

Table of Contents

	Page
Acknowledgements.....	iii
Abstract in English.....	v
Abstract in Thai.....	vii
List of Tables.....	xii
List of Figures.....	xiii
List of Abbreviation.....	xiv
Chapter I Introduction.....	1
1.1 Background of the study.....	1
1.2 Overview of litchi production.....	2
1.2.1 History and original provenance of the litchi tree.....	2
1.2.2 World litchi production.....	3
1.3.3 Litchi production in Vietnam.....	5
1.3 Statement of the problem.....	6
1.4 Objectives of the study.....	8
1.5 Usefulness of the study.....	8
Chapter II Literature review 9	
2.1 Approaches of frontier production function and productive efficiency study....	9
2.2 Related studies to frontier production and technical efficiency, and others	17
using quantitative methods in horticultural crops.....	17
Chapter III Research Methods 25	
3.1 Conceptual framework.....	25
3.2 Scope of the study.....	26
3.3 Site selection.....	27
3.4 Data collection.....	28
3.4.1 Primary data.....	28
3.4.2 Secondary data.....	29
3.4.3 Data analysis.....	29
3.5 Theoretical framework.....	30
3.5.1 Production functional form.....	30
3.5.2 Stochastic frontier production function.....	32
3.5.3 Technical efficiency.....	34
Chapter IV Characteristics of the study area 39	
4.1 General characteristics.....	39
4.1.1 Geography and natural condition.....	39
4.1.2 Population and labor characteri x.....	40
4.2 Natural resources.....	41
4.2.1 Land resources.....	41
4.2.2 Water resources.....	43
4.2.3 Forestry resources.....	43

4.3 Socio-economic situation.....	43
4.3.1 Economic structure and growth	43
4.3.2 Infrastructure.....	44
4.3.3 Agricultural production.....	44
4.3.4 Industry and others.....	45
4.4 Characteristics of the surveyed households.....	46
4.4.1 Family size.....	46
4.4.2 Education	47
4.4.3 Litchi production experience.....	47
4.4.4 Agricultural land holding.....	47
4.4.5 Structure of household income.....	48
Chapter V Litchi production system in Bacgiang province.....	50
5.1 Environment and factors influencing litchi production in the area.....	50
5.2 Present situation of litchi production in Bacgiang.....	51
5.3 Characteristics of litchi orchard in the surveyed households	56
5.3.1 Farm size.....	56
5.3.2 Tree age and tree density	57
5.3.3 Irregular and alternative bearing.....	58
5.3.4 Yield and productivity	59
5.4 Litchi cultivation practice.....	60
5.4.1 Pruning and training.....	60
5.4.2 Labor utilization.....	61
5.4.3 Farm-yard manure.....	62
5.4.4 Fertilizer.....	63
5.4.5 Irrigation	65
5.4.6 Spray.....	66
5.4.7 Harvesting.....	66
5.5 Economic aspects in litchi production system.....	67
5.5.1 Consumption.....	67
5.5.2 Litchi price.....	67
5.5.3 Access to credit.....	68

Chapter VI	Analyses of the stochastic frontier, determinants of technical inefficiency and allocative efficiency	70
6.1	Empirical models	70
6.1.1	Empirical model for the stochastic frontier production function.....	70
6.1.2	Empirical model for assessing determinants of technical inefficiency.....	71
6.1.3	Definition of variables in the models.....	72
6.2	Descriptive statistics of the variables	79
6.3	Estimation of the stochastic frontier, technical efficiency scores and determinants of technical inefficiency in litchi yield.....	82
6.3.1	Stochastic frontier production function	83
6.3.2	Determinants of technical inefficiency	89
6.3.3	Evaluation of technical efficiency scores	90
6.4	Optimization of input utilization.....	93
Chapter VII	Conclusion and recommendation	97
7.1	Summary and conclusion.....	97
7.2	Recommendation and policy implication	100
References	102
Appendices	109
Curriculum Vitae	116