

Analysis for Improvement of Parking Facilities in the Central Business District of Srinagar

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Abstract- *The growing difference between parking supply and demand has been a nightmare for the traffic engineers and urban planners, many city boards around the world conducted surveys regarding the improvement of their parking facilities and arrived at the results which proved beneficial after their implementation, the problems of parking were no different in Central business district of Srinagar, the summer capital of Jammu and Kashmir. In this report the parking surveys were conducted at different location in the CBD of Srinagar, the inventories of parking were noted and the occupancy of the lots was computed at peak hours, illegal parking surveys were conducted and the reasons behind the illegal parking were found by simple questionnaires, the inventories yielded the supply of parking in the area, and the occupancy was computed by license plate method on different site locations, then the land use method of analysis was implemented to find the demands of parking in the whole study area and the difference between the supply and demand was solved by suitable techniques. It was found after analysis that average occupancy of all lots is 92% and supply lags behind the demand by almost 900 spaces, which could be worse in the years to come, hence suitable improvements were devised to curb the problems, the areas like Sheikh bagh, Pratab park were proposed for the multilevel parking lots, the empty spaces beneath the flyover corridor at Jahangir chowk, the road in front of Civil secretariat were other options proposed for future expansion. For the sake of parking management, informatory boards at strategic points was put forward, mobile apps to book the lots and check the available slots was concluded after the investigation. Installation of the CCTV cameras at strategic locations was the answer to the illegal parking activities So that existing inventories can be efficiently used and future expansion of inventories was put forward to handle the growing needs of parking.*

Keywords- Central Business District, Peak Hours, License Plate Method, Parking Management:

I. INTRODUCTION

I. General

Transportation is one of the principal factors responsible for the economic prosperity of the country. Due to the urbanization in recent decades and significant increase in manufacturing of vehicles, traffic engineers are facing challenges of providing proper parking facilities to the ever

increasing vehicles hitting the streets of urban centers. The problems of improper parking facilities shout mainly in unplanned classic cities which were settled before the advent of technology. The commercial centers of those cities face improper parking facilities which mainly lead to congestion, discomfort and waste of time hence hindering the economic development of the region. Hence the need of an hour is to upgrade existing parking facilities by innovative techniques so as to meet the demand of traffic in Central Business Districts of urban centers. The illegal parking in the commercial centers can pose the problems to the engineers as they are the core reasons for the congestion, accidents, discomfort and as far as economic perspective is concerned, the loss of valuable time in congestions directly effects the economic development of the region. The legal parking with sufficient inventories can boost the economy as parking facilities near the commercial hubs shortens the lead distance from the lots to the office buildings, hence saves time, moreover the congestions are minimized when the CBD of any city has adequate lots to park all its vehicles at peak hours. When the roads are cleared of the illegally parked vehicles, the possibility of accidents, halts to fire fighting hydrants is naturally stopped; hence it can prosper the area to new heights in terms of economically, socially and culturally.

II. LITERATURE REVIEW

Nikolay Naydenov (2016) In this paper, studied the city Sofia, the capital of Bulgaria. The inventories were gathered by using latest GIS technique to create a data base and generate map of parking areas. The parking areas were scanned for 30 minutes time periods and 15 minutes time periods in case on some special days. The counting and processing of results yielded vital results about parking capacity, occupancy rate, parking duration distribution and parking count. The analyzed results were helpful in eradicating problems regarding the parking in the area.

Brian Davis and Todd Mobley (2015) In this paper, a detailed analysis of parking occupancy and stay durations was conducted in Portland's Central City. The study area comprised 293 block faces divided into nine subareas representing potential routes that one might travel while looking for parking. Observations for each route were conducted on a Tuesday, Wednesday, or Thursday, with each block face along the route observed once per hour.

Additionally, two routes in areas of the Central City known for numerous nightlife destinations were observed.

Nadav Levy and Itzhak Benenson (2015) In this research, proposed the novel algorithm parkfit which helps in estimating city parking patterns and helps in evaluating the parking supply and demand in the GIS environment, the city of Bat Yam was analyzed by the software and the capacity and demand of parking was analyzed and calculated.

Young Woo (Lee 2015) In this report, a study to calculate precise demand for on-street parking was performed. Though there have been many studies on estimating parking demand so far, the studies focusing on on-street parking are not enough. Thus, this study surveyed parking conditions of the entire Dong-gu, Daegu Metropolitan City, Republic of Korea with focus on parking on the street and analyzed for the variables for on-street parking demand estimation for it based on the parking survey.

Kimley-Horn (2013) studied existing parking operations in Durham and management was performed that focused on the many types of users of both on- and off-street spaces and the associated strategies of each. It was found that when compared to other communities of equal size, the City operates with fewer staff and resources to manage their parking system.

Anthony Armagno and Heather Toth (2012) quantified the current needs for parking in downtown Berea by analyzing existing parking capacity and demand. The parking demand analysis identified management options such as time restriction changes, better enforcement, bicycle racks and structured parking. The number of factors were considers in analysis such as average occupancy Vs peak, parking turnover, the percentage of parking violation and public perception of parking availability.

Sandip Chakrabarti, Taraknath Maunder (2010) studied and took into consideration the behavior characteristics of parking demand in the city of Kolkata. The study was confined to 6 strategic locations on the city of Kolkata. Primary survey effectively employed to access the motorist parking characteristics. Problems of parking were solved using detailed understanding of the motorist behavior, psychology, parking characteristics and other factors governing the mode choice.

III. EXPERIMENTAL INSVESTIGATIONS

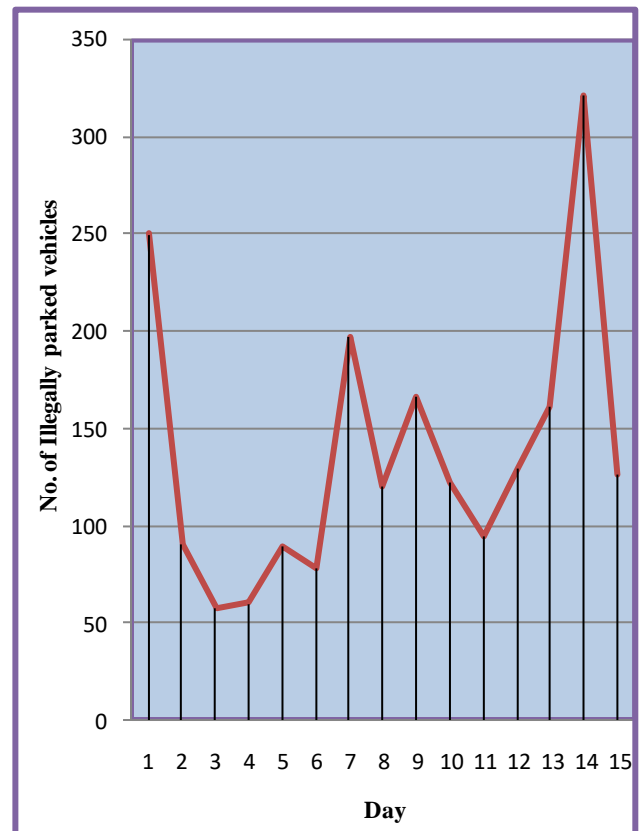
I. Inventories

The supply of parking facilities in the area can be tabulated as:

S No	Study Area Supply	
1	On Street	1095
2	Off Street	2113
3	Total	3208

II. Illegal Parking

The results of the illegal parking survey can be tabulated below, the peak illegal parking was noted on Sunday, 14th April = 321 vehicles.



III. License Plate Method

The license plate method was performed to get the parking load, volume and occupancy measure in the area which revealed 92% occupancy on average for all lots, the results of the method on one of the lots (Lala Rukh Parking) is shown in table below:

Bay	Time (min)				Time (min)				
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	15	30	45	60	15	30	45	60	Turn over
1	4280	4280	4280	3656	1	1	1	1	2
2	-	5606	5606	5606	0	1	1	1	1
3	0865	0865	0865	0865	1	1	1	1	1
4	8985	8985	8985	8985	1	1	1	1	1
5	-	-	9358	9358	0	0	1	1	1
6	0584	0584	0584	4770	1	1	1	1	2
7	1055	1055	5282	2778	1	1	1	1	3
8	0077	-	0916	0916	1	0	1	1	2
9	3252	-	3178	3178	1	0	1	1	2
10	2636	2636	2636	7400	1	1	1	1	2
11	4776	4776	4776	4776	1	1	1	1	1
12	0013	-	0264	0264	1	0	1	1	2
13	6760	6760	-	0032	1	1	0	1	2
14	6113	6113	-	8819	1	1	0	1	2
15	-	-	9255	9255	0	0	1	1	1
16	8747	8747	-	3654	1	1	0	1	2
17	454	454	-	-	1	1	0	0	1
18	3935	3935	8780	0015	1	1	1	1	3
19	6339	3141	3141	3141	1	1	1	1	2
20	-	2820	-	6113	0	1	0	1	2
	Accumulation				16	15	15	19	
	Occupancy(%)				.80	.75	.75	.95	1.75

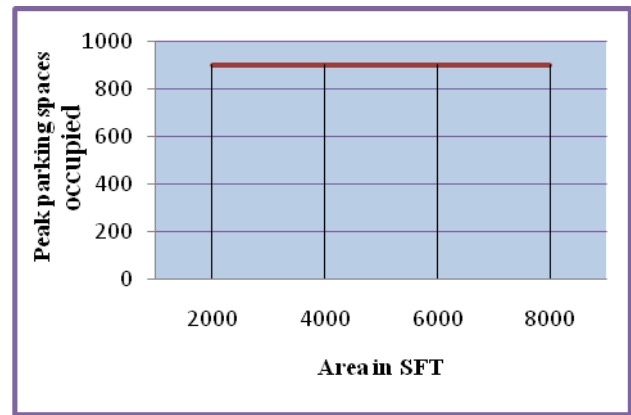
License Plate Parking Survey Solution

IV. LAND USE METHOD

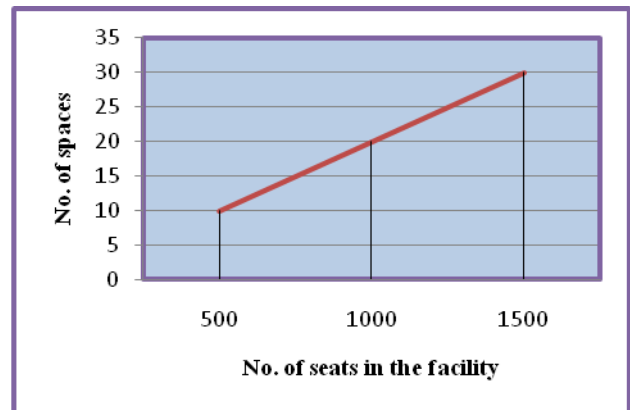
Land use method was used to calculate the demand for the area, the graphs below show the results for different land uses.

1. General Shops

Survey Result :- Fixed Number Of 900 Spaces for the General Shops

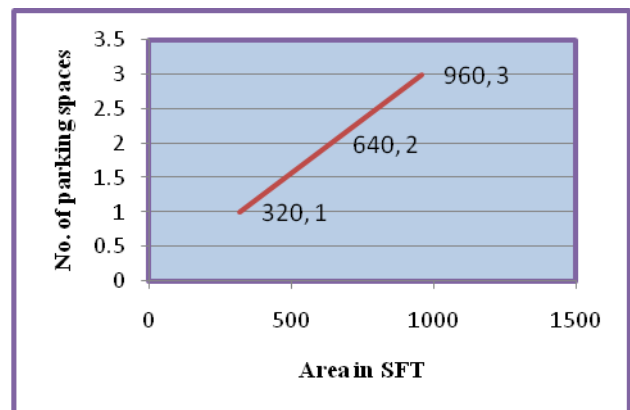


2. Masjids And Other Places Of Worship
Survey Result:- 1 Space/50 Seats Or Per 50 Persons Using the Facility.



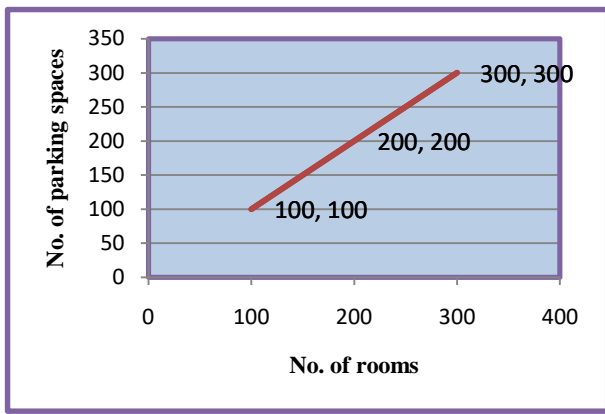
3. Banks

Survey Result= 1 Space Per 320 SFT

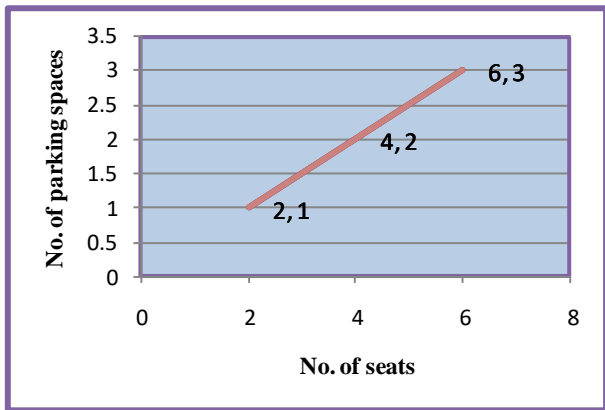


4. Hotels

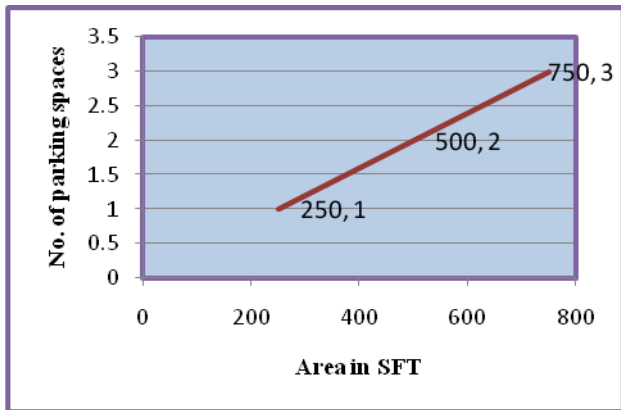
Survey Result=1 Space Per Room



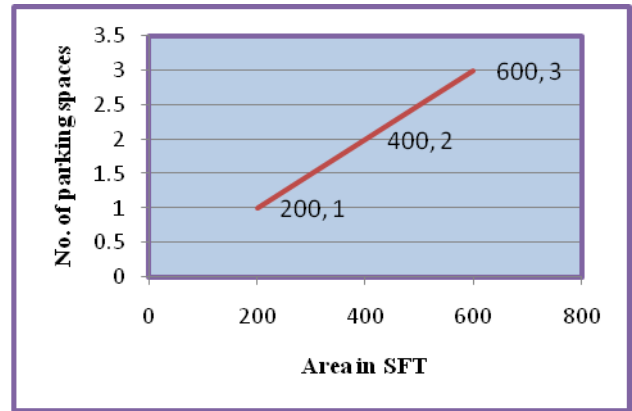
5. Family Restaurants
Survey Result = 1 Space Per Two Seats



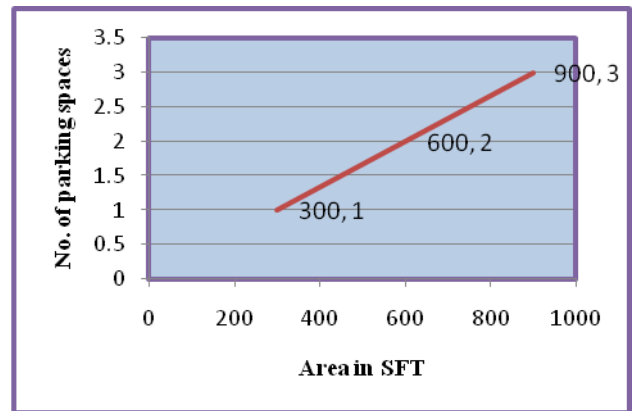
6. Cloth And Fabric Shops
Survey Result = 1 Space Per 250 SFT



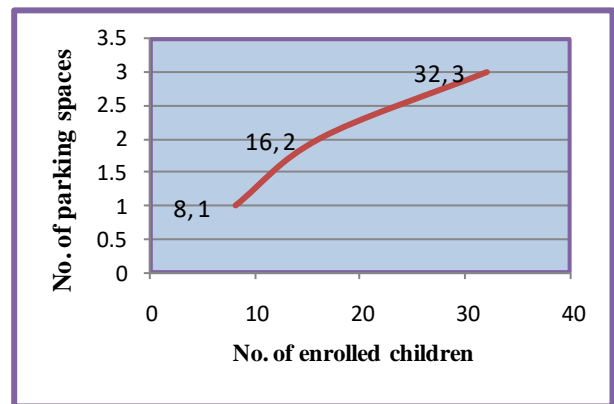
7. Office Buildings/Supermarkets
Survey Result = 1 Space Per 200 SFT



8. Home Improvement Stores/Medical Shops
Survey Result = 1 Space Per 300 SFT



9. Day Cares
Survey Result = 1 Space Per 8 Enrolled Children



Overall Result:- The result of the parking analysis revealed that supply of parking lags behind the demand by 900 spaces, which should be provided to solve the parking problems in the area.

V. FUTURE SCOPE OF THIS STUDY

The study area is the CBD of the city of Srinagar. The scope of the research can be summarized in the following points:-

- The techniques that can be employed after the detailed survey for the improvement of parking facilities can be rationally applied in any other business districts of India or around the world. It is because of the behavior of the drivers parking the vehicles in city centers are same or nearly equal. The people working in CBD may need to park them for longer periods of time as compared to people whose sole purpose is to enter CBD for shopping. This behavior can be seen around the world.
- The methodology that is applied to get the parking data can be implemented in any business district to get an idea of parking inventories, accumulation counts and occupancy measures which can be used for parking lot designs.
- The said study can explore all the available vacant space both coming under public and private domain to put it to good use of parking.
- This research can be extended to explain the parking behavior and patterns and calculate the demand and supply for the whole city of Srinagar thus can help in eradicating the problems of parking in the capital of Jammu and Kashmir after the problems are adequately dealt with suitable techniques.
- Indian cities are facing problems of parking in commercial centers. The result can be effectively applied on those cities with slight changes according to the conditions.

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