

Table of Contents

Title Page	i
Dedication	iii
Certificate by the Supervisor	v
Declaration	vii
Acknowledgments	ix
Abstract	xiii
Abbreviations	xv
List of Symbols	xvii
List of Figures	xxv
List of Tables	xxvii
1 Introduction and Theoretical Framework	1
1.1 Introduction	1
1.1.1 Facility location problem	2
1.1.2 Different kind of logistics network problems	5
1.1.3 Inventory management	6
1.1.4 Carbon emission	7
1.1.5 Solution methodology	8
1.1.6 Uncertain environments	11
1.2 Theoretical framework	13
1.3 Motivation and objective of the thesis	19
1.4 Organization of thesis	21
2 An exact and a heuristic approach for transportation-location problem	25
2.1 Introduction	25
2.2 Mathematical identification	26

2.2.1	Problem description	26
2.2.2	Notations and Assumptions	26
2.2.3	Model formulation	27
2.2.4	Connection between T-LP and TP	28
2.2.5	Structural properties	28
2.3	Solution methodology	30
2.3.1	Exact approach	30
2.3.2	An Exact algorithm	31
2.3.3	A Loc-Alloc heuristic algorithm	31
2.4	Experimental analysis	32
2.4.1	Performance of Exact approach	33
2.4.2	Performance of Loc-Alloc heuristic	34
2.5	Computational results and discussion	35
2.5.1	Comparison of the obtained results	36
2.6	Conclusion	37
3	An approximation approach for fixed-charge transportation-location problem	39
3.1	Introduction	39
3.2	Mathematical description	40
3.2.1	Problem definition	40
3.2.2	Assumptions and Notations	40
3.2.3	Model formulation	42
3.2.4	Connection between FCT-LP and FCTP	42
3.2.5	Characteristics of FCT-LP	43
3.3	Methodology	44
3.3.1	Approximation approach	44
3.3.2	Algorithm	46
3.4	Experimental design	46
3.4.1	Performance of approximation approach	47
3.4.2	Computational results and discussion	50
3.5	Sensitivity analysis	50
3.6	Conclusion	52
4	Heuristic approaches for solid transportation-location problem	53
4.1	Introduction	53
4.2	Mathematical description	54
4.2.1	Problem background	54
4.2.2	Notations and Assumptions	54
4.2.3	Model identification	56
4.2.4	Connection between ST-LP and STP	56
4.2.5	Characteristics properties	57

4.3	Methodology	59
4.3.1	Loc-Alloc heuristic approach	59
4.3.2	A Loc-Alloc algorithm	60
4.3.3	An approximate heuristic algorithm	61
4.4	Application example	62
4.4.1	Performance of the Loc-Alloc heuristic	62
4.4.2	Performance of the approximate heuristic	66
4.4.3	Computational results and discussion	66
4.5	Sensitivity analysis	66
4.6	Conclusion	68
5	Multi-objective transportation-location problem under neutrosophic environment	69
5.1	Introduction	69
5.2	Mathematical description	70
5.2.1	Problem background	70
5.2.2	Notations and Assumptions	71
5.2.3	Model identification	73
5.2.4	Connection between MOT-LP and MOTP	75
5.2.5	Basic definitions	75
5.3	Methodology	76
5.3.1	Hybrid approach	77
5.3.2	Advantages of the proposed approach	80
5.3.3	Disadvantages of our approach	81
5.4	Analysis of non-dominated solution	81
5.5	Experimental example	82
5.5.1	Performance of the hybrid approach	83
5.6	Computational results and discussion	86
5.7	Sensitivity analysis	88
5.8	Managerial insights	88
5.9	Conclusion	89
6	Multi-objective solid transportation-location problem in inventory management	91
6.1	Introduction	91
6.2	Modeling framework	92
6.2.1	Problem description	93
6.2.2	Notations & Assumptions	94
6.2.3	Model formulation	97
6.2.4	Connection between MOST-LP and MOSTP	98
6.2.5	Basic concept of a multi-objective problem	99

6.3	Solution methodology	100
6.3.1	Hybrid approach	100
6.3.2	Advantages of the hybrid approach	102
6.3.3	Disadvantages of the proposed approach	103
6.4	Analysis of Pareto-optimal solution	103
6.5	Numerical experiment	104
6.5.1	Performance of the proposed procedure	105
6.6	Experimental result and discussion	107
6.7	Sensitivity analysis	108
6.8	Managerial insights	109
6.9	Conclusion	110
7	Multi-objective green solid transportation-location problem under two-fold uncertainty	111
7.1	Introduction	111
7.2	Preliminaries	113
7.2.1	Trapezoidal type-2 intuitionistic fuzzy number (TT2IFN)	113
7.2.2	Proposed defuzzification technique	115
7.3	Mathematical identification	115
7.3.1	Background	115
7.3.2	Notations and Assumptions	116
7.3.3	Model formulation	118
7.3.4	Deterministic formulation	119
7.4	Solution techniques	121
7.4.1	Fuzzy programming	122
7.4.2	Global criterion method	123
7.5	Application examples	125
7.6	Result and discussion	126
7.7	A comparative study with particular cases	129
7.8	Sensitivity analysis	129
7.9	Managerial insights	130
7.10	Conclusion	131
8	Conclusion and Future Research Direction	133
8.1	Conclusion	133
8.2	Future research direction	136
	Appendix A Some derivations	139
A.1	Iterative formula:	139
A.2	Optimality condition:	140
A.3	Find (x_j, y_j):	141

A.4 Iterations for (x_j, y_j) :	142
Bibliography	145
List of Publications	157
Conferences/seminars/workshops	169
About Contributors	171