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Sustainable Traffic Improvement forUrban Road Intersections of Developing Countries: A Case Study of Ettumanoor, India

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Abstract

The spectacular increase of number of motor vehicles on the road is mainly attributed ingeneration oftraffic problems like accidents, congestions, delays etc., especially in the urban premises of developing countries. This paper examines the traffic problems and sustainable improvement ofroadintersection at Ettumanoor, India. The spacial and temporal constitutions of the vehicle as well as pedestrian traffic at the intersections were examined and the characteristics of the junction indoctrinating the delay problems are identified. Data regarding the traffic volume, land use and pedestrian movement activities are collected through direct field surveys. Analysis of the collected data revealed that the improper planning of the junctions, lack of traffic signals and unauthorised parking are the major factors contributing to the traffic congestions. Various remedial measures are also proposed, focusing on junction improvement, alternative operation plan and junction signalisation.

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*Keywords:*Traffic congestion; intersections; traffic volume; traffic delay; junction signalisation.

1. Introduction

India is urbanising in a rapid rate and the absolute increase of population is more in the urban areas (9.1%) than in the rural areas [1] during the period 2001-2011. The urban population of India is estimated to be 37.7 crore. The quick urbanisation has resulted in enhanced travel demands and thereby an increase inurban transport problems.The urban traffic problems are attested with traffic congestions, accidents, unauthorised parking, poor land use, inadequate transport planning as well as poorly maintained road networks. Accounting for the colligationof social

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and economic regimes, traffic systems are perceived to be the nervure of an urban area [2]. Productivity and development is highly pendant with the transport systems and the problems related to the mobility adversely affect the urban life and system [3].Moreover, acute traffic congestions and associated problems potentially induce psychological and environmental issues.

Many researchers have performed studies that address the traffic flow issues in urban areas worldwide and are reported in the literature [4-9]. Ruskin and Wang [7] studied traffic flow in an urban unsignalised intersection using cellular automata (CA) models. Artificial neural networks were employed by Murat and Baskan [8] to model and address vehicle delays at signalised junctions. Kidwai et al. [9] attempted traffic flow analysis of a signalised intersection at Kuala Lumpur, Malaysia. As the traffic scenarios vary considerably compared to the developed countries, a special attention to the traffic problems in developing countries is demanded. A number of researchers have studied and suggested solutions for urban transportation issues subsumed with developing countries [10-19]. Patel [10] studied traffic congestion and delays at Thaltej rotary intersection, India. The traffic delay problems and related studies at Ilorin – a Nigerian city, were carried out by Aderamo and Salau [3], Atomode [11] and Adeleke and Jimoh [12]. Maitra et al. [13] took effort to evaluate the troubles encountered at road intersections of Kolkata, India. Research on safety and efficiency of a signalised intersection at Chennai, India were carried out by Sharma et al. [14].The impact of a flyover on transportation problems at an intersection was studied by Maitra et al. [15].Researches on pedestrian traffic and safety in Delhi, India were attempted by Mittal [16].Rubayat and Sultana [17] examined the reasons behind road accidents at Dhaka, Bangladesh. The traffic congestions and related problems at a railway crossing at Gandhinagar, India were studied by Modi and Podar [18]. Gomasta et al. [19] contributed to the literature by reporting traffic issues and possible solutions at two intersections of an Indian city – Bhopal.

Even though a handful of studies have been reported regarding the traffic problems related to urban environment, traffic delays and related issues at the urban road intersections still demands contemplation, taking local issues into consideration. Moreover, idealised models to solve traffic issues that can be implemented in growing urban areas of developing countries are still lacking in the literature. In this paper, the traffic issues at a burgeoning prominent urban intersection - Ettumanoor, Kerala State, India is studied. Field studies on traffic volume count, pedestrian traffic and public transport bus traffic within the study area were performed to establish the spatial model of commutation at the intersection. Past accident data were collected from local governing bodies and are critically analysed. Ailment in operational plans and unscientific land use pattern are identified to be the critical issues pertaining the area. An attempt is also made to suggest remedial measures by modification of traffic, alternative operational and routing strategies as well as junction signalisation.

2. Field Survey and Data Collection

Ettumanoor is one of the developing urban areas in Kottayam district, Kerala, India. Three major roads meet at the Ettumanoor Central junction: the Main Central (MC) road (State Highway 1), Ettumanoor – Poonjar road (State Highway 32) and Ettumanoor – Athirampuzha road. Ettumanoor en route to major destinations like Ernakulum (Kochi), Vagamon, Sabarimala, Kottayam etc. The proximity of a University, few colleges and a number of schools together with important religious in situations are also keyed out with Ettumanoor. Two bus stations (one private owned and other the State owned) and taxi stands are in propinquity with the junction. Inadequacy of road width, unsignalised junctions, deficiency of parking space, unauthorised trading along the road sides and lack of pedestrian amenities are also identified within the area under consideration. The especial nature of Ettumanoor with regard to the abovementioned reasons are attributed to the initiation and the outgrowth of traffic issues, especially during the peak hours of a day. In order to characterise the problems owing to the traffic issues in the Ettumanoor junction, direct field survey was performed to collect relevant data. Accident data were collected from the Ettumanoor Police