THE APPLICATION OF SIMULATION ON TRANSIT SYSTEMS FOR LONG DISTANCE MASS TRANSPORT -- THE DESIGN OF TRANSIT LOCATIONS, RO

李宗翰、陳慧芬,陳偉星

E-mail: 9017535@mail.dyu.edu.tw

ABSTRACT

IN THIS RESEARCH WE USE MONTE CARLO ESTIMATION TO DESIGN ROUTE MERGING FOR THE INTERCITY-BUS TRANSFER NETWORK. INTERCITY BUSES TAKE THE SUPER HIGHWAY ROUTES. IF THE PASSENGER LOAD IS LOW FOR MANY ROUTES, THEN THE OPERATING REVENUE MIGHT BE SO SMALL AS TO CAUSE LOSSES. BY COMBINING ROUTES WITH OVERLAPS, THE OPERATING COST CAN BE REDUCED. MEANWHILE THE BUS FREQUENCY OF MERGED ROUTES CAN BE INCREASED FOR ELEVATE THE SERVICE TO PASSENGERS. THE STOCHASTIC MODEL WE ASSUMED FOR THE SYSTEM OF INTERCITY BUSES IS AS FOLLOWS: PASSENGERS ARRIVE ACCORDING TO NONHOMOGENEOUS POISSON PROCESSES AND BUS TRAVELING TIMES ARE DISTRIBUTED AS WEIBULL DISTRIBUTIONS. THE PERFORMANCE MEASURE IS THE EXPECTED PROFIT---THE EXPECTED VALUE OF THE TICKET REVENUE MINUS THE SUM OF BUS OPERATION COST, CUSTOMER'S WAITING COST, AND CUSTOMER'S INCONVENIENT COST DUE TO TRANSFER. WE PROPOSE HERE A HEURISTIC METHOD FOR COMBINING ROUTES. THE HEURISTIC METHOD WORKS AS FOLLOWS: THE ROUTES WITH PASSENGER-LOAD RATES HIGHER THAN A DESIGNED VALUE WOULD NOT MERGE WITH ANY OTHER ROUTES. THE OTHER ROUTES WILL MERGE WITH EACH OTHER BY SELECTING THOSE WITH HIGHEST OVERLAP; ANY MERGED ROUTE IS LIMITED TO TWO TRANSFER STOPS. IF THE MERGING CHOICE WITH THE HIGHEST OVERLAP INCREASES THE NUMBER OF STOPS BY TWO, THIS CHOICE WILL BE COMPARED WITH THE CHOICE WHOSE OVERLAP LENGTH IS HIGHEST AMONG ALL ROUTES THAT ONLY INCREASES ONE TRANSFER STOP. THE ONE WITH A HIGHER ESTIMATED PROFIT WINS. AT THE END, THE ROUTES THAT ARE LEFT BUT CAN NOT BE COMBINED STAYS THE SAME. AFTER THE TRANSFER NETWORK IS COMPLETED, THE HEADWAYS ARE COMPUTED. IF THE COMPUTED HEADWAY OF A NEW COMBINED ROUTE IS LARGER THAN THE MINIMUM OF THE ORIGINAL HEADWAYS, IT IS SET TO THE MINIMUM FOR PRESERVING PASSENGER'S RIGHT. FINALLY WE RUN THE SIMULATION EXPERIMENT OF A SIMPLE EXAMPLE TO SHOW THE PERFORMANCE OF OUR HEURISTIC METHOD.

Keywords : NETWORK DESIGN; SIMULATION; TRANSFER SYSTEM

Table of Contents

REFERENCES

1.游政霖, 「城際客運轉車系統路線設計之研究」, 運輸計劃季刊, 29(1), 143-180, 民國八十九年三 月。 2.許書耕、陳茂南、邱裕鈞, 「高速公路客運接駁轉運系統運轉規劃」, 中華民國運輸學會第十二屆學 術論文研討會, 民國八十六年十二月。 3.朱正祺, 「高速公路城際客運轉運操作最佳化模式之建構與求解」, 交通大學交通運輸研究所碩士論 文, 民國八十五年六月。 4.吳家麟, 「長途客運轉運接駁站選位模式之研究」, 交通大學管理科學研究所碩士論文, 民國七十三 年。 5.劉方旗, 「市區公車排班與即時機動調度之研究---以新竹市公車為例」, 交通大學交通運輸研究所 碩士論文, 民國八十七年六月。 6.洪士吉編著, 「操作輕鬆巨集通---EXCEL VBA 巨集逐步操作指引」, 標旗出版股份有限公司, 民國 八十八年十一月出版。 7.LAW, A.M. AND W.D. KELTON (2000). SIMULATION MODELING AND ANALYSIS. MCGRAW-HILL, INC . 8.O`FLAERTY, C.A. AND D.O.MANGAN (1990) . BUS PASSENGER WAITING TIME IN CENTRAL AREAS. TRA -FFIC ENGINEERING AND CONTROL, NO.11, 419-445。