

TABLE OF CONTENTS

	Page
ACKNOWLEDGMENT	iii
ABSTRACT	v
THAI ABSTRACT	vii
TABLE OF CONTENTS	viii
LIST OF TABLES	x
LIST OF ILLUSTRATIONS	xi
1. INTRODUCTION	1
2. LITERATURE REVIEW	3
2.1 Paddy Rice Market	3
2.2 Network Analysis	8
3. MATERIALS AND METHODS	14
3.1 Study Area	14
3.2 The Study Framework	14
3.3 Road Network	17
3.4 Mills Locations and attributes	21
3.5 Rice Coverage	24
3.6 Accessibility	26
3.7 Spatial Interactions	28
3.8 Potential trade zones	28

4. RESULTS AND DISCUSSION	30
4.1 Rice Production Areas	30
4.2 Rice Mill Distribution	31
4.3 Rice Transportation Network	35
4.4 Accessibility of Rice Production Areas	40
4.5 Spatial Interactions	42
4.6 Analysis of Trade Areas	45
Example I. Using distance matrix	45
Example II. Using accessibility index matrix	47
Example III. Using spatial interaction matrix	47
5. CONCLUSION	60
REFERENCES	61
CURRICULUM VITAE	64

LIST OF TABLES

Table	Page
3.1 The road types and average speed used in the study.	17
3.2 The road attribute table.	20
3.3 The attribute table of the mill.	22
3.4 The attribute table of the paddy area.	25
4.1 Cultivated areas in Chiang Mai by types of crop.	30
4.2 Number of rice mills in Chiang Mai During 1988 to 1997.	31
4.3 Distribution of medium and large-scale mills by districts.	34
4.4 Part of a distance matrix (expressed as traveling time in minute) between different pairs of paddy field and rice mill. The full matrix is 1410 paddy × 54 mills.	38
4.5 A part of standardized accessibility index matrix computed from distance decay function using β of 0.5, 1.0 and 1.2.	41
4.6 Interaction matrix between selected paddy fields and three rice mills using β value of 1.0.	43
4.7 A matrix of cumulative probability of interaction between selected paddy fields and three rice mills, using β value of 1.0.	44
4.8 Potential trade areas and rice production at different traveling time from selected rice mills.	58
4.9 Potential trade areas and rice production at different cumulative probability of spatial interactions for selected rice mills ($\beta = 1.2$).	59

LIST OF ILLUSTRATIONS

Figure		Page
2.1	Flow of rice from farm to market.	5
3.1	The Study area, Chiang Mai province.	15
3.2	Major steps involved in this study.	16
3.3	The process of creating spatial digital data and necessary attributes for road network.	19
3.4	The steps of building a mill coverage.	23
3.5	The 'FindFac' flow chart.	27
4.1	Rice production areas in Chiang Mai province.	32
4.2	Rice mills in Chiang Mai province.	33
4.3	Nodes representing paddy and rice mills in transportation network.	36
4.4	A transportation network in Chiang Mai province.	37
4.5	The shortest route from rice mill number 39 to the target paddy in Fang district.	39
4.6	Trade zones of some 3 mills generated from traveling time (distance) matrix.	46
4.7	Standardized accessibility of paddy fields in Chiang Mai valley using β value of 0.5.	48
4.8	Standardized accessibility of paddy fields in Chiang Mai valley using β value of 1.0.	49
4.9	Standardized accessibility of paddy fields in Chiang Mai valley using β value of 1.2.	50

4.10	Trade zone of rice mill number 4 generated from paddy fields with cumulative interaction probability of 20%, using β of 1.0.	51
4.11	Trade zone of rice mill number 5 generated from paddy fields with cumulative interaction probability of 20%, using β of 1.0.	52
4.12	Trade zone of rice mill number 61 generated from paddy fields with cumulative interaction probability of 20%, using β of 1.0.	53
4.13	Trade zone of rice mill number 4 generated from paddy fields with cumulative interaction probability of 20%, using β of 1.2.	54
4.14	Trade zone of rice mill number 5 generated from paddy fields with cumulative interaction probability of 20%, using β of 1.2.	55
4.15	Trade zone of rice mill number 61 generated from paddy fields with cumulative interaction probability of 20%, using β of 1.2.	56