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Optimization of Congested Area for the Parking

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Abstract - There is quote on our traffic condition, " Everybody in hurry but no one reach on time" now it is carry forward with respective to parking, " that's why many of them doesn't want to park in line". As the space in urban area shrinks day by day resulting in increased the demand for parking space. Wardha is one of city in Maharashtra having area 70 km^2 with population 1,26,444. Growth in percentage of vehicles in 2015-16 (34%), 2016-17 (10.51%). One of the problems faced by the CBD area of Wardha city is congestion due to the parking means more parked vehicle on the road than its parking supply. Aim of project is find out congested area of road due to the parking and optimize for it. Four roads of the CBD area taken as the study area named as, Jain Temple road, Kapada line road, Sarafa line road, Patrawali road which sub divided on the basis of side i.e. left and right. Parking space inventory and in -out parking survey are being done on this road to determine parking bays availability, parking accumulation, parking index and parking load. Some new terms used here like avg. parking accumulation and avg. parking index for lean hour, peak hour and day hour of the study. Most of the times congestion on the roads found in peak hour of the study time. The optimization subjected to those roads whose avg. parking index of the peak hour exceeds 80% that means there is problem of congestion due to the parking exist. The optimization made in such way that, shift more numbers of vehicle of congested road due to which avg. parking index of peak hour time exceeds 80% to nearby road which have low avg. parking index for the peak hour and without affecting the parking supply of the nearby road.

***Key Words*: Parking, Optimization, Congestion, Parking accumulation, Parking Index, Peak Hour**

1. INTRODUCTION

The study area is within the CBD area of the city. Many types of commercial establishment here like Jewellery, Stationary, Cloths, Daily needs, Snacks Center, Hospitals and Temple. As this is commercial core area of city so it is dealing with parking problem always particularly in peak hours. Many reasons behind this congestion like presence of hawkers & vendors on road, four wheelers occupied the space of parking, weak enforcement in peak hour for the handling the parking. For a CBD area, optimize the parking area through the various ways like various parking types underground, multilevel, stack, Tower. But there is no enough space available for provision of such parking. This is same scenario in many Tier-3 cities of India. In such condition, optimization for the congested area for the parking provide by shifting the numbers of vehicles due to which the congestion improves to the nearby road without affecting the parking supply of nearby road.

2. LITERATURE REVIEW

2.1 Parking Study on Main Corridors in Major Urban Centre, T. Subramani: - The author has done parking study the city Salem. Salem is fifth largest city in Tamilnadu. He was conducted parking survey in 15 place to study existing parking traffic condition then carried out parking studies and formulate strategies for better management for parking. Parking survey done on working day in middle of weak in CBD area. Paper described various parking charaeristic, parking Survey, ill effects parking. In result to reduced parking of vehicle he suggested, short term measure such as pay and park and long term measure such as provide off street parking near CBD area within radius of 1km.

2.2 Behavioral **Characteristics of Car Parking Demand: A case Study of Kolkata, Sandip Chakrabarti and Tarakanath Mazumdar**: - This paper attempted to look into behavioral charaeristic of parking demand for various kinds of trips at various locations in Kolkata city with varied urban order. In this paper, it has not only tried out parameters which significantly influence parking demand but also find relative influence of each parameter on parking demand. It includes primary survey including parkers' behavioral survey and made choice survey in preference questionnaire Survey in peals and lean hours at 6 locations in Kolkata. Various parameters used like age, incomes etc. Here used multiple regression analysis by SPSS software. In result it seen that each parameter influence can parking demand. So various parking demand management at various location need to be adopted parking parameter depends on trip purposes, trip location order and destination.

2.3. A Model for On-Street Parking Management for Khargone City, Shruti Arne & Dr. Sunil Sugandhi: - Author done Systematic study of parking in the four major centers in Khurgaon city, Madhya Pradesh, India. The availability of less space in urban area has increased demand for the parking space in central business district area. Extensive parking survey made at four places in Khurgaon city to determine parking demand, supply charaeristic, estimate mean time duration, develop a parking demand model by regression analysis and access parking charaeristic like parking duration Parking accumulation by plotting between

cumulative vehicle parked and parking duration. Paper described various types of parking their pros and cons. Parking survey carried and 10 AM to 7 PM continues on four places cumulative frequency of two weather seen maximum at 6:30 PM to 7 PM in evening. In result, two wheelers found processed less parking duration than four wheeler parking demand model verified by the chi-square test result.

2.4 Demand and supply analysis of parking in commercial Area: A Case study Probortak more Area, Chittagong, Md. Kamrul Islam & Sudipta Chowdhary: - Author presented data on the parking demand and supply in Probortak Area, Chittagong to know parking trend in this region. Also here they estimated public and private parking supply and was observe there any shortfall occur of parking?. They told that there was no data available of parked vehicle in the study area. The paper briefly described the parking types, parking survey types, common terms used in parking analysis. They gathered the primary data from parking demand, parking supply, parking accumulation and Secondary data from methods of parking survey. They used the SPSS software, MS-Excel to analyzed and calculate data which got from method of survey to draw accumulation curve. They took 60 drivers of different vehicle as sample in different parking lots of streets. They compared parking demand, parking supply for the weekday and weekend from which the accumulation curve is drawn. In result, parking supply doesn't meet the parking demand. There was no on-street parking lot in area but there was lots of vehicles which parked besides the roads which was the most influential cause of traffic congestion. Finally they concluded, parking supply charaeristic could play significant role in automobile dependency.

2.5. Studies on on-street parking using License plate method in Basavangudi, Bangalore, Arjuna C.A. & Dr. M.S.Nagakumar :- Author studied the on-street parking by license plate survey method in Basavangudi, Bangalore. Objectives of study were to analyze street traffic flow on the two way divided carriageways which carried out by trained person. Study of existing parking condition in an area with common parking terms and methods were use like parking volume study which carried out in all roads along with the main traffic, parking turnover to find out avg. use of parking lot or bays which used to analyze length of time spent by the vehicle in parking space. In this license plate survey method parking occupancy collected at survey for every 30 minutes to know utilization of parking street by vehicles, willing to pay survey include condition of interview for 2 weeks on working days. The regression analysis established to measure relationship between parking demand and parking space capacity variable. Author studied Karnataka parking policy and used general character of it. Finally it conducted that, all roads having high parking demands also suggested multi-story parking facility to increase number of parking space. Parking Space will bring out corresponding decrease in parking demand.

2.6. Modeling travel time under the influence of on-street parking. Hongwei Guo, Ziyou Gao, Xiaobio Yang, Xiaomei Zhao & Wuhong Wang :- Aim of paper to discussed quantitative analysis of influence of on-street parking on travel time. The travel time data of motor vehicle moving on the road collect by observer by license plate survey method. It is associated with travel state and parking state. In this paper, Hazard-based duration approach is proposed to analyzed impact of on-street parking on travel time. It is used to determine causalities duration data. Finding on this paper can help to explain how on street parking influence traffic performance which factor is more significant. This duration methodology can capture the effects of factors associated with parking condition and traffic condition; therefore it can explain how the on-street parking influences distributions of travel time. The distribution of travel time estimated by the model would give quantitative analysis of influence on street parking additionally influence factor related to charaeristic of on-street parking should be given full consideration in planning and designing of on-street parking.

2.7. On Street Parking: Biggest problem on urban streets, Rakesh Prajapatil, Jayesh Jurmalani, N.B.Parmar Mostly they focused on paid parking. They give support of many articles for paid parking that how could be this one of the tools for managing on street parking problem. They attempted to know, what kind of research going into world towards solving urban street problem through paid parking they said that first understand parking problem and effect on users, tools and technology adopted to manage parking problem. They showed that problem of urban street parking in India due to low price parking and free parking. This trend to encourages ride by private car alone than car sharing or carpooling. They gave different reasons for parking space needs to price. Finally they concluded, In India available legal parking space highly underutilized to highest efficiency & financial viability street parking mainly function of purposes of trip and frequencies of visit the CBD area duration of parking lines, absence of parking space has resulted into chaotic parking behavior and high congestion level on urban streets. So Proper Street parking management needs to be encouraged and digital parking management should be introduced.

2.8. Methodology for parking analysis. Diallo, Catherine Morency, Nicolas Saunier: - Parking analysis in Montreal, Canada. They used Origin-Destination survey and forty years data from corresponding authority on it. This study confirms developing vehicle accumulation profiles for various zones from there theoretical parking capacity derived. First they calculated parking accumulation for vehicles and theoretical capacity for area from Origin-Destination survey (OD Survey). Then they determined the raw parking capacity without regulation and actual capacity without regulation based on the field survey. Finally, they compare the above data to determine difference between actual parking capacity and theoretical parking capacity. The OD Survey

also helps to determine the vehicle accumulation, Profile VAP and theoretical parking capacity. They used some direct sources like OD Survey by government in Montreal and indirect data from open street map, GIS, Google Street View. Raw parking capacity estimated for On-Street parking and outdoor parking for calculating number of parking spaces for each area. The actual parking capacity obtained by combining raw capacity and regulation data. Finally it concluded that on street parking capacity estimated from OD Survey was equivalent to two-fifth of raw on street parking capacity in the field.

2.9. Parking Search Caused Congestion .Rachel Weinberger, Adam Millard Bell, R.C. Hampshire:-The author described the method for determine parking search behavior using GPS traces. This traces based on the household travel survey dataset of GPS With video, commercially purchased set of trip. The survey done for San Francisco CA. Searching for parking colloquially known as cruising. This paper author worked with goal of using such traces to develop understanding cruising. It measures by spatial and temporal patterns. It will provide a tool to any city to understand parking search behavior and in turn create better policy.

2.10. Reservation based smart parking system. Hongwei Wang, Wenbo Hei: - Finding a Parking space in most metropolitan area especially during the peak hours, difficult job for the drivers. The difficulty arises from not knowing where the available parking space may not be known at that time. Many vehicles may pursue the limited parking space causes serious parking congestion, that's why the paper author design reservation based smart parking system. It allows drivers to effectively find and reserve the vacant parking spaces. Here used some performance metrics such as walking distance, traffic volume, reservation performance, data collection, local presentations and drive identify verification. Zigbee sensors used to provide continuous measure of parking status for each space. The reservation based parking system used to optimize the parking management. The parking reservation policy used to balance benefits of service providers and requirement from users.

2.11. Real time viewing automated parking system. Demegillo, Dizon, Talon, Balahadia: - As there is increased in numbers of vehicle on the road in the city. It has a big impact on commuter particularly in off- street parking. They used real time gross view automated system. This system uses proximity sensors to detect the position of vehicle then driver can use the mobile phone to access the web application. Then driver reserve the slot for parking while system administrator assist the transaction. This system can relived of release up to some level from struggling of finding parking availability of parking bays via website, choosing their parking slot or bay, lessen the time of car owner for looking parking boys in area on road.

2.12. Automated Parking slot allocated using RFID Technology, K.Ganeasan K, Vingesh :- This technology used for parking and monitoring various places like at airport, cargo container tracking, library management system, because its ability to track moving objects. With the technology the RFID, parking slot availability known in advance which saves time and petrol. This provides parking slot availability to driver via Short Message Service (SMS) via internet to registered user. Author compares RFID with barcode. It also includes free slots checker, parking charge calculator and free slot viewer. It is easily used in allocating parking slot on off-street parking and with some charges on on-street parking.

2.13. Parking Management for college campus, Rohan Zade :- This paper is discussed about the parking management for college G.H.Rasoni campus Nagpur. Author described management for parking in college campus by stock parking system with two different types of sensors that nedap sensit system and pir sensor system by the use of stack parking area. Also by the use of nedap sensit and pir sensor reduce the human efforts, electricity for the basement for parking area. Author used the data like no. of vehicle of facility and students parking demand of campus area, stacked parking can raised, lowered & has low maintenance. Both sensors can detect no. of parking bays available by in infrared light radiation. Stacked parking can used at optimization of congested area for parking. No expert person needs to handle.

2.14. IoT based smart parking system, Abhiroop Khanna: - Today everyone has mobile. The problem such as traffic congestion, limited car parking facility and road safety are being addressed by the IoT module that used to monitor and signalize state of availability of each single parking bay. Also the mobile app is provided allows and user to check availability of parking space and use parking slot accordingly. The mobile app connected to cloud computing provide information on connected to cloud computing provide information on real time basis. App provide parking slot availability, selection of parking area, amount of slots available in area, selection the time for which vehicle is park, pay the parking charges with credit or debit card than once you parked vehicle in selected parking slot conform your occupancy using mobile app.

2.15. Guidelines and the toolkits for the Parking: - This is prepared by the technical assistance on urban transport strategy (TA4836-IND) funded by Asian development bank for the Ministry of Urban development of India(MoUD). This provides information about guidelines on planning vehicle parking policy and development strategy. Also various steps in design in vehicle parking schemes like how to diagnose the existing parking situation, consider potential measure, appropriate measure various forms of parking facilities like bicycle, riseshaw, auto rickshaw. It also provide information about IRC regulations sample forms on parking survey,

international case studies on parking of Paris, Budapest Vienna, Warsaw, London, Singapore.

2.16. Pune Municipal Corporation Public Parking Policy: - The parking policy touches the technical and administrative social, economic aspects of parking policy shows that traffic management and parking policy clearly interlinked, they serve wider set of environmental, social and economic objectives. It also explains National urban transport policy towards parking management comprehensive mobility plan for Pune includes travel demand management plan for parking management plan. It also delineates the old end new parking thought. Legal provision with respect to parking explained like in Maharashtra municipal cooperation Act 1949, Motor vehicle Act 1988, Maharashtra Motor vehicle Act 1989. The policy contains classification of zones on level of congestions, parking prices, parking districts, on and off street parking structure and parking revenue management collect as Urban Transport Fund.

2.17. Nagpur Municipal Corporation Public Parking Policy: - The policy explains technical, economical, legal, environmental aspect regarding parking. This policy reviews case studies of domestic cities like Delhi, International cities like Thimbu, Cape Town and London etc. They give summary of parking day accumulation, peak hour accumulation parking turnover, capacity utilization of weekday and weekend. They suggest short, medium and long term measures regarding parking. Policies explain the concept of paid parking with need implement. They consider peak hour and lean hour or off peak hour and weekday-weekend variation for parking analysis Various legal provision for parking were explained. Identify role of public awareness and public private partnership in parking management.

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