International Journal of
Information
and
Management
Sciences

International Journal of Information and Management Sciences
27 (2016), 61-72. DOI:10.6186/IJIMS.2016.27.1.4

Bus Service Model with Rectangular Service Zone under Exponential Relation

Shu-Cheng Lin and Chu Hopscotch

Lee-Ming Institute of Technology and Central Police University

Abstract

Most researchers developed bus service models with a rectangular service zone that relations among different costs are related by a linear relation. A bus service model had been constructed with a rectangular service zone where costs are synthesized by an exponential relation. An accepted paper had point out that a previous model without capacity constraint is unreasonable. This paper examines another model with capacity constraint to show that previous formulated optimal solution contains questionable findings and then we provide our solution approach. The key feature of our paper is to point out that using the route width as a continuous variable will derive unreasonable results. Our improved approach is to use the partition number for the zone width as a discrete variable. A numerical example is provided to illustrate our proposed approach.

Keywords: Bus service model, bus service zones, optimal solution.

1. Introduction

In Tung et al. [16], they classified traffic models into two categories: (a) Simplified traffic systems with formulated solution, and (b) Complicated traffic models with numerical solutions. Most researchers have tried to develop traffic models to be applied in the real world situation. However, those papers did not know whether or not their numerical findings are the optimal solutions. Moreover, the real world is so complex so that those complicated traffic models only reflect a few features in traffic environment. In this paper, we will work on traffic models in category (a) for bus service models with a rectangular service zone. We will provide a review for related papers of bus service models with a rectangular service zone. Chang and Schonfeld [2] first constructed a bus service model for rectangular bus service areas with a steady fixed demand such that there are three variables: the headway, the service route length and capacity constraint. And then Chang and Schonfeld [2] extended their models with a cyclical fixed demand and several time periods. Chang and Schonfeld [3] generalized Chang and Schonfeld [2] to consider the service route width as a new variable. Yang et al. [19] pointed out that in Chang and Schonfeld [3], their derivation including questionable results and then Yang