

## TABLE OF CONTENTS

Chapter Title	Page
Signature Page	i
Acknowledgement	ii
Abstract	iii
Table of contents	iv
List of Figures	vi
List of Tables	vii
1. Introduction	1
1.1 Problem Statement	1
1.2 Objective of the Thesis	2
1.3 Overview of the Thesis	2
2. Literature Review of Facility Location Problem	3
2.1 $p$ -median Problems	3
2.2 $p$ -center Problems	4
2.3 Capacitated Facility Location Problems	5
2.4 Uncapacitated Facility Location Problems	12
3. Method of Approach	14
3.1 A Single-Source Capacitated Facility Location Problem	14
3.2 Ant Colony Optimization Algorithm	17
3.3 Generalized Assignment Problem	22
4. The Proposed Single-Source Capacitated Facility Location Problem and Ant Colony Optimization	26
4.1 Components of the Proposed Single-Source Capacitated Facility Location Problem	26
4.2 Assumptions	27
4.3 Notations used in the Single-Source Capacitated Facility Location Problem	28
4.4 Objective Functions	29
4.5 The proposed model is an $NP$ -hard problem	30
4.6 Solving the Problems by Ant Colony Optimization	33
4.7 Solving the Problems by Simple Heuristics	39
4.8 Numerical Example of the Single-Source Capacitated Facility Location Problem	40
4.9 Conclusion	46
5. The Proposed Single-Source Capacitated Facility Location Problem and Simulated Annealing Algorithm	47
5.1 Overview of Simulated Annealing	47
5.2 Simulated Annealing Algorithm	47
5.3 Why Simulated Annealing	51

5.4 Simulated Annealing on Single-Source Capacitated Facility Location Problem	52
5.5 Solving the Problems by Simulated Annealing	53
5.6 Simulation Tests	58
5.7 Conclusion	71
6. Conclusion and Recommendation for Further Study	72
6.1 Concluding Remarks	72
6.2 Recommendation for Further Study	74
References	75

