

**AN IMPROVED PRIMAL SOLUTION FOR THE TRANSPORTATION
PROBLEMS IN OPERATIONAL RESEARCH**

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MASTER OF SCIENCE IN OPERATIONAL RESEARCH

DEPARTMENT OF MATHEMATICS

UNIVERSITY OF MORATUWA

SRI LANKA

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degree of

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DECLARATION

I do hereby declare that the work reported in this project report/thesis was exclusively carried out by me under the supervision of Prof. W. B. Daundasekera and Mr. T. M. J. A. Cooray. It describes the results of my own independent research except where due reference has been made in the text. No part of this project report/thesis has been submitted earlier or concurrently for the same or any other degree.

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ABSTRACT

Organizations providing goods and services are mainly focusing on cost minimization within their organizations as it is a vital factor for their existence. In common, scheduling activities with less conflict within organizations is vital for their survival. In many organizations, transportation scheduling plays a major role in cost minimization. In particular, transporting goods from manufacturing plants to identified destinations with minimum transportation cost is known as transportation scheduling or transportation problem.

The objective of the transportation problem is to satisfy the destination requirements with minimum cost while satisfying the operating production capacity. Transportation problem is categorized as a Linear Programming problem. Generally, the Simplex method is the widely used method to solve Linear Programming problems. But, Simplex method is not the most efficient method to solve the transportation problem due to its special structure. Therefore, the most of the time effective and numerical efficient way to solve the transportation problem is Transportation Algorithm (TA) designed from the basic principles of Simplex method.

The Transportation Algorithm consists of two major steps: obtaining the Initial Basic Feasible Solution (IBFS) and finding optimal solution using the IBFS. A better IBFS always reduces the number of iterations and computational time in finding the optimum solution. There are existing standard methods which are available to find the IBFS, but have failed to find an effective IBFS for the most of the transportation problems. To overcome this failure, in this research a modified heuristic approach is proposed to find a more promising IBFS.

In the proposed method, the cumulative difference representation is used instead of cost matrix in order to make the assignments. This technique leads to assign most of the assignments at minimum cost. The cumulative difference representation represents the additional excess cumulative costs throughout the row and column for each possible cost of transportation. The IBFS found by the newly proposed method converges to the optimal solution faster than the standard methods considering the time consumed as well as less number of iterations to achieve it. The proposed method has proved to be in finding better IBFS for all the 70 transportation problems discussed in this study. The IBFS of 41 problems of selected 70 transportation problems themselves are the optimal solutions. Further, for the rest of the 29 problems, the difference between IBFS and the optimal solution is only less than five percentage. Therefore, it can be concluded that the newly proposed method to find IBFS is robust in providing an improved primal solution compared to the existing standard methods.

Keywords: Transportation problem, Optimal Solution, IBFS, Cumulative Difference.

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TABLE OF CONTENTS

DECLARATION.....	i
ABSTRACT	ii
ACKNOWLEDGMENT	iii
LIST OF FIGURES	vi
LIST OF TABLES	vii
CHAPTER 1.....	1
INTRODUCTION	1
1.1 The Transportation Problem.....	1
1.2 Mathematical Model of the Transportation Problem for Single Commodity.....	2
1.3 Method of Solution to the Transportation Problem.....	4
1.3.1 Transportation Algorithm (TA)	5
1.3.2 The Initial Basic Feasible Solution (IBFS).....	5
1.3.3 Optimal Solution	6
1.4 Background of the Study	7
1.5 Scope of the Thesis	7
1.6 Contents of the Thesis.....	8
CHAPTER 2.....	9
LITERATURE REVIEW	9
2.1 Introduction.....	9
2.2 Transportation Problem.....	9
2.3 Related Methodologies on Initial Basic Feasible Solution (IBFS)	10
CHAPTER 3.....	14
METHODOLOGY.....	14
3.1 Analysis of the Three Standard Methods.....	14
3.1.1 North- West Corner Rule (NWCR).....	14
3.1.2 Least Cost Method (LCM).....	15
3.1.3 Vogel’s Approximation Method (VAM)	16
3.2 Analysis of the Related Works from Literature.....	17
3.3 Overview of the New Proposed Heuristic Algorithm	17
3.4 Algorithm of the Cumulative Difference Method	17
3.5 Illustration of the Cumulative Difference Method.....	18

CHAPTER 4.....	27
RESULTS AND DISCUSSION	27
4.1 Comparative Study of IBFS of the Cumulative Difference Method with the Standard Methods.....	27
4.2 Comparative study of IBFS of the Cumulative Difference method with the alternative methods in the literature.....	38
4.3 A Comparative Study between Cumulative Difference Method and Standard Methods for Large Scale Problems	43
CHAPTER 5.....	47
CONCLUSION.....	47
REFERENCES.....	49
APPENDIX.....	52
Appendix-01 MATLAB 2015 Code	52
Code for MODI Method	52
Code for Cumulative Difference Method.....	57
Code Vogel’s Approximation Method.....	59
Code for North-West Corner Rule Method	61
Code for Least Cost Method	62
Appendix-02 Problem set	64
20 Selected problems.....	64
28 Selected problems from literature.....	66

LIST OF FIGURES

Figure 1.1: Network diagram of the transportation problem	2
Figure 1.2: Solution procedure of the transportation problem	4
Figure 4.1: Percentage deviation of the IBFS of North-West Corner Rule and Cumulative Difference method	31
Figure 4.2: Percentage of deviation of the IBFS of Least Cost method and Cumulative Difference method.	31
Figure 4.3: Percentage of deviation of the IBFS of Vogel's Approximation Cumulative Difference method.	32
Figure 4.4: Percentage of deviation of the IBFS of Cumulative Difference method and standard methods	32
Figure 4.5: Histogram of percentage of deviation transportation cost at IBFS	33
Figure 4.6: Number of iterations needed to reach the optimality from the IBFS	35
Figure 4.7: Histogram of percentage of deviation of the transportation cost at IBFS of the Cumulative Difference method	41
Figure 4.8: Percentage deviation from the optimal transportation cost to IBFS	42
Figure 4.9: Percentage of deviation of f the IBFS of North-West Corner Rule vs. Cumulative Difference method	45
Figure 4.10: Percentage of deviation of the IBFS of Least Cost method vs. Cumulative Difference method	45
Figure 4.11: Percentage of deviation of the IBFS of Vogel's Approximation method vs. Cumulative Difference method	46

LIST OF TABLES

Table 3.1: Considered transportation problem	19
Table 3.2: Transportation cost matrix	19
Table 3.3: Computational illustration of CDRM	20
Table 3.4: CDRM of the given transportation problem	20
Table 3.5: CDRM with Cumulative Index	20
Table 3.6: CDRM with 1 st allocation	21
Table 3.7: Reduced CDRM after the 1 st allocation	22
Table 3.8: Reduced CDRM with Cumulative Index after the 1 st allocation	22
Table 3.9: CDRM with 2 st allocation	23
Table 3.10: Reduced CDRM with Cumulative Index after the 2 nd allocation	23
Table 3.11: CDRM with 3 rd allocation	24
Table 3.12: Reduced CDRM after 3 rd allocation	24
Table 3.13: Complete transportation assignments on CDRM	25
Table 3.14: Assignments of IBFS to the given transportation problem	25
Table 3.15: Summary of IBFS of the given transportation problem	26
Table 4.1: IBFS outcomes of the selected problems	28
Table 4.2: Summary of the comparative study	39
Table 4.3: Deviation between the transportation cost at IBFS and the optimum transportation cost	30
Table 4.4: Number of iterations needed to reach the optimality from the IBFS obtained from the proposed new method and the standard methods	34
Table 4.5: Time consumed to reach the optimal solution from the IBFS	36
Table 4.6: Time consumed to reach the optimal solution	37
Table 4.7: IBFS outcomes of the selected problems from literature	39
Table 4.8: Summary of the comparison of IBFS between the Cumulative Difference method and the methods proposed in the literature	40
Table 4.9: IBFS of the selected large scale problems	43
Table 4.10: Deviation of the IBSF from the optimal solution	44