

OPTIMIZATION OF BUS DISPATCHING FROM ANY GIVEN TERMINAL



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This thesis was submitted to the department of Civil Engineering of the University of Moratuwa in partial fulfillment of the requirement for the Degree of Master of Science.

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DECLARATION

The work included in this thesis is part or whole, has not been submitted for any other academic qualification at any institution.

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Abstract

The problems of scheduling and schedule co-ordination have conflicting objectives related to user's cost, operator's cost, overloading and crew deployment hours. Passengers would like to have bus service where there is less waiting time. Operators on the other hand would like to have profit with lesser vehicle operating cost and a minimum number of buses. When the service of buses is considered, passengers would like to have less crowding in buses but operators would like to have higher load factors to increase revenues. The crew would like to have less working hours and there are legal requirements in crew working hours. The minimum economic cost is the main consideration in bus dispatching when considering as a country.

When there is a mechanism to find out an average headway for a route for a day considering above four factors and economic cost to the country while satisfying all parties involved, then regulators can apply that mechanism to decide average headways on a route.

As a mechanism of finding average headway for a route for a day, an improved dispatching process was introduced in this study to find out the average headway considering the financial costs, economic costs, overloading and crew deployment hours involved in bus dispatching.

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Annexes

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List Symbols, Notations, Abbreviation & Acronyms

ECP(W)	– Waiting Cost of Passengers per Month
h	– Headway(min.)
h_a	– Average Headway
h_o	– Headway(min.), which Passengers Starts to Travel Standing
V_{wt}	– Value of Waiting Time(Rs./hr)
D_{tw}	– Two Way Demand per Day
EDDpM	– Equivalent Demand Days per Month
ECP_{Total}	– Total Economic Cost of Passengers per Month
V_{st}	– Value of Standing Time(Rs./hr)
ECO(F)	– Fixed Economic Cost of Operation per Month
N_{br}	– Number of Buses in Route
C_{fo}	– Fixed Operating Cost per Month
ECO(V)	– Variable Economic Cost of Operation per Month
RT_{km}	– Round Trip km per Day
C_v	– Variable Cost per km
RT_b	– per Bus Round Trips per Month
C_o	– Overtime Cost per Hour per Bus
OND_m	– Optimum Number of Days per Bus per Month
ADO_m	– Average Days Operated per Month
MSNO_b	– Marginal Saving of Non Operation of a Bus per Day
ECO_{Total}	– Total Economic Cost of Operation per Month
f_{tec}	– Function of Total Economic Cost to the Country
f_{ecp}	– Function of Total Economic Cost to the Passenger
f_{eco}	– Function of Total Economic Cost to the Operator
h_e	– Most Economic Headway as a Country
EC_{total}	– Total Economic Cost to the Country per Month
FRO	– Financial Revenue to Operator per Month
F_r	– Resulting Fare
E_d	– Elasticity of Demand
CDH_{Total}	– Total Crew Deployment Hours per Day
ART_t	– Average Round Trip Time(in minutes)

T_d	– Length of Traffic Day
S_a	– Average Seat Capacity per Bus
h_f	– Most Financial Headway for Operators
$pBRTpM$	– per Bus Round Trips per Month
h_{cd1}	– Headway of Lower Boundary of Crew Deployment Hours
h_{cd2}	– Headway of Upper Boundary of Crew Deployment Hours
$SPpDAOF$	– Supply Passengers per Day with Allowed Overload Factor
AOF	– Allowed Overload Factor
OF	– Overload Factor
h_{ol}	– Headway with Maximum Overload
h_{design}	– Designed Headway

