

An Analysis on Effectiveness of Transportation Demand Management in Beijing

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Abstract: From 2006 to 2009, a set of transportation demand management (TDM) policies were applied in Beijing during various important activities. This paper studies the performance targets, the implementation details and compares the effects of these TDM measures which implemented during different important activities. On the basis of TDM effectiveness analysis, it is evident that combined strategies are implemented successfully. At the same time, compared with evening peak-hour, the traffic status of morning peak-hour changes more significantly, morning peak-hour during the important activities should be paid more attention.

Key Words: transportation demand management (TDM); Beijing Olympic Games; important activities

1 Introduction

Great changes have already been and are still taking place in Chinese economic and social life since early 90s, which as a result brings significant pressure to the transportation systems of almost all Chinese big cities. For example, in Beijing, the number of motor vehicles became twofold in numbers during the last decade (157 8000 in 2000 to 350 4000 in 2008)^[1] and produced annoying urban traffic congestions and severe environmental pollutions. Increasing number of vehicles in Beijing from 2000 to 2008 is shown in Fig. 1. To deal with these problems, Beijing government has executed several constructing projects to boost the performance of current transportation infrastructures. Moreover, different intelligent transportation control systems (e.g. SCOOTs, ARCTRA, and etc.), traffic information dissemination systems, electronic payment, and toll collection systems have also been applied in Beijing^[2]. However, according to the investigation data, traffic jams are occurring more frequently mainly because of the tremendous increase of vehicle holders^[3,4]. In response, Beijing government is advocating on residents to take use of public transportation services instead of private cars since early 2000. To deal with the increasing transportation problems, Beijing government is trying all

means to reduce the total volume of traffic or to promote shifts towards more sustainable modes of transport, as well. Different policies and measures are attempted, which include but not limit to installing advanced transportation control systems and advocating public transport (e.g. constructing exclusive bus lanes).

Transportation demand management, which is also called travel demand management in some literatures, usually refers to the management of the distribution of, and access to transportation and services on the basis of needs^[5].

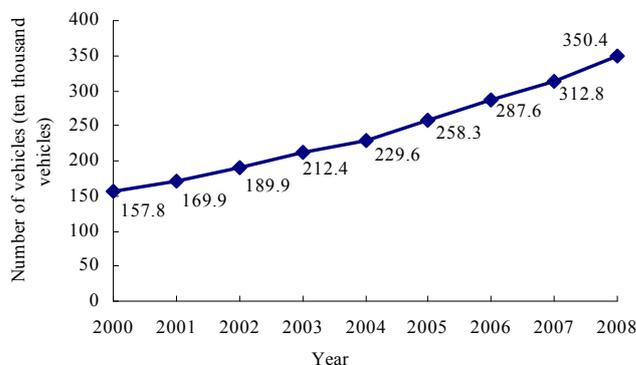


Fig. 1 Increasing numbers of vehicles in Beijing from 2000 to 2008

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2 TDM policies in Beijing

As the last remedy, some special Transportation Demand Management (TDM) measures are attempted in the last four years. Various TDM strategies have also been tested:

(1) From 1st to 6th in Nov. 2006 (during the Beijing Summit Forum on China-Africa Cooperation), a special travel demand management strategy, namely Government-Vehicles Prohibition (GVP), was tested. According to authority statistical data, about 500k government-cars were inactive during this period.

(2) From 17th to 20th in Aug. 2007 (during the “Good Luck Beijing” Test Events), a more powerful TDM strategy was tested, namely Odd-Even Day Vehicles Prohibition (OEDVP). From 17th to 20th in August 2007, cars with odd license plate number can only be used in odd days (Aug 17th and 19th) whereas cars with even license plate number can only be used in even days (Aug 18th and 20th).

(3) From 20th in July 2008 to 20th in September 2008 (during the Beijing Summer Olympic Games), the separated special lanes for Olympic vehicles, the separated bus lanes and/or bus priority, the Staggered Work Hours, the Government-Vehicles Prohibition (GVP) and the Odd-Even Day Vehicles Prohibition (OEDVP) were worked together.

(4) After 2008 Olympic Games, in order to preserve these satisfactory traffic services for Beijing during the post-Olympic Games time, some Transportation Demand Management (TDM) strategies are still at work, for example, the implementation of Traffic Control Measures on regularly rotating No Driving Day on a weekly basis by the tail plate No. of motor vehicles.

Valuable experience can be obtained from analyzing the results of before-and-after TDM measures. To give a detailed analysis on the TDM effectiveness, the rest of this paper is organized as follows: Section 2 briefly summarizes what TDM measures have already been tested in Beijing from 2006 to 2009. According to different time period, section 3 first describes how the traffic flow data are collected, and then presents the statistics of traffic flow with and without TDM policies with an emphasis on the observed flow phase transition characteristics. Based on the conclusion given in Section 3, Section 4 finally discusses how to combine different TMD measures for better service of special large activities.

According to classification of TDM^[6], the separated special lanes for Olympic vehicles and bus signal priority belong to the improvement in the level of services of the existing public transport systems; staggered work hours belongs to the shift trip from a more congested time period to another less congested one; and the government-vehicles prohibition, the odd-even day vehicles prohibition and the regularly rotating no driving day on a weekly belong to the reform travel

behaviors of vehicle holders independent of location, and land use. The summary of the adopted TDM policies from 2006 to 2009 in Beijing is illustrated as Table 1.

3 Effectiveness of TDM in Beijing

To obtain the traffic flow data, one typical urban link is monitored by using video camera. This link connects the West 4th Ring Road and the West 5th Ring Road of Beijing. In the morning, people go to work from west (suburban) to east (urban centre). In the evening, people go home in opposite direction after they go off work.

In the morning, traffic flow and density data are collected between 7:00 AM and 8:30 AM (morning peak-hour), in the evening, between 5:00 PM and 6:30 PM (evening peak-hour).

According to the research targets and traffic participant behaviors, the plan of collecting traffic flow data is as follows. The data without implementing TDM are collected between 30th in June and 4th in July 2008 (from Monday to Friday) before Olympic Games; the data with implementing TDM policies during Olympic games are collected between 11th and 15th in August 2008 (from Monday to Friday); and the traffic flow and density data are collected between 2nd and 6th in March 2009 (from Monday to Friday), regularly rotating No Driving Day on a weekly basis by the tail plate No. of motor vehicles are implemented after Olympic Games.

The change of traffic status from free traffic flow to congestion can be reflected more directly by road density. The comparisons of road density with and without transportation demand management are shown in Figs. 2, 3, and 4. The dot and dash lines represent data before Olympic Games, the solid lines represent data during Olympic Games and the dash lines represent data after Olympic Games. According to research results^[7,8], the density threshold of traffic status changed from free flow to congestion is about 60 vehicles/kilometer/lane. The length of data collected road is 0.1 kilometer and there are three lanes on the road, so the traffic jam threshold of this section is about 18 vehicles driving on the road.

Table 1 Summary of adopted TDM policies from 2006 to 2009 in Beijing

TDM policies	Time			
	Nov. 2006	Aug. 2007	Aug. 2008	Mar. 2009
Separated special lanes for Olympic vehicles			√	
Bus signal priority			√	
Staggered work hours		√	√	
Government-vehicles prohibition	√		√	
Odd-even day vehicles prohibition		√	√	
Regularly rotating no driving day on a weekly				√

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