土木学会第50回年次学術講演会（平成７年９月）

IV－208 A Management Tool for Bicycle Commuting Traffic in Urban Areas in China

日本テトラポッド株式会社　正会員　周　遠強
東京大学工学部　正会員　渡邊法美

Introduction In Chinese cities, the bicycle has been and will be playing a vital role for many years to come in dealing with the commuting traffic; Heavy use of bicycles in Chinese cities causes many problems of which the main cause is the mixed traffic of bicycle and motorized vehicle [1). (Hereafter motorized vehicle is referred as to "vehicle"). In this study, we discuss a management tool with the aim at helping traffic engineers of cities in China to explore right management countermeasures to manage bicycle commuting traffic for their interests [2). Following parts of this paper briefly introduce the tool.

The Management Tool The framework of the tool is shown in Figure 1. As well known, the problems between the transport demand (demand side) and road system (supply side) appear as the *congestion* on roads and the *delay* over the road network. The levels of service (LOS) of bicycle road segments and bicycle road intersections (at-grade signalized) are used in this tool as local performance indexes to measure the congestion. We define the LOS criteria for bicycle road segments and bicycle road intersections (at-grade signalized) as in Table 1 and Table 2. Bicycle travel time over the network is used in this tool as a performance index of the bicycle road network, and the delay can be measured directly by comparing different travel times under different conditions. Apart from these, the tool is also, to some extent, capable of providing the information on how bicycle traffic influences vehicle traffic for the mixed traffic. The influence is measured by the performance index for the user of vehicle. The detailed contents of these performance indexes are shown in Figure 1.

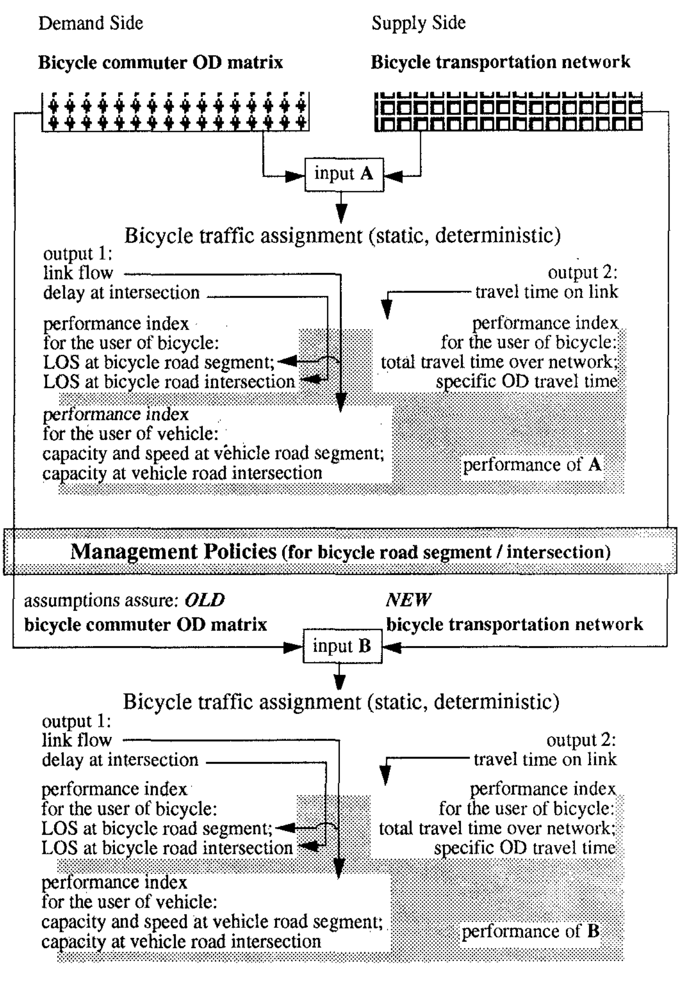

Figure 1 The Framework of the Management Tool

The information on the demand side and the supply side is necessary for the tool. The information on the demand side is the bicycle commuter OD matrix, and that on the supply side is the bicycle transportation network. Both are treated as the input of the tool. By doing the user-equilibrium traffic assignment for the bicycle commuter OD matrix over the bicycle transportation network, we obtain link flow and delay at intersection classified in output 1 as well as travel time on link classified in output 2. Then we obtain the performance indexes aforementioned from output 1 and output 2. Hence, for a given input (for example, the input **A** in Figure 1), its performance can be known if we consider that the performance of an input consists in these performance indexes.

After evaluating the performance of **A** by the user of the tool, some changes might be considered to be essential to achieve better performance. The "better performance" means better achievement of the objectives which depend on the user's interests. The "some changes" mean to implement management countermeasures. When these countermeasures are implemented, the input **A** will be changed, and consequently will be the performance. However, if the management countermeasures are local events such as rearrangements of bicycle road segment / intersection layout and rearrangements of bicycle road intersection traffic signal, the bicycle commuter OD matrix of the input **A** is probably uninfluenced by implementing the countermeasures. Using this tool, we assume that local events will not alter the demand side. In this way, the input **A** will be changed to the input **B** in Figure 1 after implementing the management policies, with the same demand side as that of the input **A** and a new supply side different from that of the input **A**. Then the performance of **B** can be obtained. The comparison between "with" the management measures (input **B**) and "without" the management measures (input **A**), that is, the comparison in between performances of **B** and **A**, is thus possible.

Table 1 LOS Criteria for Bicycle Road Segments in Cities in China *

LOS	flow rate (b/h/m)	freedom of choosing speed
stable flow		
1	•• ≤ 400	any, 6 - 40 km/h suggested
2	400 < •• ≤ 800	9 - 34 km/h
3	800 < •• ≤ 1200	11 - 31 km/h
4	1200 < •• ≤ 1600	13 - 24 km/h
5	1600 < •• ≤ 2000	14.5 - 17 km/h
forced flow		
6		

* suggested by Zhou [2)]

Table 2 LOS Criteria for Signalized Intersections **

LOS	stopped delay per bicycle
1	≤ 5.0 sec
2	5.1 to 15.0 sec
3	15.1 to 25.0 sec
4	25.1 to 40.0 sec
5	40.1 to 60.0 sec
6	> 60.0 sec

** borrowed from HCM [3)]

Conclusion Therefore, by employing the tool, traffic engineers of cities in China can examine their local management countermeasures for improving current situations before actually launching these measures because the performance after launching these measures can be predicted. By comparing the predicted performance (with the management measures) with the current situations (without the management measures), traffic engineers can predict the differences between "with" and "without", and hence, they can find better alternatives among their policies according to their criteria.

ACKNOWLEDGMENT: The authors would like to express their sincere gratitude to Professor Masahiko Kunishima in the Department of Civil Engineering at the University of Tokyo for his valuable advice.

REFERENCES

1) Yuan Qiang ZHOU and Tsunemi WATANABE. "Review and Discussion of Bicycle Issues in Urban Transportation Systems Worldwide and in China". *Proceedings of the Symposium of Young Scholars on Urban Development.* Shanghai, May 7-9, 1992

2) Yuan Qiang ZHOU. *Traffic Management for Bicycle Commuting in Cities of China.* Doctoral Thesis, Department of civil Engineering, University of Tokyo, 1994

3) *Highway Capacity Manual.* TRB, National Research Council, Washington, D.C., 1985