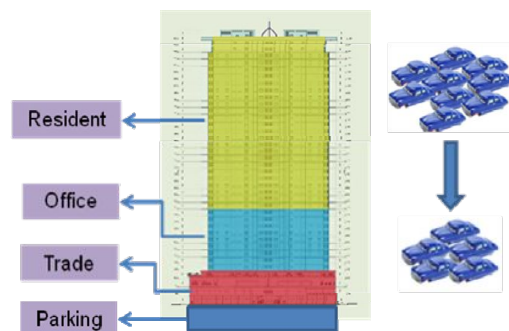


Figure 5: Reducing parking space for mixed-buildings

The Parking spaces was calculated by apply occupancy rate to the high-grade buildings. The saved parking spaces are rather large.

- Without Shared Parking: 20865 parking spaces
- With Shred Parking: 13492 Parking spaces
- Save: 7373 spaces

## IV. Conclusion

Result shows that the gap between Supply and Demand of parking in current and estimate that this

gap still remain to 2020. The demand continues increase while supply cannot keep with demand because of limiting land and investment fund.

The gap cause from the public parking is not enough to cover all parking for old buildings and the new buildings that under the cut-off line. So, it is better to provide more public off-street parking in Hanoi.

Rules as Shared Parking apply for different of land use types, especially between resident and non-resident and the cut-off line of parking requirement will useful for reduce parking spaces. So, Hanoi needs further consideration about them.

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