

## TABLE OF CONTENTS

	Page
Acknowledgements	iii
Abstract (Thai)	iv
Abstract (English)	vi
Tables of Contents	viii
List of Tables	xii
List of Figures	xiii
<b>Chapter I Introduction</b>	
1.1 Background	1
1.2 Rational of study	3
1.3 Objective of the study	4
1.4 Usefulness of the study	4
<b>Chapter II Literature Review</b>	
2.1 Groundnut production systems in Myanmar	6
2.2 Concept of technical efficiency	7
2.3 Stochastic frontier production function	10
2.4 Research and studies relating to technical efficiency	14
<b>Chapter III Research Methodology</b>	
3.1 Site selection of the study	19
3.2 Sample techniques	19
3.3 Data collection	20
3.3.1 Primary data	21
3.3.2 Secondary data	21
3.4 Data analysis	22
<b>Chapter IV General Information and Characteristics of the Groundnut Production Systems in Central Region of Myanmar</b>	
4.1 General information of the central region of Myanmar	27
4.1.1 General physical description and land use	27
4.1.2 Climate	28

4.1.3	Groundnut production in the central region of Myanmar	29
4.2	Groundnut production system of sample farms	30
4.2.1	Groundnut-based cropping patterns	30
4.2.2	Farm size and land characteristic for groundnut production	33
4.2.2.1	Farm size and ownership	33
4.2.2.2	Groundnut production areas	34
4.2.2.3	Soil	35
4.2.3	Land preparation	36
4.2.4	Input use	36
4.2.4.1	Labor use	36
4.2.4.2	Seed variety and seed rate	37
4.2.4.3	Chemical fertilizer and manure application	38
4.2.4.4	Insecticides and pesticides application	39
4.2.5	Productivity	41
4.2.5.1	Yield	41
4.2.5.2	Change of yield	42
4.2.6	Socio-economic characteristics of farm households	43
4.2.6.1	Age of households heads	43
4.2.6.2	Education of households heads	44
4.2.6.3	Experience in groundnut production	45
4.2.6.4	Labor force availability	46
4.2.7	Capital use	47
4.2.7.1	Own capital	47
4.2.7.2	Credit access	48
4.2.8	Extension services	49
4.2.9	Farmers' view on problems of groundnut production	51
<b>Chapter V Technical Efficiency of Groundnut Production</b>		
5.1	Groundnut production and technical efficiency model	52
5.1.1	Explanation of the variables used in the technical efficiency Model	52
5.1.2	Statistics summary of the variables of the sample groundnut firms in Mandalay	54

5.1.3 Statistics summary of the variables of the sample groundnut firms in Magway	55
5.2 Hypothesis Testing	56
5.2.1 Results of hypothesis testing in Mandalay model	56
5.2.2 Results of hypothesis testing in Magway model	58
5.3 Results of maximum-likelihood estimates of stochastic frontier Cobb-Douglas groundnut production function	60
5.3.1 Maximum-likelihood estimation of stochastic frontier Cobb-Douglas groundnut production functions for Mandalay	60
5.3.2 Maximum-likelihood estimation of stochastic frontier Cobb-Douglas groundnut production functions for Magway	61
5.4 Technical Efficiency of groundnut producers in Mandalay and Magway	64
<b>Chapter VI Conclusions and Suggestions</b>	
6.1 Conclusions	67
6.2 Suggestions	71
<b>References</b>	72
<b>Appendix A Questionnaire</b>	76
<b>Appendix B Instruction file and outputs from the Frontier v.4.1c</b>	83
<b>Curriculum Vitae</b>	99

## LIST OF TABLES

<b>Table</b>	<b>Page</b>
1.1 Sown area and yield of groundnut in Myanmar	2
4.1 Number of sample farmers for each cropping pattern in the central region of Myanmar, 2007	31
4.2 Classification of farm size in Mandalay and Magway	34
4.3 Groundnut production areas in Mandalay and Magway	34
4.4 Labor used per hectare for groundnut production in central region of Myanmar	37
4.5 Percentage of purchasing groundnut seed of farmers in central region, Myanmar	38
4.6 Application of chemical and manure fertilizer in groundnut production	39
4.7 Chemical and manure application in groundnut production areas	39
4.8 Insecticide and pesticides cost per hectare in groundnut production	41
4.9 Average yield per hectare in Mandalay and Magway	42
4.10 Change of yields in last three years 2003-2005	43
4.11 Age of household heads in Mandalay and Magway areas	44
4.12 Education of households in two study areas of Myanmar	45
4.13 Experience of farm of households in groundnut production, in Mandalay and Magway	46
4.14 Labor force availability in groundnut production of study areas, Myanmar	46
4.15 Source of capital used for groundnut production in central region of Myanmar	47
4.16 Source of credit is borrowed by groundnut farmers in central region of Myanmar	48
4.17 Amount of Credit in groundnut production in study areas, Myanmar	49
4.18 Access to extension services, in Central of Myanmar	50
4.19 Problems of groundnut farmers in central region of Myanmar	51
5.1 Statistic summary of the variables used in the analysis of sample groundnut firms in central region of Myanmar	55
5.2 Likelihood ratio tests of hypothesis involving parameters of the stochastic frontier inefficiency model for Mandalay and Magway groundnut firms in Myanmar	60
5.3 Maximum likelihood estimates of the parameters of the Cobb-Douglas stochastic frontier groundnut production function in Myanmar	63
5.4 Technical Efficiency scores of farm household heads.	65

## LIST OF FIGURES

<b>Figure</b>	<b>Page</b>
2.1 Sown area, and production of groundnut in the central region of Myanmar	6
2.2 Input and output –oriented technical efficiency measures	9
2.3 Stochastic Frontier Production Function	12
3.1 Study sites in the central region of Myanmar	20
4.1 Monthly rainfall distribution in Mandalay Division in 2006	28
4.2 Monthly rainfall distribution of Magway Division in 2006	29
4.3 Groundnut-based cropping patterns in Mandalay division	32
4.4 Groundnut-based cropping patterns in Magway division	33
4.5 Soil quality based on farmers’ view in Mandalay division	35
4.6 Soil quality based on farmers’ view in Magway division	35
4.7 Percent of farmer applied pesticide for groundnut production in Mandalay	40
4.8 Percent of farmer applied pesticide for groundnut production in Magway	40
4.9 Training participation of household heads in Mandalay division, Myanmar	50
4.10 Training participation of household heads in Magway division, Myanmar	50
5.1 Distribution of technical efficiency indexes for the groundnut producers in Mandalay division and Magway division, Myanmar	65