



Ineffective human control of signalised intersections in developing countries; Case of Dar es Salaam city



David A. Mfinanga*

Department of Transportation and Geotechnical Engineering, University of Dar es Salaam, P.O. Box 35131, Dar es Salaam, Tanzania

ARTICLE INFO

Article history:

Received 31 December 2012
Received in revised form 6 May 2014
Accepted 11 October 2014
Available online 11 November 2014

Keywords:

Traffic control
Intersection control
Signals
Driving behaviour

ABSTRACT

Intersections constitute one of the major bottlenecks on road networks that exacerbate congestion; effective control of which is an important strategy in improving traffic flow. While signals can cost-effectively control traffic at intersections, African countries have adopted an increasing trend across the developing world of overriding traffic signals and instead letting traffic police officers guide vehicles. This study has compared the performance of two major signalised intersections in Dar es Salaam city in Tanzania, when operating under the traffic signal and when the traffic police officer is controlling the intersection. Results show that the traffic police officer is not improving the performance of the intersection but rather makes sure that drivers observe traffic rules. The capacity and delay are improved on some approaches of intersections and worsened on others. The findings dispute the widely held view that traffic police officers do a better job than the signals. It has therefore been concluded that simple improvements on signal timing and improving driver's behaviour through improved enforcement of traffic regulations can better and cost-effectively improve the performance of intersections.

© 2014 Elsevier Ltd. All rights reserved.

1. Introduction

1.1. Background

Congestion has emerged as one of the main challenges facing the highway mode of transport resulting in economic losses to nations and hitting hard on the developing countries' productivity as they struggle to develop their economies. Traffic control is one of the most important components of traffic management as an efficient operation could increase traffic capacity at a very low cost and there are beneficial environmental impacts in terms of reduced delays and congestion, and improved air quality. Intersections have a disproportionate effect on the overall safety and capacity of highways, one reason being that intersections serve a special function of accommodating travel in opposing or conflicting directions. Intersections constitute one of the major bottlenecks in road networks and exacerbate congestion; effective control of intersections therefore forms an important strategy in improving traffic flow. An effective intersection control would maximise capacity, minimise delays and minimise conflicts (TRL, 1994).

There is no doubt that signals are the most powerful tools for urban traffic control available to city authorities and their correct installation can improve both traffic flow and the safety of all road users. In comparison with other traffic

* Tel.: +255 713 329690; fax: +255 22 2850952.

E-mail address: mfinanga@udsm.ac.tz

improvements, signals are also relatively low capital intensive (TRL, 1996). There is however an increasing trend across the African continent of overriding traffic signals and using traffic police officers to guide vehicles at signalised intersections. Such a practice is very common in East African countries of Tanzania, Kenya and Uganda and in other parts of Africa. This research has compared the performance of two major signalised intersections in Dar es Salaam city in Tanzania, using capacity and delay as the main comparison criteria, when operating under traffic signals and when a traffic police officer is controlling the intersection.

1.2. Objective of the study

As already stated, there are traffic police officers overruling traffic signals and guiding traffic during peak hours at all major intersections in Dar es Salaam city. The argument behind this popular practice is that signals fail to perform efficiently during peak periods leading to long queues and sometimes locking of the intersections. However, there have also been complaints and observations that the traffic police guidance at the signals leads to even longer waiting queues, intolerable delays and road approach bias. It has therefore become necessary to examine the effectiveness of the intervention by comparing the intersection delay (or LOS) and capacity when operating under traffic signal and traffic police officers controls.

Two major intersections in Dar-es-salaam city were chosen for the analysis; the Ubungo intersection and TAZARA intersection. The two are the most congested among the ten intersections on major roads in Dar es Salaam. Fig. 1 shows a traffic police officer taking charge at the TAZARA intersection.

1.3. Description of the two signalised intersections

The Ubungo intersection is located in Ubungo area in Dar es Salaam city and joins the Morogoro road and Nelson Mandela/Sam Nujoma roads. Each of the intersection approach has three lanes; one through lane, one combined through and left turn lane and a separate lane for the right turn movement with two lanes at the exit (see Fig. 2). The intersection is operated by a pre-timed four phase system of traffic signal with exclusive right turning movements. Signal phasing and timing is on a fixed 120-s cycle.

The TAZARA intersection is located near the TAZARA railway headquarters in Dar-es-salaam and joins the Nyerere road and Nelson Mandela road. Each of the intersection approach has three lanes; one through lane, one combined through and left turning lane and a separate lane for the right turning movement with two lanes at the exit (see Fig. 3). The intersection is operated by a pre-timed four phase system of traffic signals with traffic from each approach constituting a phase. Phasing and signal timing is on a fixed 132-s cycle.

2. Methodology and data collection

2.1. General approach

The capacity of an approach or lane group of the intersection is a function of the saturation flow rate, the green time allocated to this approach or lane group and the cycle length of the intersection. Delay is derived from the volume of the vehicles



Fig. 1. Traffic police officer guiding traffic at TAZARA intersection during the morning peak period.

Download English Version:

<https://daneshyari.com/en/article/897723>

Download Persian Version:

<https://daneshyari.com/article/897723>

[Daneshyari.com](https://daneshyari.com)