

## LIST OF CONTENT

Chapter	Page
I INTRODUCTION .....	1
Background.....	1
Objectives .....	2
Scope of work.....	2
Outline of the thesis.....	3
II THEORY AND LITERATURE REVIEW.....	4
Supply chain and logistics (SCL) .....	4
Genetic Algorithm (GA) .....	13
Linear programming (LP) .....	19
Statistical Background .....	21
III RESEARCH/METHODOLOGY .....	25
Required Research Environment .....	25
Linear Programming (LP) for Logistic Chain Network (LCN) .....	25
Matrix-based Genetic Algorithms (m-GA) for LCN.....	28
Testing problems.....	33
IV RESULTS AND DISCUSSION.....	43
Experiment 1 .....	43
Experiment 2 .....	48
Discussion on Experiments.....	58
V CONCLUSION AND RECOMMENDATION .....	62

## LIST OF CONTENT (CONT.)

Chapter	Page
REFERENCES.....	64
APPENDICES .....	68
APPENDIX A – An example of m-GA’s programming in MATLAB .....	69
APPENDIX B – The best results for small problem in the experiments .....	81
BIOGRAPHY .....	86

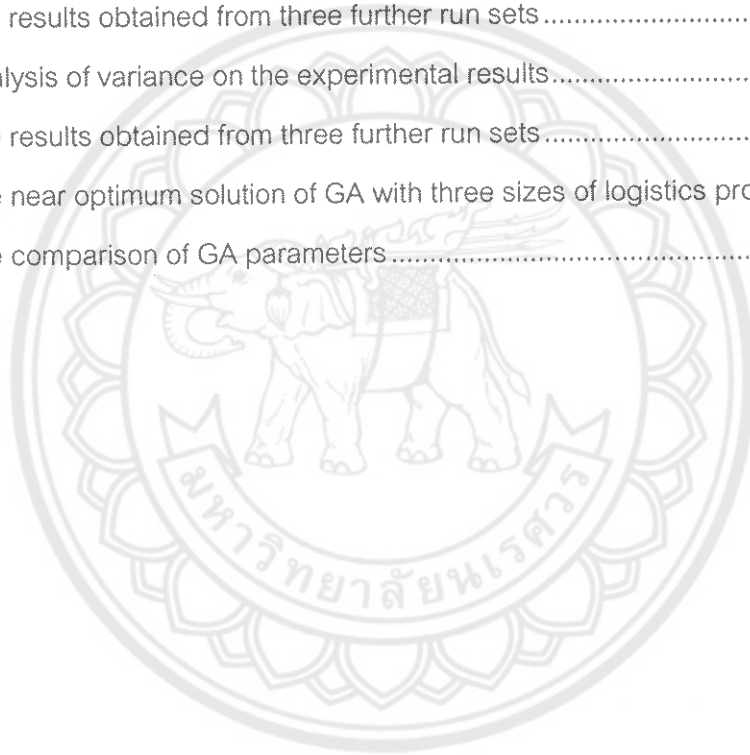


## LIST OF TABLES

Table		Page
1	Comparative Performance of Delivery Network Designs.....	12
2	Performance of Delivery Networks for Different Product/Customer Characteristics .....	12
3	Observed response arrangement for Two-Factor Factorial design .....	23
4	General ANOVA table for the Two-Factor Factorial design.....	24
5	Capacity constraints and customer demand.....	33
6	Transportation cost per unit for each stage .....	34
7	Capacity constraints and customer demand.....	35
8	Transportation cost per unit for each stage .....	35
9	The raw material cost per, manufacturing cost and holding cost per unit.....	36
10	The fixed cost for operating at plants and Distribution Centres .....	36
11	Capacity constraints and customer demand of medium problem .....	37
12	Transportation cost per unit for each stage of medium problem .....	37
13	The raw material cost per, manufacturing cost and holding cost per unit of medium problem .....	38
14	The fixed cost for operating at plants and Distribution Centres of medium problem .....	39
15	Capacity constraints and customer demand of large problem.....	40
16	Transportation cost per unit for each stage of large problem .....	40
17	The raw material cost per, manufacturing cost and holding cost per unit of large problem .....	42
18	The fixed cost for operating at plants and Distribution Centres per 1000 units of large problem .....	42
19	Experimental factors and its level .....	43
20	Analysis of variance on the experimental results.....	45

## LIST OF TABLES (CONT.)

Table	Page
21 The results obtained from three further run sets .....	47
22 Analysis of variance on the experimental results.....	49
23 The results obtained from three further run sets .....	51
24 Analysis of variance on the experimental results.....	52
25 The results obtained from three further run sets .....	54
26 Analysis of variance on the experimental results.....	56
27 The results obtained from three further run sets .....	58
28 The near optimum solution of GA with three sizes of logistics problems .....	59
29 The comparison of GA parameters .....	60



## LIST OF FIGURES

Figure	Page
1 Typical logistics chain network .....	5
2 Manufacturer Storage with Direct Shipping .....	9
3 In-Transit Merge Network .....	9
4 Distributor Storage with Carrier Delivery .....	10
5 Distributor Storage with Last Mile Delivery .....	10
6 Manufacturer or Distributor Warehouse Storage with Consumer Pickup .....	11
7 The general structure of genetic algorithms .....	14
8 Example of chromosomes with binary string for eight genes .....	14
9 Example of chromosomes with permutations for eight genes .....	15
10 Crossover Operation for chromosomes with binary string .....	15
11 Mutation Operation for chromosomes with binary string .....	16
12 Roulette Wheel Selection .....	18
13 The transportation model as a network .....	20
14 Sub-chromosome representation for a matrix 4x6 .....	28
15 Sub-chromosome initialization in part I .....	29
16 Sub-chromosome initialization in part II .....	30
17 Examples of crossover type I .....	31
18 Examples of crossover type II .....	31
19 Examples of mutation type I .....	32
20 Examples of mutation type II .....	32
21 Normal probability plot of the residuals .....	46
22 Main effect plots of experimental factors .....	46
23 Normal probability plot of the residuals .....	50
24 Main effect plots of experimental factors .....	50
25 Normal probability plot of the residuals .....	53

## LIST OF FIGURES (CONT.)

Figure	Page
26 Main effect plots of experimental factors .....	53
27 Normal probability plot of the residuals .....	57
28 Main effect plots of experimental factors .....	57
29 The best results of logistics chain networks with minimum total transportation cost by LP at 25750 Baht.....	82
30 The best results of logistics chain networks with minimum total transportation cost by GA at 25750 Baht .....	82
31 The best results of logistics chain networks with minimum total cost by LP at 87500 Baht .....	83
32 The best results of logistics chain networks with minimum total cost by GA at 88150 Baht .....	83
33 The best results of logistics chain networks with minimum total cost by LP at 187800 Baht .....	84
34 The best results of logistics chain networks with minimum total cost by GA at 199600 Baht .....	84
35 The best results of logistics chain networks with minimum total cost by GA at 674300 Baht .....	85