TABLE OF CONTENTS

		Page
ACKNOWLED	OGEMENT	iii
ABSTRACT (Thai)	v
ABSTRACT (E	English)	vii
LIST OF TABI	ES	xii
LIST OF FIGURES		xiv
CHAPTER I	INTRODUCTION	1
	1.1 Background	1
	1.2 Rationale	4
	1.3 Objectives	5 5
	1.4 Usefulness of study	5
CHAPTER II	LITERATURE REVIEW	6
	2.1 Shifting cultivation	6
	2.2 Agroforestry systems	11
11 (} \	2.3 Assessment of adoption in agroforestry	15
	2.4 Farming system assessment and decision making	18
CHAPTER III	RESEARCH METHODS	22
	3.1 Site selection	22
	3.2 Data collection method	23
	3.3 Farmer selection	24
	3.4 Data analysis	25
	3.4.1 Characterization of integrated farming system	25
	3.4.2 Economic assessment	25
	3.4.3 Problem and constraint to adoption of IRFS	27
CHAPTER IV	GEOGHAPHICAL AND SOCIO-ECONOMICAL	
dans	FEATURES IN THE STUDY AREAS	28
	4.1 Geographical features of the study area	28
onvright	4.1.1 Oudomxay province 4.1.2 Namo District	28
opyrigin		
	4.1.3 The study areas	31
	4.2 Socio-economical conditions 4.2.1 Farming system practice	$\begin{array}{c} 33 \\ 33 \end{array}$
	4.2.2 Ethnic group and religion	36
	4.2.3 Education level	37
	4.2.4 Household members	38
	4.2.5 Labor use and family labor in farm activity	39
	4.2.6 Land ownership	40
	4.2.7 Infrastructure	41

CHAPTER V	CHARACTERISTICS, STRENGTHS AND	
	WEAKNESSES OF hai SYSTEM AND IRFS PRACTICE	43
	5.1 The <i>hai</i> system practice in study area	43
	5.2 The strengths, weaknesses, opportunities and threats of	
	the <i>hai</i> system practice	53
	5.2.1 Strengths and weaknesses of the <i>hai</i> system	53
	5.2.2 Opportunity and threats of the <i>hai</i> system	54
	5.3 Integrated Rubber-based Farming System practice	57
	5.4 The strengths, weaknesses, opportunity and threats of the IRFS system practice	66
	5.4.1 Strengths and weaknesses of IRFS	66
	5.4.2 Opportunities and threats of IRFS	68
CITA DEED AT	ECONOMIC COMPARISON OF A SCREEN AND	
CHAPTER VI	ECONOMIC COMPARISON OF hai SYSTEM AND	
	INTEGRATED RUBBER-BASED FARMING SYSTEM PRACTICES	70
		72
503	6.1 Productivity of annual crop in the <i>hai</i> system practice6.2 Estimated productivity of the rubber plantation only in	72
	the study areas 6.3 Estimated productivity of the integrated rubber-based	78
	farming system	87
	6.3.1 The estimated productivity of the IRFS 1	87
	6.3.2 The estimated productivity of the IRFS 2	92
	6.4 The profitability comparison of the hai system, IRFS 1	
	and IRFS 2	98
	6.5 Risk and uncertainty	100
CHAPTER VI	PROBLEMS AND CONSTRAINTS TO ADOPTION OF	
CIM IER VI	THE IRFS	106
	7.1 Farmers' opinion concerning the adoption of the <i>hai</i>	106
	system and IRFSs practice	
	7.2 The long term environmental changes in the <i>hai</i> system	
	and IRFS practices	113
ามสิทธิ	7.3 Problems and constraints of the IRFS practices	116
CHAPTED VI	H. CONCLUCION AND DECOMMENTATION	
CHAPTER VI	II CONCLUSION AND RECOMMENTATION	117
Lopyrigh	8.1 Conclusions 8.2 Recommendations	SI ₁₁₉
REFERENCE	ights reserv	125
APPENDICES		131
CURRICULUI	M VITAE	145

LIST OF TABLES

Table		Page
3.1	Number of selected farmers' household in study area	25
4.1	Land size of each main farm types in hectare (ha) in study areas	36
4.2	Number of household by ethnic group in the study areas	37
4.3	Education of surveyed farmers in the study areas	38
4.4	Number of family members	38
4.5	Distribution of land holdings	41
5.15	Farm activities cropping calendar in the <i>hai</i> system	44
5.2	The strengths, weaknesses, opportunities and threats of <i>hai</i> system practice	55
5.3	Farm activities cropping calendar in the IRFSs system	59
5.4	The strengths, weaknesses, opportunities and threats of IRFSs	69
6.1	Productivity of upland rice	73
6.2	Productivity of maize	74
6.3	Productivity of job's tear	75
6.4	Profitability of annual crops per hectare of land in the hai system	76
6.5	The investment of rubber farm at the first year in the study areas	79
6.6	The estimation of the input costs and output revenue of the only rubber plantation at the year seventh in the study area	81
6.7	The investment of the IRFS 1 at the first year	88
6.8	The second year of the IRFS 1 investment	89
6.9	The third year of the IRFS 1 investment	90
6.10	The first year of the IRFS 2 investment	93
6 11	The second year of the IRFS 2 investment	94

Table		Page
6.12	The third year of the IRFS 2 investment	95
6.13	Litchi and orange yields in northern Thailand	96
6.14	The probability profit comparison of the <i>hai</i> system, IRFS 1 and IRFS 2 in the study areas using discounted factor at 18%.	100
6.15	Sensitivity of changing in tub-lump rubber yield price	102
6.16	Sensitivity of changing in labor cost for investing in the pure stand rubber plantation and the IRFSs practice	104
7.1	Percentage of farmers who preferred IRFSs and the <i>hai</i> system practice in the study area	107
7.2	The percentage of farmers who would like to adopt IRFSs practice	108
7.3	Percentage of family members' agreeing to the carrying out the IRFSs practice Percentage of farmers who thought that IRFSs was suitable to their	109
	land resources	110
7.5	Percentage of farmers reported about the quantity of annual crop yield in the IRFSs practice	111
7.6 7.7	Percentage of farmers' opinion on the quality of annual crop yield observation in the IRFSs practice Percentage of farmers' opinion on the soil quality changes observation	112
	in the hai system and IRFSs practice	113
7.8	Percentage of farmers' opinion on the water quantity changes observation in the hai system and IRFSs practice	114
7.9	Percentage of farmers who had opinion on the soil erosion changes	itv
A 1 _{7.10}	observation in the hai system and IRFSs practice Percentage of farmers' opinion on the expansion of the IRFSs areas'	115
	observation in the study areas.	116

LIST OF FIGURES

Figure		Page
3.1	Location map of the study site and other L-SUAFRP	22
3.2	Diagram of data collection method	23
4.1	Oudomxay province map	29
5.1	Curved-hand hoe	46
5.2	The IRFSs pattern (terrace on the slopping land)	61
5.3	Diagram of IRFS 1 and IRSF 2 system practices	62
6.15	Comparison of profitability for three main crops in the study area	76
6.2	The gross margin of the main crops in the hai system practice	78
6.3	The estimated latex yield in the Hadyao village in 2007	82
6.4	The use of plastic bag and bucket for processing latex into tub- lump rubber and kept at the farm in Hadyao, (Source: Vongpaphun, August, 2005)	83
6.5	The sale of tub-lump rubber on market day in Hadyao Village, (Source: Vongpaphun, August, 2005)	84
6.6	The difference of input cost and benefit in the rubber production in the <i>hai</i> system practice.	86
6.7	The difference of input cost and benefit in the IRFS 1 in the <i>hai</i> system	91
6.8	The difference of input cost and benefit in the IRFS 2 in the <i>hai</i> system	97
6.9	The comparison of benefit income in the rubber, IRFSs and the <i>hai</i> system	99
6.10	The difference of the AVE between the <i>hai</i> system, rubber only, IRFS 1 and IRFS 2	100