CHAPTER IV

RESOURCE USE AND ACTIVITIES

This chapter will present an analysis of MOTAD model, resource constraints, activities of the model, and coefficients of inputs. Details are summarized and presented as follows.

4.1 Analysis of MOTAD model

4.1.1 Context

In choosing rice varieties for rice production, farmers will diversify rice varieties such as RD15, KDML105 and RD6 to reduce risk and earn income. A model which handles risk will enable farmers to obtain stable income. Moreover, if farmers participate in government support price program, farmer's income will be higher and more stable because selling rice at market price has higher risk.

4.1.2 Model formulation

It is in this context that the MOTAD model is built. This study made use linear programming to cope with rice production under risk in Phayao province. This program is employed to set the optimal farm plan of efficient frontier for the levels of expected maximize gross margin, minimize risk or minimize variance of income.

Model is used in this study is created according to farmers' crop cultivation. This study takes into account cropping patterns in the rainy season with RD15, KDML105, and RD6 in cropping systems in lowland areas. The model is separated for rainfed area and irrigated area. It was also separated in term of price for market price and another for government support price. Maximization of profit will be one of constraints in linear programming.

4.1.3 Activities in model

It is assumed that all crops in the study area included in the model will be sold for commercial production. It has no livestock, fisheries and horticulture in the study area. Land resource, labor and gross margin are included in the model. The period covers one year. Deviation of gross margin from rice production over the 6 years in the analysis represents risk. As most farmers have to consume glutinous rice, the model assumes that farmers will produce at least 1,000 kg of RD6 for consumption or about 80 % consumption in household (Office of the National Economic and Social Development Board, 2006).

4.2 Resource Constraints

4.2.1 Land

This study assumes that land is used for cultivation throughout the rainy season. They can be utilized for planting one crop. Constraints are defined in terms of supply of land by type, rainfed area and irrigated area and for in 2001 paddy area are 779,511 *rai* that average rice area for irrigated areas 6 *rai*/household and rainfed areas 12 *rai*/household. Land use coefficient was estimated on per unit of *rai*.

4.2.2 Labor use

Labor supply is estimated from the economically-active agricultural labor between the ages of 15-64 years assuming that each farmer is able to work 8 hours a day. Agricultural labor in the household is assumed to be 2.59 persons per household. The period of rice crop in Phayao is 6 months (July – December). In this study, one man-day is equal 8 hours. For the month that has 31 days, total labor at the early (15 days) of month would be 38.86 man-days and at the late of month (16 days) would be 41.44 man-days. For month that has 30 days, total labor at the early and the late of month as 38.86 man-days. The wage rate for crop year (2005/2006) in the study area is used at 150 baht per day. Table 4.1 shows labor constraints of the model.

Table 4.1 Labor constraints

Period	Labor constraint (man-day)
Early July	38.85
Late July	41.44
Early August	38.86
Late August	41.45
Early September	38.86
Late September	38.86
Early October	38.86
Late October	41.45
Early November	38.86
Late November	38.86
Early December	38.86
Late December	41.45

Source: Calculation

4.2.3 Financial capital supply

In this model, a constraint deals with financial capital function that is defined by farmers own capital and loan money. As farmers have to repay debts, so farmers' own financial capital is left 0 baht (Ngamtong *et al,* 2006). The limited loan money will be 30,000 baht per year. Interest rate of loan money is set as 8 % per year.

4.3 Coefficient of inputs

4.3.1 Labor use

Coefficients of labor use in each rice variety were obtained from data in the survey in 2005/06. Labor use for rice production activities was classified in to 12 periods: early July until late December. Man-days are estimated on the basis of 8 working hours per day. Table 3.18 shows labor coefficient of the model.

4.3.2 Cash cost

Cash costs will be coefficients of rice production cost in financial capital function in MOTAD model. Coefficient of rice production will use the data in crop year 2000/2001 - 2005/2006 by estimating at based year 2005/2006. The average cash cost for RD15 in rainfed area will be determined 1,708 baht/*rai*, for RD15 in irrigated area 1,487 baht/*rai*. Cash cost of KDML105 in rainfed area were 1,908 baht/*rai*, in irrigated area 1,964 baht/*rai*. Cash costs of RD6 in rainfed areas were 1,849 baht/*rai* and in irrigated area 1,964 baht/*rai* (Table 4.2). Test of significance did not reveal any significant different in cash costs between that in rainfed and irrigated area.

Table 4.2 Cash costs for each rice variety

Rice variety	Rainfed area	Irrigated area
	----*baht/rai*----	
RD15	1,708	1,487
KDML105	1,908	1,964
RD6	1,849	1,974

Source: Calculation

4.3.3 Gross margin under market price and government support price

This model will use gross margin as the coefficients of the objective function (Equation (2.10) and (2.12) in chapter II) of the MOTAD dealing with expected profit $(E(c_{jt}))$.

Gross margin for each rice variety is obtained by multiplying average yields by the price of each rice variety and then subtract the variable costs of each crop, there by gross margin of each rice variety in crop year 2000/2001 - 2005/2006 by estimating at based year 2005/2006 can be calculated and are shown in Table 4.3. Using market prices, gross margin of RD15 was the highest, in rainfed area being 1,695 baht/*rai*, and in irrigated area being 1,716 baht/*rai*. Also, using market price, KDML105 gross margin in rainfed area was the lowest at 1,376 baht/*rai* and in irrigated area was 1,502 baht/*rai*. Similarly, RD6 gross margin was 1,094 baht/*rai* in

rainfed area and for irrigated area at 1,186 baht/*rai* using market price. Under government support price system, gross margin of KDML105 was the highest, in rainfed area being 1,653 baht/*rai*, and in irrigated area being 1,747 baht/*rai*. RD6 cash income in rainfed area was 1,583 baht/*rai* and in irrigated area was 1,605 baht/*rai*. For RD15 cash income was the lowest at 1,375 baht/*rai* in rainfed area and for irrigated area at 1,695 baht/*rai*

Table 4.3 Gross margin for each rice variety

Rice variety	Market price		Government support price	
	Rainfed area	Irrigated area	Rainfed area	Irrigated area
	----baht/*rai*----			
RD15	1,695	1,716	1,375	1,695
KDML105	1,376	1,502	1,653	1,747
RD6	1,094	1,186	1,583	1,605

Source: Calculation

4.3.4 Deviation of gross margin

In this model, expected income deviation will be used as coefficients of risk function (Equation (2.12) in Chapter II). Deviation of rice gross margin will be calculated from taking the gross margin of rice variety in each year minus mean gross margin for rice variety across 2001 - 2006.

The deviation of gross margin from its average for each rice variety can be calculated, using 2000/01 -2005/06 figure as averages. It should be noted that are some variations in gross margin from year to year are due to price, yield, or cost variations. Under market price and government support price, deviations of gross margin for rice are shown in Table 4.4 and Table 4.5.

Table 4.4 shows the deviation of gross margin from its 6-year average by using market price. RD15 showed the least negative deviations in 2001/02 being -489.51 baht/*rai* in rainfed area and -453.24 baht/*rai* in irrigated area. The highest positives for RD15 were in 2004/05, in rainfed area (634.42 baht/*rai*) and in irrigated area (634.38 baht/*rai*). In rainfed areas, negative deviations were highest for

KDML105 in 2002/03 (-299.62 baht/*rai*) and in irrigated area, 2001/02 (-414.55 baht/*rai*). The highest positives for KDML105 were in 2005/06 being 351.68 baht/*rai*, in rainfed area and 233.75 baht/*rai* in irrigated area. For RD6, negative deviations were highest in rainfed area (-376.53 baht/*rai*) in 2003/04 and in the same year for in irrigated area (–392.42 baht/*rai*). The highest positives for RD6 were in 2002/03 being 434.29 baht/*rai* in rainfed area and 444.68 baht/*rai* in irrigated area.

Table 4.5 shows the deviation of gross margin from its 6-year average by using government support price. For RD15, negative deviations were highest in 2003/04 being -597.9 baht/*rai* in rainfed area and -522.94 baht/*rai* in irrigated area. The highest positives for this variety were in 2000/01. For KDML105, negative deviations were highest in 2003/04 while the highest positives were in 2005/06. For RD6, negative deviations were highest in 2003/04 while the highest positives were in 2001/02. Notice that in most of the cases, negative or positive deviation in rainfed and irrigated areas go together.

Table 4.4 Deviation of revenue of rice varieties in Phayao province under market price from 2000/2001 – 2005/2006

Rice variety	Land type	Deviation of gross margin from its 6-year average (using market price) baht*/rai*----					
		2000/01	2001/02	2002/03	2003/04	20004/05	2005/06
RD15	Rainfed area	-338.39	-498.51	-233.22	127.14	634.42	350.21
	Irrigated area	-299.46	-453.24	-256.60	132.07	634.38	296.57
KDML105	Rainfed area	70.95	-282.65	-299.62	196.24	-36.61	351.68
	Irrigated area	-26.87	-414.55	-279.39	279.87	-171.14	233.75
RD6	Rainfed area	-325.32	397.17	434.29	-376.53	-123.93	-5.67
	Irrigated area	-338.51	408.52	444.68	-392.42	-126.05	3.80

Source: Calculation

Table 4.5 Deviation of revenue of rice varieties in Phayao province under government support price from 2000/2001 – 2005/2006

Rice variety	Land type	Deviation of gross margin from its 6-year average (using government support price) ----baht/rai----					
		2000/01	2001/02	2002/03	2003/04	20004/05	2005/06
RD15	Rainfed area	470.16	-321.40	91.60	-597.95	258.61	140.62
	Irrigated area	569.17	-248.55	72.35	-522.94	419.28	-235.59
KDML105	Rainfed area	224.31	83.37	-128.54	-608.82	-231.66	661.33
	Irrigated area	138.85	-27.84	-92.05	-565.12	-378.28	546.10
RD6	Rainfed area	-321.85	454.29	66.94	-539.14	254.49	85.27
	Irrigated area	-327.72	463.20	69.33	-548.81	258.56	85.44

Source: Calculation

4.3.5 Tested model

Optimal farm plan for rainfed area under market price and government support price are model A and model B respectively. Optimal farm plan for irrigated area under market price and government support price will be model C and model D respectively. Moreover, model E is representative for optimal farm plan for rainfed area under market price of RD15 and RD6, and under government support price of KDML105. Model F is the same as Model E but it is the model in irrigated area (Figure 4.1).
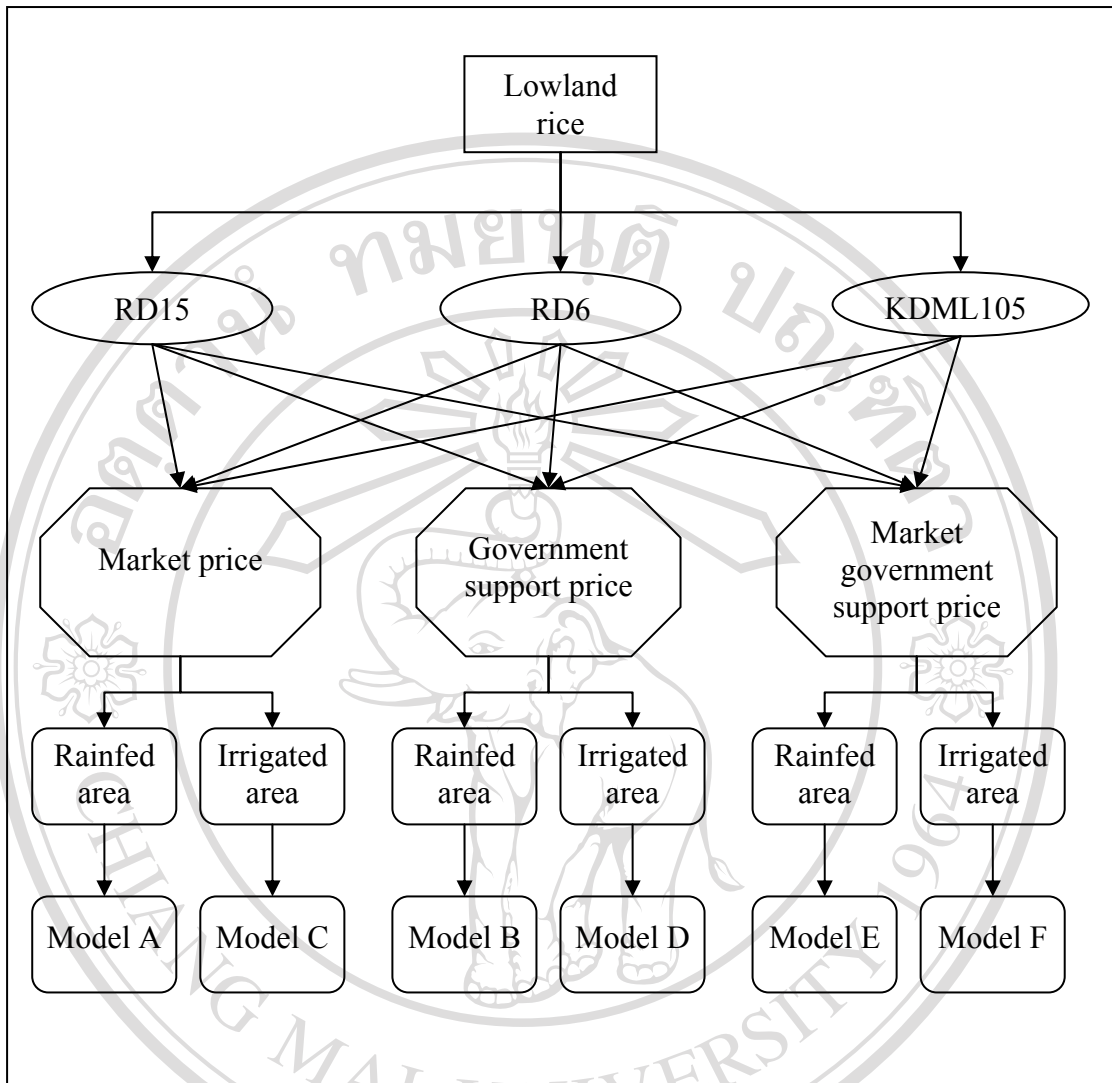
Figure 4.1 The framework for optimal farm plans

According to resource use and activities, 6 models can be tested. Model A is one in rainfed area under market price. Model B is one in rainfed area under government support price. Model C is one in irrigated area under market price. Model D is one in irrigated area under government support price. Model E is one in rainfed area under market price of RD15 and RD6 but under government support price of KDML105. Model F is like model E but in irrigated area. Table 4.6 - 4.11 show the detail of Model A to F.

Table 4.6 MOTAD model in rainfed area with market price (Model A)

Restriction function	Unit		X01 (Production)	X02	X03	X04 Loan money (baht)	X05 (Wage labor man days)	X06	X07	X08	X09	X10	X11	X12	X13	X14	X15	X16	X17 (Absolute of negative deviation in total revenue)	X18	X19	X20	X21	X22	σ (Risk variable baht)	RHS
Objective function	baht	Max	+1,695	+1,376	+1,094	-0.08	-150	-150	-150	-150	-150	-150	-150	-150	-150	-150	-150	-150							-0.9	
Paddy area rainfed	*rai*	Y01	+1	+1	+1																					<=12
Early July	man-day	Y02	+1.09	+1.10			-1																			<=38.85
Late July	man-day	Y03	+1.90	+3.41	+1.22			-1																		<=41.44
Early August	man-day	Y04	+0.20	+0.10	+4.04				-1																	<=38.86
Late August	man-day	Y05	+0.19	+0.52	+0.10					-1																<=41.45
Early September	man-day	Y06	+0.15	+0.27	+0.67						-1															<=38.86
Late September	man-day	Y07	+0.08	+0.38	+0.63							-1														<=38.86
Early October	man-day	Y08	+0.17	+0.16	+0.68								-1													<=38.86
Late October	man-day	Y09	+0.08	+0.14	+0.31									-1												<=41.45
Early November	man-day	Y10	+2.24	+0.78	+0.42										-1											<=38.86
Late November	man-day	Y11	+0.41	+4.67	+2.22											-1										<=38.86
Early December	man-day	Y12	+1.07	+0.98	+0.83												-1									<=38.86
Late December	man-day	Y13		+2.15	+1.51													-1								<=41.45
Hired labor	man-day	Y14					+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1								>=0
Own financial capital	baht	Y15	+1,708	+1,907	+1,849	-1	+150	+150	+150	+150	+150	+150	+150	+150	+150	+150	+150	+150								=0
Loan money	baht	Y16				+1																				<=30,000
Deviation of revenue in 2000/01	baht	Y17	-338.39	+70.95	-325.32														+1							>=0
Deviation of revenue in 2001/02	baht	Y18	-498.51	-282.62	+397.17															+1						>=0
Deviation of revenue in 2002/03	baht	Y19	-233.22	-299.62	+434.29																+1					>=0
Deviation of revenue in 2003/04	baht	Y20	+127.14	+196.24	-376.53																	+1				>=0
Deviation of revenue in 2004/05	baht	Y21	+634.42	-36.61	-123.93																		+1			>=0
Deviation of revenue in 2005/06	baht	Y22	+350.214	+351.68	-5.67																			+1		>=0
Total deviation	baht	Y23																	+1	+1	+1	+1	+1	+1	-2.18	=0
Household consumption	kg.	Y24			+523.01																					>=1,000

Table 4.7 MOTAD model in rainfed area with government support price (Model B)

Restriction function	Unit		Production			Loan money (baht)	Wage labor (man days)												Absolute of negative deviation in total revenue (baht)						Risk variable (baht)	RHS
			X01	X02	X03	X04	X05	X06	X07	X08	X09	X10	X11	X12	X13	X14	X15	X16	X17	X18	X19	X20	X21	X22	σ	
Objective function	baht	Max	+1,375	+1,653	+1,583	-0.08	-150	-150	-150	-150	-150	-150	-150	-150	-150	-150	-150	-150							-0.9	
Paddy area irrigated	rai	Y01	+1	+1	+1																					<=12
Early July	man-day	Y02	+1.09	+1.10			-1																			<=38.85
Late July	man-day	Y03	+1.90	+3.41	+1.22			-1																		<=41.44
Early August	man-day	Y04	+0.20	+0.10	+4.04				-1																	<=38.86
Late August	man-day	Y05	+0.19	+0.52	+0.10					-1																<=41.45
Early September	man-day	Y06	+0.15	+0.27	+0.67						-1															<=38.86
Late September	man-day	Y07	+0.08	+0.38	+0.63							-1														<=38.86
Early October	man-day	Y08	+0.17	+0.16	+0.68								-1													<=38.86
Late October	man-day	Y09	+0.08	+0.14	+0.31									-1												<=41.45
Early November	man-day	Y10	+2.24	+0.78	+0.42										-1											<=38.86
Late November	man-day	Y11	+0.41	+4.67	+2.22											-1										<=38.86
Early December	man-day	Y12	+1.07	+0.98	+0.83												-1									<=38.86
Late December	man-day	Y13		+2.15	+1.51													-1								<=41.45
Hired labor	man-day	Y14					+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1								>=0
Own financial capital	baht	Y15	+1,708	+1,907	+1,849	-1	+150	+150	+150	+150	+150	+150	+150	+150	+150	+150	+150	+150								=0
Loan money	baht	Y16				+1																				<=30,000
Deviation of revenue in 2000/01	baht	Y17	+470.16	+224.31	-321.85														+1							>=0
Deviation of revenue in 2001/02	baht	Y18	-321.40	+83.37	+454.29															+1						>=0
Deviation of revenue in 2002/03	baht	Y19	+91.60	-128.54	+66.94																+1					>=0
Deviation of revenue in 2003/04	baht	Y20	-597.9	-608.82	-539.14																	+1				>=0
Deviation of revenue in 2004/05	baht	Y21	+258.61	-231.66	+254.49																		+1			>=0
Deviation of revenue in 2005/06	baht	Y22	+140.62	+661.33	-85.27																			+1		>=0
Total deviation	baht	Y23																	+1	+1	+1	+1	+1	+1	-2.18	=0
Household consumption	kg.	Y24			+523.01																					>=1,000

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Table 4.8 MOTAD model in irrigated area with market price (Model C)

Restriction function	Unit		Production			Loan money (baht)	Wage labor (man days)												Absolute of negative deviation in total revenue (baht)						Risk variable (baht)	RHS
	Unit		X01	X02	X03	X04	X05	X06	X07	X08	X09	X10	X11	X12	X13	X14	X15	X16	X17	X18	X19	X20	X21	X22	σ	
Objective function	baht	Max	+1,716	+1,502	+1,186	-0.08	-150	-150	-150	-150	-150	-150	-150	-150	-150	-150	-150	-150							-0.9	
Paddy area rainfed	*rai*	Y01	+1	+1	+1																					<=6
Early July	man-day	Y02	+1.11	+0.92			-1																			<=38.85
Late July	man-day	Y03	+3.41	+3.59	+1.75			-1																		<=41.44
Early August	man-day	Y04	+0.28	+0.44	+2.31				-1																	<=38.86
Late August	man-day	Y05	+0.64	+0.39	+0.21					-1																<=41.45
Early September	man-day	Y06	+0.68	+0.32	+0.52						-1															<=38.86
Late September	man-day	Y07	+0.52	+0.21	+0.55							-1														<=38.86
Early October	man-day	Y08	+0.69	+0.19	+0.48								-1													<=38.86
Late October	man-day	Y09	+0.52	+0.22	+0.26									-1												<=41.45
Early November	man-day	Y10	+2.07	+0.11	+0.39										-1											<=38.86
Late November	man-day	Y11	+0.36	+3.97	+2.76											-1										<=38.86
Early December	man-day	Y12	+3.22	+0.80	+0.63												-1									<=38.86
Late December	man-day	Y13		+2.26	+2.51													-1								<=41.45
Hired labor	man-day	Y14					+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1								>=0
Own financial capital	baht	Y15	+2,308	+2,561	+2,408	-1	+150	+150	+150	+150	+150	+150	+150	+150	+150	+150	+150	+150								=0
Loan money	baht	Y16				+1																				<=30,000
Deviation of revenue in 2000/01	baht	Y17	-299.46	+26.87	-338.51														+1							>=0
Deviation of revenue in 2001/02	baht	Y18	-453.24	-414.55	+408.52															+1						>=0
Deviation of revenue in 2002/03	baht	Y19	-256.60	-279.39	+444.68																+1					>=0
Deviation of revenue in 2003/04	baht	Y20	+132.07	+279.87	-392.42																	+1				>=0
Deviation of revenue in 2004/05	baht	Y21	+634.38	-171.14	-126.05																		+1			>=0
Deviation of revenue in 2005/06	baht	Y22	+296.57	+233.75	+3.80																			+1		>=0
Total deviation	baht	Y23																	+1	+1	+1	+1	+1	+1	-2.18	=0
Household consumption	kg.	Y24			+532.26																					>=1,000

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Table 4.9 MOTAD model in irrigated area with government support price (Model D)

Restriction function	Unit		Production			Loan money (baht)	Wage labor (man days)												Absolute of negative deviation in total revenue (baht)						Risk variable (baht)	RHS
			X01	X02	X03	X04	X05	X06	X07	X08	X09	X10	X11	X12	X13	X14	X15	X16	X17	X18	X19	X20	X21	X22	σ	
Objective function	baht	Max	1,694	+1,747	+1,605	-0.08	-150	-150	-150	-150	-150	-150	-150	-150	-150	-150	-150	-150							-0.9	
Paddy area irrigated	*rai*	Y01	+1	+1	+1																						<=6
Early July	man-day	Y02	+1.11	+0.92			-1																			<=38.85
Late July	man-day	Y03	+3.41	+3.59	+1.75			-1																		<=41.44
Early August	man-day	Y04	+0.28	+0.44	+2.31				-1																	<=38.86
Late August	man-day	Y05	+0.64	+0.39	+0.21					-1																<=41.45
Early September	man-day	Y06	+0.68	+0.32	+0.52						-1															<=38.86
Late September	man-day	Y07	+0.52	+0.21	+0.55							-1														<=38.86
Early October	man-day	Y08	+0.69	+0.19	+0.48								-1													<=38.86
Late October	man-day	Y09	+0.52	+0.22	+0.26									-1												<=41.45
Early November	man-day	Y10	+2.07	+0.11	+0.39										-1											<=38.86
Late November	man-day	Y11	+0.36	+3.97	+2.76											-1										<=38.86
Early December	man-day	Y12	+3.22	+0.80	+0.63												-1									<=38.86
Late December	man-day	Y13		+2.26	+2.51													-1								<=41.45
Hired labor	man-day	Y14					+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1								>=0
Own financial capital	baht	Y15	+2,308	+2,561	+2,408	-1	+150	+150	+150	+150	+150	+150	+150	+150	+150	+150	+150	+150								=0
Loan money	baht	Y16				+1																				<=30,000
Deviation of revenue in 2000/01	baht	Y17	+569.17	+138.86	-327.72														+1							>=0
Deviation of revenue in 2001/02	baht	Y18	-248.55	-27.84	+463.20															+1						>=0
Deviation of revenue in 2002/03	baht	Y19	+72.35	-92.05	+69.33																+1					>=0
Deviation of revenue in 2003/04	baht	Y20	-522.95	-565.12	-548.81																	+1				>=0
Deviation of revenue in 2004/05	baht	Y21	+419.28	-378.28	+258.56																		+1			>=0
Deviation of revenue in 2005/06	baht	Y22	-235.59	+546.10	+85.44																			+1		>=0
Total deviation	baht	Y23																	+1	+1	+1	+1	+1	+1	-2.18	=0
Household consumption	kg.	Y24			+532.26																					>=1,000

Table 4.10 MOTAD model in rainfed area with market price for RD15 and RD6 and government support price for KDML105 (Model E)

Restriction function	Unit		Production			Loan money (baht)	Wage labor (man days)												Absolute of negative deviation in total revenue (baht)						Risk variable (baht)	RHS
			X01	X02	X03	X04	X05	X06	X07	X08	X09	X10	X11	X12	X13	X14	X15	X16	X17	X18	X19	X20	X21	X22	σ	
Objective function	baht	Max	+1,695	+1,653	+1,094	-0.08	-150	-150	-150	-150	-150	-150	-150	-150	-150	-150	-150	-150							-0.9	
Paddy area rainfed	rai	Y01	+1	+1	+1																					<=12
Early July	man-day	Y02	+1.09	+1.10			-1																			<=38.85
Late July	man-day	Y03	+1.90	+3.41	+1.22			-1																		<=41.44
Early August	man-day	Y04	+0.20	+0.10	+4.04				-1																	<=38.86
Late August	man-day	Y05	+0.19	+0.52	+0.10					-1																<=41.45
Early September	man-day	Y06	+0.15	+0.27	+0.67						-1															<=38.86
Late September	man-day	Y07	+0.08	+0.38	+0.63							-1														<=38.86
Early October	man-day	Y08	+0.17	+0.16	+0.68								-1													<=38.86
Late October	man-day	Y09	+0.08	+0.14	+0.31									-1												<=41.45
Early November	man-day	Y10	+2.24	+0.78	+0.42										-1											<=38.86
Late November	man-day	Y11	+0.41	+4.67	+2.22											-1										<=38.86
Early December	man-day	Y12	+1.07	+0.98	+0.83												-1									<=38.86
Late December	man-day	Y13		+2.15	+1.51													-1								<=41.45
Hired labor	man-day	Y14					+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1								>=0
Own financial capital	baht	Y15	+1,708	+1,907	+1,849	-1	+150	+150	+150	+150	+150	+150	+150	+150	+150	+150	+150	+150								=0
Loan money	baht	Y16				+1																				<=30,000
Deviation of revenue in 2000/01	baht	Y17	-338.39	+224.31	-325.32														+1							>=0
Deviation of revenue in 2001/02	baht	Y18	-498.51	+83.37	+397.17															+1						>=0
Deviation of revenue in 2002/03	baht	Y19	-233.22	-128.54	+434.29																+1					>=0
Deviation of revenue in 2003/04	baht	Y20	+127.14	-608.82	-376.53																	+1				>=0
Deviation of revenue in 2004/05	baht	Y21	+634.42	-231.66	-123.93																		+1			>=0
Deviation of revenue in 2005/06	baht	Y22	+350.214	+661.33	-5.67																			+1		>=0
Total deviation	baht	Y23																	+1	+1	+1	+1	+1	+1	-2.18	=0
Household consumption	kg.	Y24			+523.01																					>=1,000

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Table 4.11 MOTAD model in irrigated area with market price for RD15 and RD6 and government support price for KDML105 (Model F)

Restriction function	Unit		X01	X02	X03	X04	X05	X06	X07	X08	X09	X10	X11	X12	X13	X14	X15	X16	X17	X18	X19	X20	X21	X22	σ	RHS
			Production			Loan money (baht)	Wage labor (man days)												Absolute of negative deviation in total revenue (baht)						Risk variable (baht)	RHS
Objective function	baht	Max	+1,716	+1,747	+1,186	-0.08	-150	-150	-150	-150	-150	-150	-150	-150	-150	-150	-150	-150							-0.9	
Paddy area irrigated	rai	Y01	+1	+1	+1																					<=6
Early July	man-day	Y02	+1.11	+0.92			-1																			<=38.85
Late July	man-day	Y03	+3.41	+3.59	+1.75			-1																		<=41.44
Early August	man-day	Y04	+0.28	+0.44	+2.31				-1																	<=38.86
Late August	man-day	Y05	+0.64	+0.39	+0.21					-1																<=41.45
Early September	man-day	Y06	+0.68	+0.32	+0.52						-1															<=38.86
Late September	man-day	Y07	+0.52	+0.21	+0.55							-1														<=38.86
Early October	man-day	Y08	+0.69	+0.19	+0.48								-1													<=38.86
Late October	man-day	Y09	+0.52	+0.22	+0.26									-1												<=41.45
Early November	man-day	Y10	+2.07	+0.11	+0.39										-1											<=38.86
Late November	man-day	Y11	+0.36	+3.97	+2.76											-1										<=38.86
Early December	man-day	Y12	+3.22	+0.80	+0.63												-1									<=38.86
Late December	man-day	Y13		+2.26	+2.51													-1								<=41.45
Hired labor	man-day	Y14					+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1								>=0
Own financial capital	baht	Y15	+2,308	+2,561	+2,408	-1	+150	+150	+150	+150	+150	+150	+150	+150	+150	+150	+150	+150								=0
Loan money	baht	Y16				+1																				<=30,000
Deviation of revenue in 2000/01	baht	Y17	-299.46	+138.86	-338.51														+1							>=0
Deviation of revenue in 2001/02	baht	Y18	-453.24	-27.84	+408.52															+1						>=0
Deviation of revenue in 2002/03	baht	Y19	-256.60	-92.05	+444.68																+1					>=0
Deviation of revenue in 2003/04	baht	Y20	+132.07	-565.12	-392.42																	+1				>=0
Deviation of revenue in 2004/05	baht	Y21	+634.38	-378.28	-126.05																		+1			>=0
Deviation of revenue in 2005/06	baht	Y22	+296.57	+546.10	+3.80																			+1		>=0
Total deviation	baht	Y23																	+1	+1	+1	+1	+1	+1	-2.18	=0
Household consumption	kg.	Y24			+532.26																					>=1,000