FREE SCHOOL BUS SERVICE FOR NEEDY CHILDREN IN SURABAYA: FINDING THE OPTIMAL ROUTE USING GEOGRAPHIC INFORMATION SYSTEM

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ABSTRACT

Surabaya city, Indonesia, has a considerable number of unschooled children. Even though the Government has eliminated the tuition fee, the number of needy school aged children remains high because of additional schooling costs beyond the tuition fee. The Government tries to support the needy student population by donating money for books, uniforms, shoes, and other school supplies, and would also like to offer help by easing transportation costs. The distribution of upper school make the traveling length and traveling costs excessive, compared with lower level schools. This goal of this research is to provide a clear framework of methodology and analysis which will serve to assist the government in analyzing the probability of the use of school buses in supporting the needy with their transportation.

The work begins with an exploration of the research area and the related technology. This research is in the vehicle routing problem area, with a special emphasis on the school bus. The environment is an urban area, with uniform fleet, across multiple schools. Within this concept, that data that will be required is defined. This research requires a needy area map, street map, school map, depot map, and existing transportation map. The concept then details in a methodology. From the methodology it is noted that there are several types of work which must be completed over 3 broad stages: preprocessing, routing and analyzing. In the preprocessing stage, the needy area must be refined, the network dataset needs to be built, and the visiting places and the number of passengers in the street segments need to be generated. In the routing stage, some experimentation is required and is useful with respect to looking at the street network in different settings, discovering how many routes need to be provided to cover all needy areas and school locations. There are two analyst processes in the analyzing stage; load analyst and accessibility analyst. The load analyst will show the passenger flow characteristic and the accessibility analyst will show the effect of the school buses in the existing transportation system.

Several models have been developed for different functionalities. The routing model is used repetitively and each output is assessed and compared. This assessment is based on load balancing, number of covered needy, time consumed, and shared area. The best route is then discovered and analyzed. Finally, the route is evaluated with ground checking. The positive results of the research and its methodology are twofold: the methodology provides a framework for analysis that can be easily and effectively used by government to make decisions regarding the creation of practical and acceptable bus routes to help needy families. Secondly, the methodology also provides a useful new starting point in those cities across the world that lack sufficient spatial data in conducting VRP research.
ABSTRAK

Bandar Surabaya, Indonesia mempunyai ramai kanak-kanak yang tidak bersekolah. Walaupun kerajaan telah menghapuskan yuran pengajian, tetapi bilangan kanak-kanak miskin yang tidak bersekolah masih lagi tinggi kerana terdapat kos tambahan sampingan selain yuran pengajian. Kerajaan berusaha untuk populasi kanak-kanak miskin dengan menyumbang wang untuk membeli buku, pakaian seragam, kasut dan barangan keperluan persekolahan yang lain, selain itu kerajaan juga ingin membantu mengurangkan kos pengangkutan mereka. Lokasi sekolah menengah adalah lebih jauh dari rumah dan memerlukan kos pengangkutan yang lebih tinggi berbanding dengan kos perjalanan ke sekolah rendah. Matlamat utama kajian ini adalah untuk menyediakan satu kerangka kerja dan kaedah analisis yang jelas yang dapat membantu kerajaan mengkaji kemungkinan penyediaan bas sekolah percuma yang dapat membantu perjalanan kanak-kanak miskin.


Beberapa model telah dibangunkan untuk pelbagai tujuan. Model routing digunakan secara berterusan dan hasil model dinilai dan dibandingkan. Penilaian berdasarkan kepada load balancing, jumlah dari covered needy, masa yang diperlukan dan shared area. Laluan yang terbaik kemudiannya dipilih dan dikenalpasti. Akhir sekali, laluan akan dinilai dengan semakan di lapangan. Hasil kajian dan kaedah yang positif dapat digambarkan: kaedah kajian menyediakan kerangka kerja analisis yang berguna kepada kerajaan untuk membuat keputusan berhubung dengan penghasilan laluan bas yang praktikal dan diterima oleh keluarga miskin. Kedua, kaedah kajian juga menyediakan titik permuatan yang baru dan berguna untuk bandar-bandar lain di dunia yang mempunyai data ruangan yang tidak mencukupi untuk memulakan kajian VRP.
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# TABLE OF CONTENTS

Abstract

Abstrak

Acknowledgements

Table of Contents

List of Figures

List of Tables

## CHAPTER 1 – INTRODUCTION

1.1 Background

1.2 Statement of Problem

1.3 Goal and Objectives of Study

1.4 Research Methodology

1.5 Scope of Study

1.6 Organization of Study

## CHAPTER 2 - STUDIES IN SCHOOL BUS ROUTING AND NETWORK ANALYSIS

2.1 Introduction

2.2 School Bus Transport

2.3 Definition of Needy Children

2.4 Finding Optimal Route

2.4.1 VRP Types

2.5 School Bus Routing

2.6 Problem Solution Definition

2.7 Accessibility Concept

2.8 Network Analyst Technology

2.8.1 Network Dataset

2.8.2 Functions in Network Analyst
2.8.3 algorithm used by Network Analyst

2.9 Summary

CHAPTER 3 – RESEARCH METHODOLOGY

3.1 Introduction

3.2 Conceptual Framework of School Bus Route Finding and Route Analysis

3.3 Variables and notations

3.4 Methodology Schema

3.5 The Geospatial Technology Used

3.5 Summary

CHAPTER 4 – DATA DEVELOPMENT AND GIS MODEL DEVELOPMENT

4.1 Introduction

4.2 Surabaya City Region Characteristics Underlying School Bus Route

4.2.1 Surabaya City Region

4.2.2 Identifying the Needy School Children

4.2.3 The Street Network in Northern Surabaya

4.2.4 Location of School in Northern Surabaya

4.2.5 Identifying the Depot

4.2.6 The Existing Transportation System in North Surabaya

4.3 Refining Needy Area

4.4 Generating Visiting Point Layer

4.5 Calculating Street Load

4.6 Network Dataset

4.7 Vehicle Routing Problem Class

4.7.1 Orders

4.7.2. Depots

4.7.3. Barriers

4.8 Inspecting the Needed Number of Routes

4.8.1 One Route
LIST OF FIGURES

**Figure 1.1.** Map of Indonesia

**Figure 1.2.** Map of East Java

**Figure 1.3.** Grouping of secondary school area

**Figure 1.4.** Distribution of needy students at the third level of school.

**Figure 1.5.** Schema of the research methodology in this research

**Figure 2.1.** The city bus and the Lyn

**Figure 2.2.** Four different types of school bus

**Figure 2.3.** A. VRP Input: Depot and location; B. VRP Output: Vehicle route

**Figure 2.4.** Representing route in graph

**Figure 2.5.** Concept of LAR Strategy

**Figure 2.6.** Concept of ALR Strategy

**Figure 2.7.** Example of the accessibility visualization

**Figure 2.8.** Example of a simple transportation network

**Figure 2.9.** Combination of Turn

**Figure 2.10.** Two different base attribute routing: a. time based, b. distance based

**Figure 2.11.** Examples output of Closest facility solver

**Figure 2.12.** Example output of Service Area Solver

**Figure 2.13.** Example of OD Cost matrix using

**Figure 2.14.** Example of storage data in OD Cost matrix

**Figure 2.15.** Example output of Vehicle Routing Problem solver

**Figure 3.1.** Conceptual framework diagram

**Figure 3.2.** Needy area layer (example).

**Figure 3.3.** Street, School, and Depot layer (example)

**Figure 3.4.** School layer and the reshaped needy area

**Figure 3.5.** Street, School, and Depot layer overlay on the new needy layer

**Figure 3.6.** Two different output of routing process (example)

**Figure 3.7.** Two different coverage needy layer (example)
Figure 3.8. The entry and exit number in each segment (example) 64
Figure 3.9. The calculation of passenger load (example) 65
Figure 3.10. Initial entry and exit value for reserve road (example) 66
Figure 3.11. The calculation of passenger load in reserve route (example) 67
Figure 3.12. The existing transport system and its accessibility layer (example) 67
Figure 3.13. Accessibility after buses added (example) 68
Figure 3.14. Methodology schema 74
Figure 4.1. Map of The North Sub Districts, and the sub-sub district. 85
Figure 4.2. Dot density map of needy student 87
Figure 4.3. Gradation color Map of Needy Density students 88
Figure 4.4. Streets that can be passed by bus 93
Figure 4.5. Street junction and example of not junction in the highway 94
Figure 4.6. The one way streets 95
Figure 4.7. The average speed of the streets 96
Figure 4.8. The drive time of the streets 97
Figure 4.9. School and the public school map (blue dotted) 98
Figure 4.10. Location of the bus depots 99
Figure 4.11. Route of Bus and Lyn 101
Figure 4.12. Schools location and needy student area 102
Figure 4.13. Model for make neighborhood needy for each school 103
Figure 4.14. Identify output of buffer of school and sub-sub district map. 104
Figure 4.15. Sharing area makes total number of needy surrounding the school invalid 105
Figure 4.16. Process model for calculating new school capacity and needy area 106
Figure 4.17. The new needy area and schools that will be eliminated 109
Figure 4.18. Model for generate Visiting point 109
Figure 4.19. The selected needy area and the generated point layer 110
Figure 4.20. Process model for generating street load 111
Figure 4.21. Street load presented in graduate color 112
Figure 4.22. Form for setting the Turning cost 114
Figure 4.23. Orders items, consist of: School and Visiting point 115
Figure 4.24. Depots, consist of bus depots and public school

Figure 4.25. Locations of barriers

Figure 4.26. Design of start and stop depot for 1 route

Figure 4.27. Output of VRP Analyst for 1 route design

Figure 4.28. Design of start and stop depot for 2 routes

Figure 4.29. Output of VRP Analyst for 2 routes design

Figure 4.30. Design of start and stop depot for 3 routes

Figure 4.31. Output of VRP Analyst for 3 routes design

Figure 4.32. Design of start and stop depot for 4 routes

Figure 4.33. Output of VRP Analyst for 4 routes design

Figure 4.34. Model for finding covered area of the routes

Figure 4.35. Model for generate area with 2 or more access routes

Figure 4.36. Model for generate area with 3 or more access routes

Figure 4.37. Model for generating area with 4 access routes

Figure 4.38. Model for separating each route and discovering each covering area

Figure 4.39. Model for separating schools by its route.

Figure 4.40. Example of dividing route into parts for load analyst.

Figure 4.41. Algorithm for filling the load analyst fields

Figure 4.42. Illustration of the example case

Figure 4.43. Illustration of bus fleet needed

Figure 4.44. Model Diagram for generating accessibility map

Figure 4.45. Model for generate uncovered need map

Figure 5.1. The routes setting (example)

Figure 5.2. The output (example)

Figure 5.3. Covered Area of the example routes

Figure 5.4. Shared areas of example output which have access to 2 or more route directions

Figure 5.5. Shared areas of example output which have access to 3 or more route directions.

Figure 5.6. Shared areas of example output which have access to 4 route directions

Figure 5.7. The 4 route directions including their covered areas and schools

Figure 5.8. Illustration of the first design of school distribution
Figure 5.9. Illustration of second design of school distribution 163
Figure 5.10. The chosen routes 167
Figure 5.11. Result Table of the Orders class 168
Figure 5.12. The west route 170
Figure 5.13. The east route 171
Figure 5.14. The north route 172
Figure 5.15. The south route 173
Figure 5.16. Table of the Load analyst 174
Figure 5.17. The 3D representation of the passenger load in the west route 176
Figure 5.18. The 3D representation of the passenger load in the east route 176
Figure 5.19. The 3D representation of the passenger load in the north route; the main direction 178
Figure 5.20. The 3D representation of the passenger load in the north route; the inverse direction 178
Figure 5.21. The 3D representation of the passenger load in the south route 179
Figure 5.22. The existing transportation system map 180
Figure 5.23. Accessibility map before school bus was added 182
Figure 5.24. Accessibility map after school bus was added 183
Figure 5.25. Uncovered needy in existing transport system 184
Figure 5.26. Uncovered needy in new transport system 183
LIST OF TABLES

Table 1.1. Indonesia Primary commodities 3
Table 2.1. Needy family criteria 20
Table 3.1. Color and meaning of the Tool 76
Table 3.2. Color and meaning of the Variable 76
Table 3.3. Example of geospatial functions 82
Table 4.1. Characteristic of Primary and Secondary Arterial Road 90
Table 4.2. Characteristic of Primary and Secondary Collector Road 91
Table 4.3. Characteristic of Primary and Secondary Local Road 92
Table 4.4. Route of Bus and Lyn 100
Table 4.5. The school list with its new capacity 108
Table 4.6. Example process for illustrating the algorithm 138
Table 5.1. Schools separated by routes and capacity 153
Table 5.2. Route design and output analyze of Unsupervised Orders type 156
Table 5.3. End depot design, output, and the assessment result of Distribution 1 161
Table 5.4. End depot design, output, and the assessment result of Distribution 2 164
Table 5.5. Schools visited sequence and time 168
Table 5.7. Existing Transport System statistic plus new school bus routes 181
Table 6.1. The School bus routing problem research 196