APPENDIX 1

DETAILS OF TRIANGULAR MEMBERSHIP FUNCTION AND CRISP VALUE USED IN FUZZY DELPHI METHOD

Table A1.1 Triangular membership function obtained from Interview with Fuzzy Delphi Method

	Colour			Defect			Firmness			Flavour			Availability			Confidence			Cost			Sale Price			Sale Promotion		
Colour	50	50	50	50	55	70	60	70	80	60	70	80	20	30	40	60	80	90	60	70	80	50	55	70	10	30	40
Defect	30	45	50	50	50	50	50	60	80	50	70	80	10	20	30	60	70	90	10	20	30	20	30	40	10	20	40
Firmness	20	30	40	20	40	50	50	50	50	50	65	70	20	30	40	50	55	60	50	65	70	10	20	30	30	45	50
Flavour	20	30	60	20	30	50	30	35	50	50	50	50	30	35	50	30	45	50	20	40	60	30	45	60	30	45	50
Availability	60	70	80	70	80	90	60	70	80	50	65	70	50	50	50	60	80	90	20	30	40	55	70	80	60	70	90
Confidence	10	20	40	10	30	40	40	45	50	50	55	70	10	20	40	50	50	50	20	35	40	50	60	70	50	60	70
Cost	20	30	40	70	80	90	30	45	50	40	60	90	60	70	80	60	75	80	50	50	50	50	55	70	50	60	80
Sale Price	30	45	50	60	70	80	70	80	90	40	55	70	20	30	45	30	40	50	30	45	50	50	50	50	50	70	80
Promotion	60	70	90	60	80	90	50	65	70	50	65	70	10	30	40	30	40	50	20	40	50	20	30	50	50	50	50

For fuzzy data obtained through Fuzzy Delphi Method as showed in Table A1.1, Centre of Area method(COA) was applied through MATLAB to get crisp valued and out puts from MATLAB are shown in Table A1.2.

Centre of Area method $z^* = \frac{\int \mu_R(z) \cdot z \, dz}{\int \mu_R(z) \cdot z \, dz}$

Table A1.2 Crisp value obtained through defuzzification with Centre of Area Method (COA)

Criteria	Colour	Defect	Firmness	Flavour	Availability	Confidence	Cost	Sale Price	Promotion
Colour	50.00	58.33	70.00	70.00	30.00	76.67	70.00	58.33	26.67
Defect	41.67	50.00	63.33	66.67	20.00	73.33	20.00	30.00	23.33
Firmness	30.00	36.67	50.00	61.67	30.00	55.00	61.67	20.00	41.67
Flavour	36.67	33.33	38.33	50.00	38.33	41.67	40.00	45.00	41.67
Availabilty	70.00	80.00	70.00	61.67	50.00	76.67	30.00	68.33	73.33
Confidence	23.33	26.67	45.00	58.33	23.33	50.00	31.67	60.00	60.00
Cost	30.00	80.00	41.67	63.33	70.00	68.33	50.00	58.33	63.33
Price	45.00	70.00	80.00	55.00	31.67	40.00	41.67	50.00	66.67
Promotion	73.33	76.67	61.66	61.67	26.67	40.00	33.33	33.33	50.00

In Table A1.2, value 50 means that both criteria are equally important. So all crisp value in Table 2A divided by 50 and to get the rating score as shown in Table A1.3.

Table A1.3 Crisp value obtained through defuzzification with Centre of Area Method (COA)

Criteria	Colour(ripe)	Defect	Firmness	Flavour	Availability	Confidence	Cost	Sale Price	Promotion
Colour	1.00	1.17	1.40	1.40	0.60	1.53	1.40	1.17	0.53
Defect	0.83	1.00	1.27	1.33	0.40	1.47	0.40	0.60	0.47
Firmness	0.60	0.73	1.00	1.23	0.60	1.10	1.23	0.40	0.83
Flavour	0.73	0.67	0.77	1.00	0.77	0.83	0.80	0.90	0.83
Availabilty	1.40	1.60	1.40	1.23	1.00	1.53	0.60	1.37	1.47
Confidence	0.47	0.53	0.90	1.17	0.47	1.00	0.63	1.20	1.20
Cost	0.60	1.60	0.83	1.27	1.40	1.37	1.00	1.17	1.27
Sale Price	0.90	1.40	1.60	1.10	0.63	0.80	0.83	1.00	1.33
Promotion	1.47	1.53	1.23	1.23	0.53	0.80	0.73	0.67	1.00

APPENDIX 2

DETAILS OF PAIRWISE COMPARISON DETAILS IN ANALYTICAL HIERARCHY PROCESS FOR POST HARVEST TECHNOLOGY SELECTION IN BANANA SUPPLY CHAIN

Table A2.1 Technological pairwise comparison obtained from survey with respect to colour criteria

Criteria	PC	PS	CE	CA	MA	MP
PC	1.000	3.000	0.500	0.250	0.200	2.000
PS	0.333	1.000	0.500	0.250	0.200	2.000
CE	2.000	2.000	1.000	0.500	0.333	3.000
CA	4.000	4.000	2.000	1.000	0.500	4.000
MA	5.000	5.000	3.000	2.000	1.000	5.000
MP	0.500	0.500	0.333	0.250	0.200	1.000

Table A2.2 Weight and rank from technological pairwise comparison with respect to colour criteria

Criteria	MP	MP	MP	MP	MP	MP	Weight	Rank
PC	0.078	0.194	0.068	0.059	0.082	0.118	0.100	4
PS	0.026	0.065	0.068	0.059	0.082	0.118	0.070	5
CE	0.156	0.129	0.136	0.118	0.137	0.176	0.142	3
CA	0.312	0.258	0.273	0.235	0.206	0.235	0.253	2
MA	0.390	0.323	0.409	0.471	0.411	0.294	0.383	1
MP	0.039	0.032	0.045	0.059	0.082	0.059	0.053	6

Table A2.3 Technological pairwise comparison obtained from survey with respect to defect criteria

Criteria	PC	PS	CE	CA	MA	MP
PC	1.000	2.000	0.500	0.333	0.250	0.250
PS	0.500	1.000	0.500	0.333	0.250	0.250
CE	2.000	2.000	1.000	0.500	0.250	0.250
CA	3.000	3.000	2.000	1.000	0.500	0.500
MA	4.000	4.000	3.000	3.000	1.000	2.000
MP	4.000	4.000	4.000	2.000	0.500	1.000

Table A2.4 Weight and rank from technological pairwise comparison with respect to defect criteria

Criteria	MP	MP	MP	MP	MP	MP	Weight	Rank
PC	0.069	0.125	0.045	0.047	0.091	0.059	0.073	5
PS	0.034	0.063	0.045	0.047	0.091	0.059	0.056	6
CE	0.138	0.125	0.091	0.070	0.091	0.059	0.096	4
CA	0.207	0.188	0.182	0.140	0.182	0.118	0.169	3
MA	0.276	0.250	0.273	0.419	0.364	0.471	0.342	1
MP	0.276	0.250	0.364	0.279	0.182	0.235	0.264	2

Table A2.5 Technological pairwise comparison obtained from survey with respect to firmness criteria

Criteria	PC	PS	CE	CA	MA	MP
PC	1.000	0.500	0.500	0.250	0.200	2.000
PS	2.000	1.000	0.500	0.500	0.333	2.000
CE	2.000	2.000	1.000	0.500	0.250	2.000
CA	4.000	2.000	2.000	1.000	0.333	2.000
MA	5.000	3.000	4.000	3.000	1.000	3.000
MP	0.500	0.500	0.500	0.500	0.333	1.000

Table A2.6 Weight and rank from technological pairwise comparison with respect to firmness criteria

Criteria	MP	MP	MP	MP	MP	MP	Weight	Rank
PC	0.069	0.056	0.059	0.043	0.082	0.167	0.079	5
PS	0.138	0.111	0.059	0.087	0.136	0.167	0.116	4
CE	0.138	0.222	0.118	0.087	0.102	0.167	0.139	3
CA	0.276	0.222	0.235	0.174	0.136	0.167	0.202	2
MA	0.345	0.333	0.471	0.522	0.408	0.250	0.388	1
MP	0.034	0.056	0.059	0.087	0.136	0.083	0.076	6

Table A2.7 Technological pairwise comparison obtained from survey with respect to flavour criteria

Criteria	PC	PS	CE	CA	MA	MP
PC	1.000	3.000	2.000	0.500	0.333	2.000
PS	0.333	1.000	2.000	0.333	0.333	2.000
CE	0.500	0.500	1.000	0.500	0.333	2.000
CA	2.000	3.000	2.000	1.000	0.500	2.000
MA	3.000	3.000	3.000	2.000	1.000	3.000
MP	0.500	0.500	0.500	0.500	0.333	1.000

Table A2.8 Weight and rank from technological pairwise comparison with respect to flavour criteria

Criteria	MP	MP	MP	MP	MP	MP	Weight	Rank
PC	0.136	0.273	0.190	0.103	0.118	0.167	0.165	4
PS	0.045	0.091	0.190	0.069	0.118	0.167	0.113	5
CE	0.068	0.045	0.095	0.103	0.118	0.167	0.099	3
CA	0.273	0.273	0.190	0.207	0.176	0.167	0.214	2
MA	0.409	0.273	0.286	0.414	0.353	0.250	0.331	1
MP	0.068	0.045	0.048	0.103	0.118	0.083	0.077	6

Table A2.9 Technological pairwise comparison obtained from survey with respect to availability criteria

Criteria	PC	PS	CE	CA	MA	MP
PC	1.000	0.500	0.500	0.333	0.333	0.333
PS	2.000	1.000	2.000	0.500	0.500	0.500
CE	2.000	0.500	1.000	0.333	0.333	0.333
CA	3.000	2.000	3.000	1.000	0.333	0.333
MA	3.000	3.000	3.000	2.000	1.000	0.500
MP	3.000	2.000	3.000	3.000	2.000	1.000

Table A2.10 Weight and rank from technological pairwise comparison with respect to availability criteria

Criteria	MP	MP	MP	MP	MP	MP	Weight	Rank
PC	0.071	0.056	0.040	0.047	0.074	0.111	0.066	6
PS	0.143	0.111	0.160	0.070	0.111	0.167	0.127	4
CE	0.143	0.056	0.080	0.047	0.074	0.111	0.085	5
CA	0.214	0.222	0.240	0.140	0.074	0.111	0.167	3
MA	0.214	0.333	0.240	0.279	0.222	0.167	0.243	2
MP	0.214	0.222	0.240	0.419	0.444	0.333	0.312	1

Table A2.11 Technological pairwise comparison obtained from survey with respect to confidence criteria

Criteria	PC	PS	CE	CA	MA	MP
PC	1.000	0.250	0.500	0.500	0.333	0.250
PS	5.000	1.000	4.000	3.000	2.000	2.000
CE	2.000	0.250	1.000	0.500	0.333	0.333
CA	2.000	0.333	2.000	1.000	0.500	0.500
MA	3.000	0.500	3.000	2.000	1.000	0.500
MP	4.000	0.500	3.000	2.000	2.000	1.000

Table A2.12 Weight and rank from technological pairwise comparison with respect to confidence criteria

Criteria	MP	MP	MP	MP	MP	MP	Weight	Rank
PC	0.059	0.088	0.037	0.056	0.054	0.055	0.058	6
PS	0.294	0.353	0.296	0.333	0.324	0.436	0.339	1
CE	0.118	0.088	0.074	0.056	0.054	0.073	0.077	5
CA	0.118	0.118	0.148	0.111	0.081	0.109	0.114	4
MA	0.176	0.176	0.222	0.222	0.162	0.109	0.178	3
MP	0.235	0.176	0.222	0.222	0.324	0.218	0.233	2

Table A2.13 Technological pairwise comparison obtained from survey with respect to cost criteria

Criteria	PC	PS	CE	CA	MA	MP
PC	1.000	0.500	2.000	3.000	5.000	5.000
PS	2.000	1.000	2.000	3.000	4.000	4.000
CE	0.500	0.500	1.000	0.333	4.000	4.000
CA	0.333	0.333	3.000	1.000	2.000	2.000
MA	0.200	0.250	0.250	0.500	1.000	2.000
MP	0.200	0.250	0.250	0.500	0.500	1.000

Table A2.14 Weight and rank from technological pairwise comparison with respect to cost criteria

Criteria	MP	MP	MP	MP	MP	MP	Weight	Rank
PC	0.241	0.176	0.235	0.360	0.303	0.278	0.266	6
PS	0.482	0.353	0.235	0.360	0.242	0.222	0.316	1
CE	0.120	0.176	0.118	0.040	0.242	0.222	0.153	5
CA	0.080	0.118	0.353	0.120	0.121	0.111	0.151	4
MA	0.048	0.088	0.029	0.060	0.061	0.111	0.066	3
MP	0.048	0.088	0.029	0.060	0.030	0.056	0.052	2

Table A2.15 Technological pairwise comparison obtained from survey with respect to selling price reduction criteria

Criteria	PC	PS	CE	CA	MA	MP
PC	1.000	0.500	2.000	3.000	4.000	5.000
PS	2.000	1.000	2.000	3.000	4.000	4.000
CE	0.500	0.500	1.000	2.000	3.000	5.000
CA	0.333	0.333	0.500	1.000	2.000	3.000
MA	0.250	0.250	0.333	0.500	1.000	1.000
MP	0.200	0.250	0.200	0.333	1.000	1.000

Table A2.16 Weight and rank from technological pairwise comparison with respect to selling price reduction criteria

Criteria	MP	MP	MP	MP	MP	MP	Weight	Rank
PC	0.233	0.176	0.332	0.305	0.267	0.263	0.267	6
PS	0.467	0.353	0.332	0.305	0.267	0.211	0.323	1
CE	0.117	0.176	0.166	0.203	0.200	0.263	0.188	5
CA	0.078	0.118	0.083	0.102	0.133	0.158	0.112	4
MA	0.058	0.088	0.055	0.051	0.067	0.053	0.062	3
MP	0.047	0.088	0.033	0.034	0.067	0.053	0.053	2

Table A2.17 Technological pairwise comparison obtained from survey with respect to promotion criteria

Criteria	PC	PS	CE	CA	MA	MP
PC	1.000	0.333	0.500	0.500	0.500	0.333
PS	3.000	1.000	2.000	2.000	2.000	2.000
CE	2.000	0.500	1.000	2.000	2.000	2.000
CA	2.000	0.500	0.500	1.000	0.333	0.333
MA	2.000	0.500	0.500	3.000	1.000	0.500
MP	3.000	0.500	0.500	3.000	2.000	1.000

Table A2.18 Weight and rank from technological pairwise comparison with respect to promotion criteria

Criteria	MP	MP	MP	MP	MP	MP	Weight	Rank
PC	0.077	0.100	0.100	0.043	0.064	0.054	0.073	6
PS	0.231	0.300	0.400	0.174	0.255	0.324	0.281	1
CE	0.154	0.150	0.200	0.174	0.255	0.324	0.210	5
CA	0.154	0.150	0.100	0.087	0.043	0.054	0.098	4
MA	0.154	0.150	0.100	0.261	0.128	0.081	0.146	3
MP	0.231	0.150	0.100	0.261	0.255	0.162	0.193	2

APPENDIX 3

SYSTEM DYNAMICS MODEL FOR RISK MODELLING FOR BAMBOO SHOOT PRODUCTION AND DISTRIBUTION SYSTEM IN PRACHIN BURI, THAILAND

The system dynamic model associated with the risk modeling of Bamboo shoot production and distribution system in Prachin Buri, Thailand, simulated graphs through system dynamic simulation and the equations used for simulation in the system dynamics are given in this Figure A3.1 to A3.8 and Table A3.1.

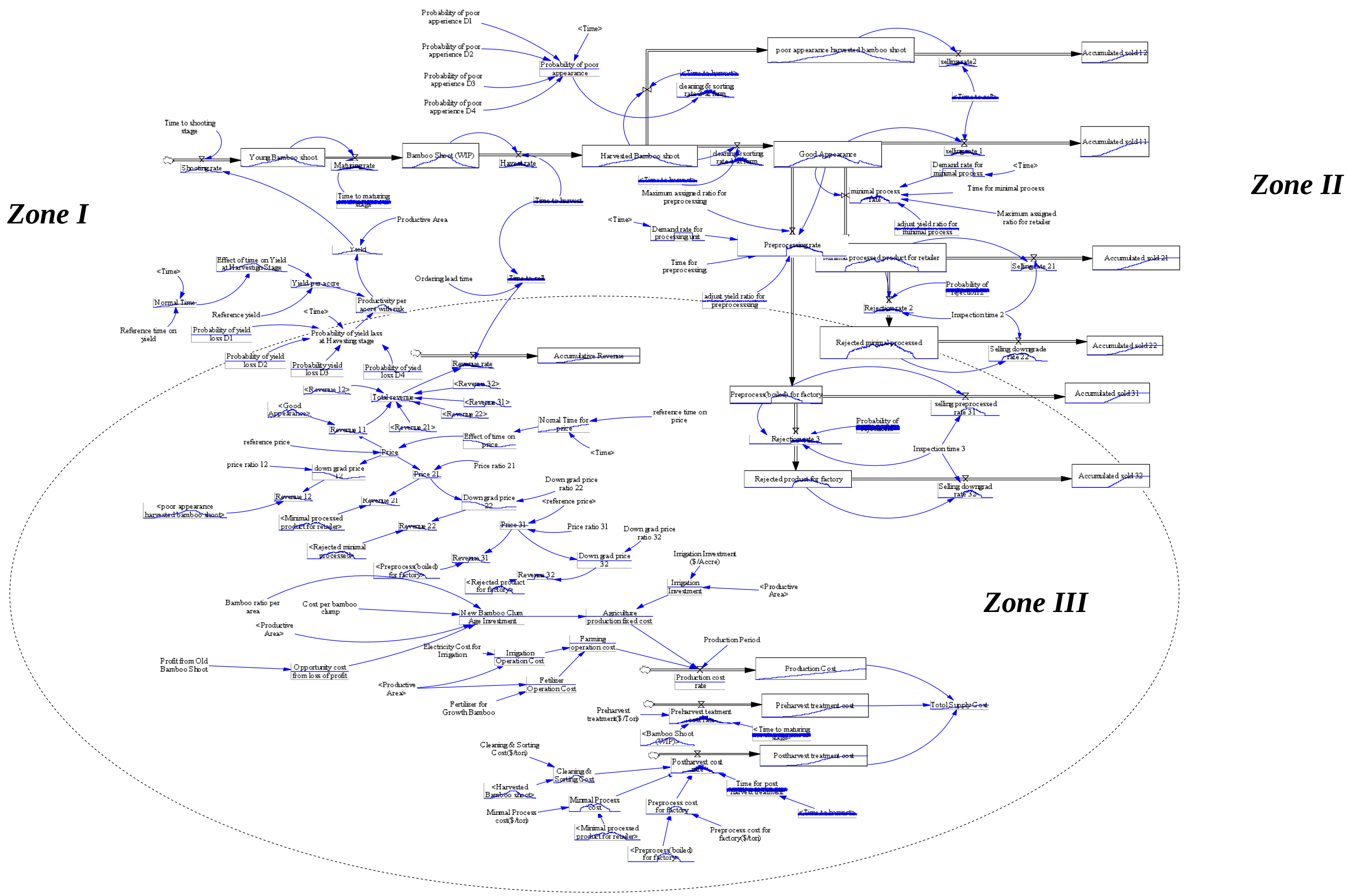

Figure A3.1 Overview of System Dynamics Model for Risk Modelling for Bamboo shoot production and distribution system in Prachin Buri, Thailand

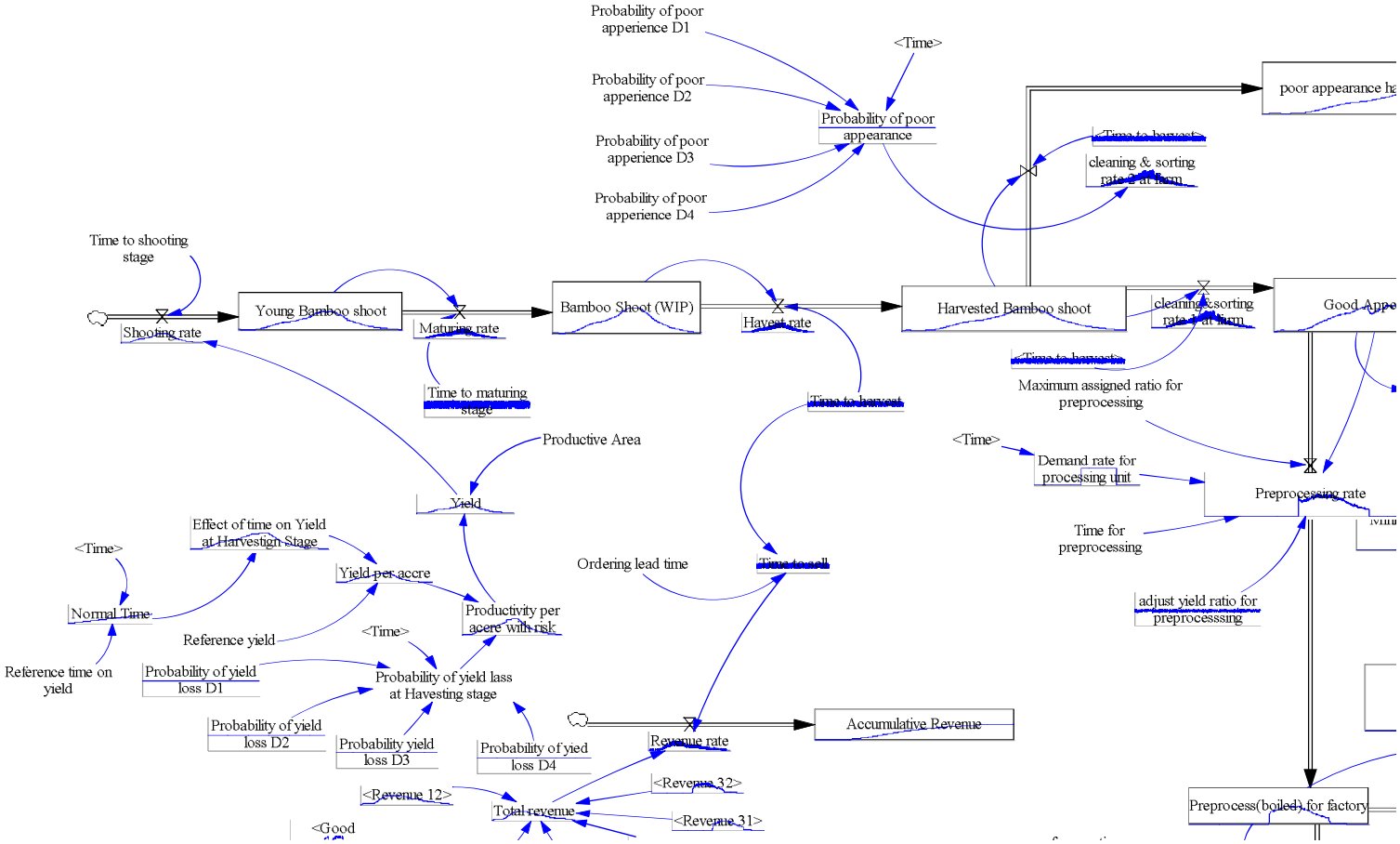

Figure A3.2 Enlarged picture System Dynamics Model for Risk Modelling for Bamboo shoot production and distribution system in zone I , Prachin Buri, Thailand

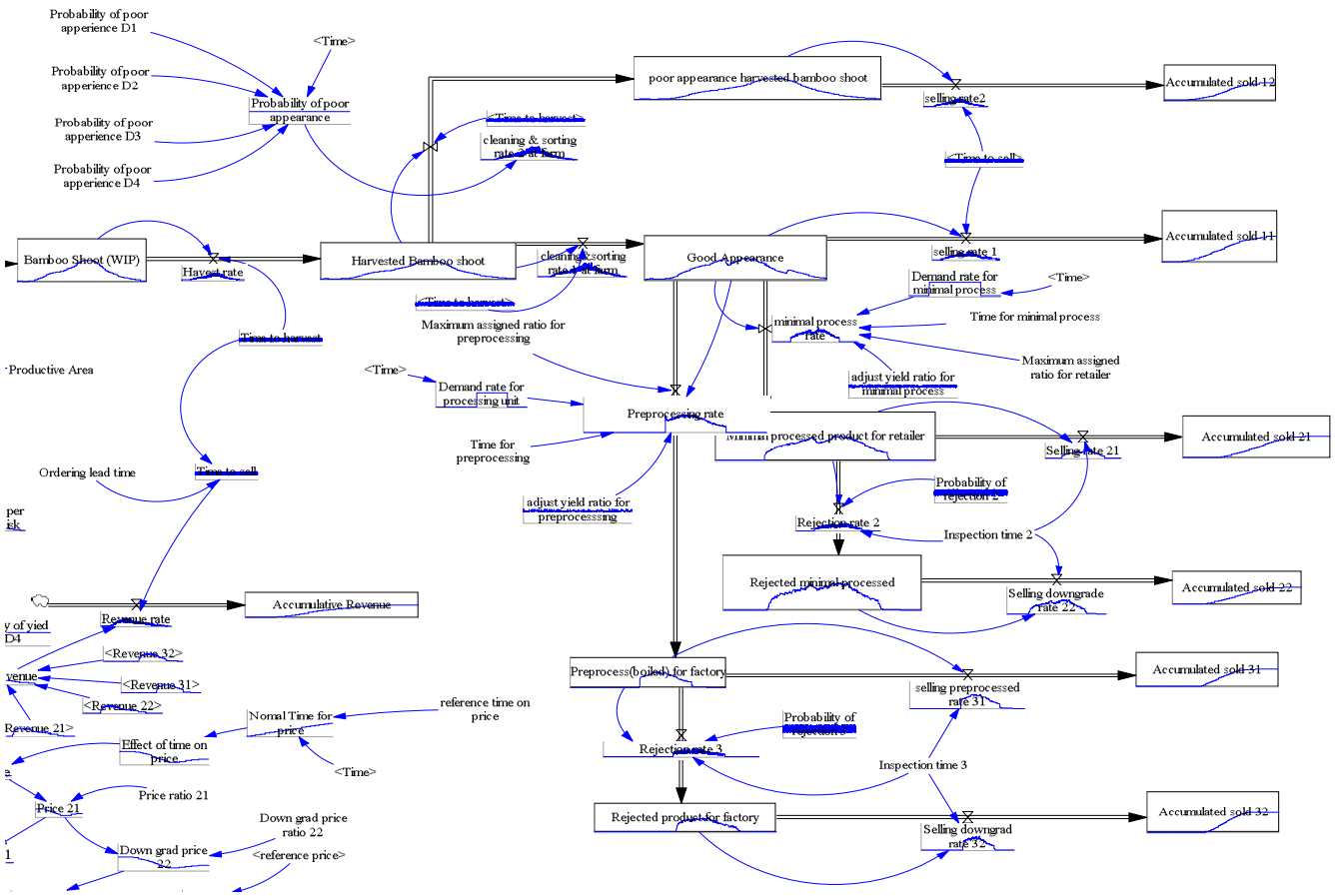

Figure A3.3 Enlarged picture of System Dynamics Model for Risk Modelling for Bamboo shoot production and distribution system in zone II , Prachin Buri, Thailand

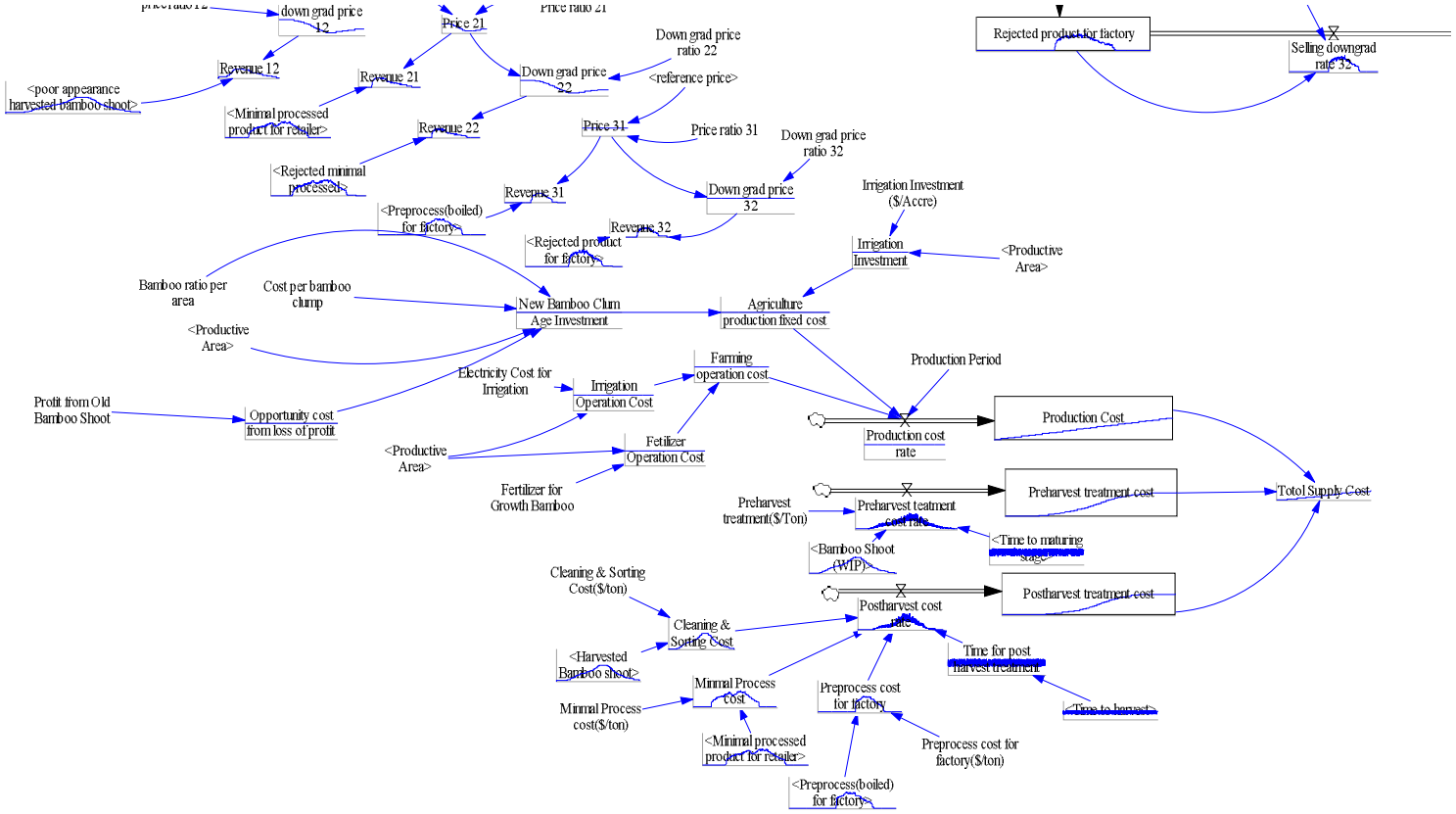

Figure A3.4 Enlarged picture of System Dynamics Model for Risk Modelling for Bamboo shoot production and distribution system in zone III, Prachin Buri, Thailand

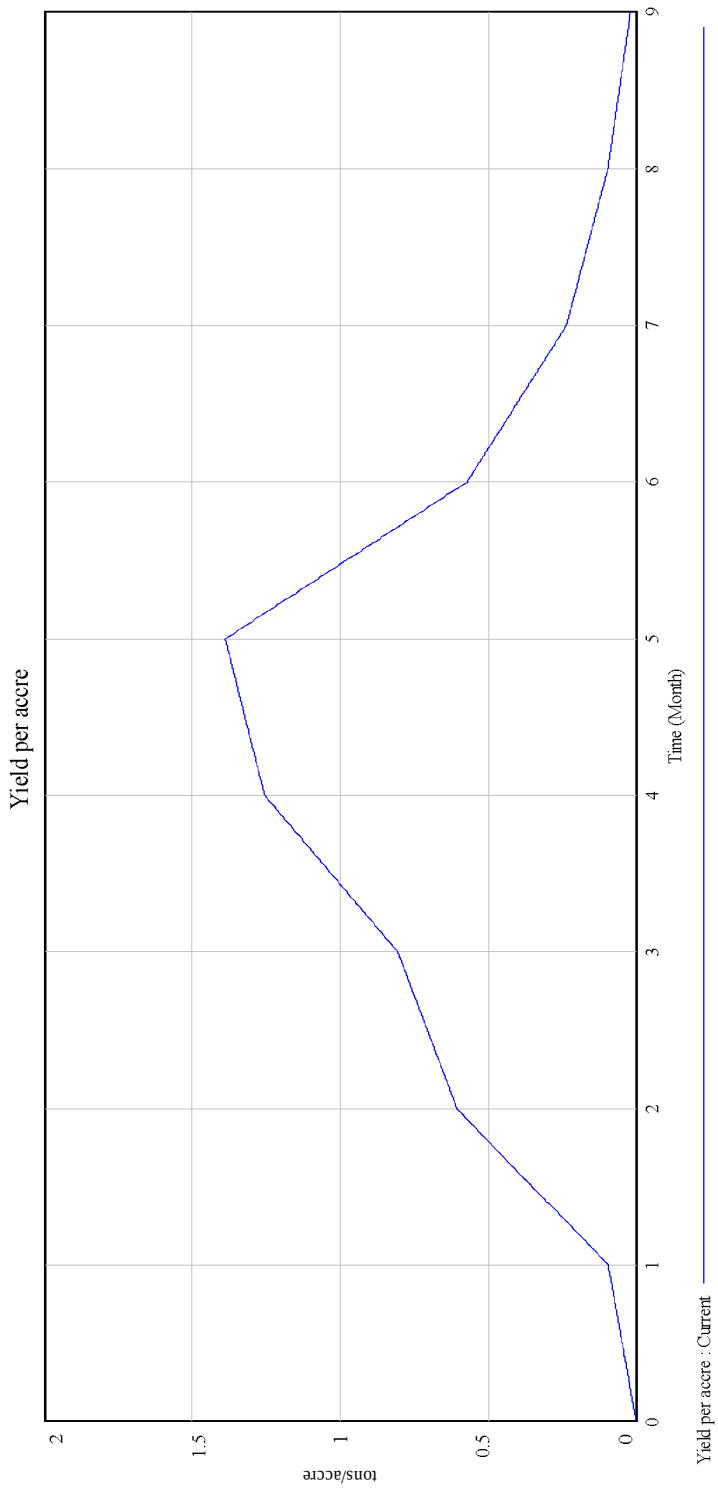

Figure A3.5 Yield per acre during four seasons (9 months)

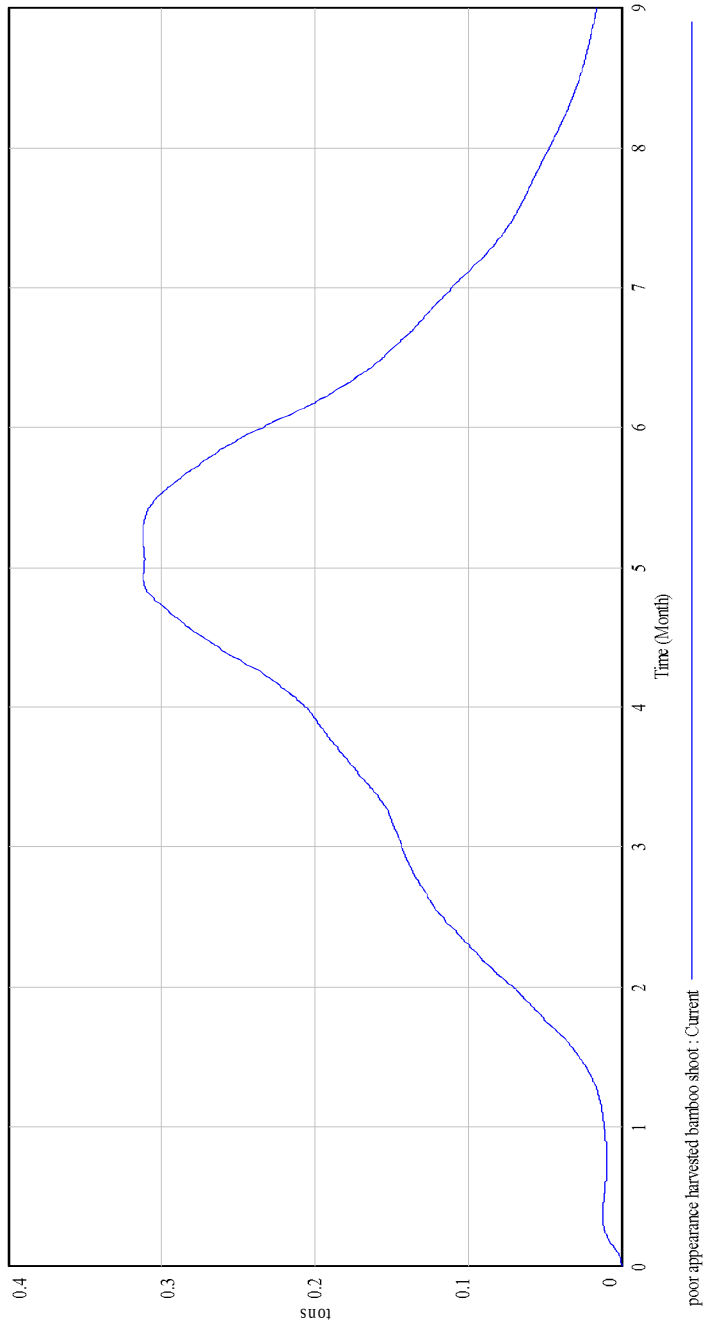

Figure A3.6 Poor Appearance during Four Seasons (9 months)

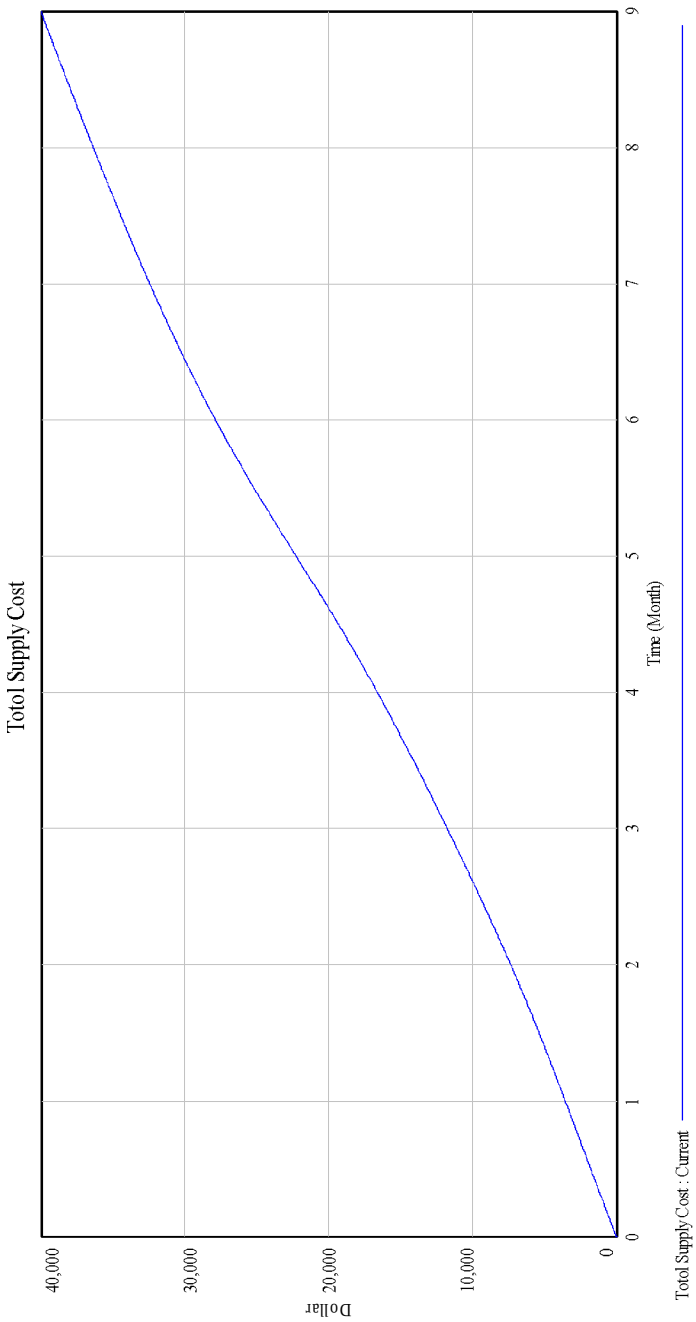

Figure A3.7 Total Operation Cost during Four Seasons (9 months)

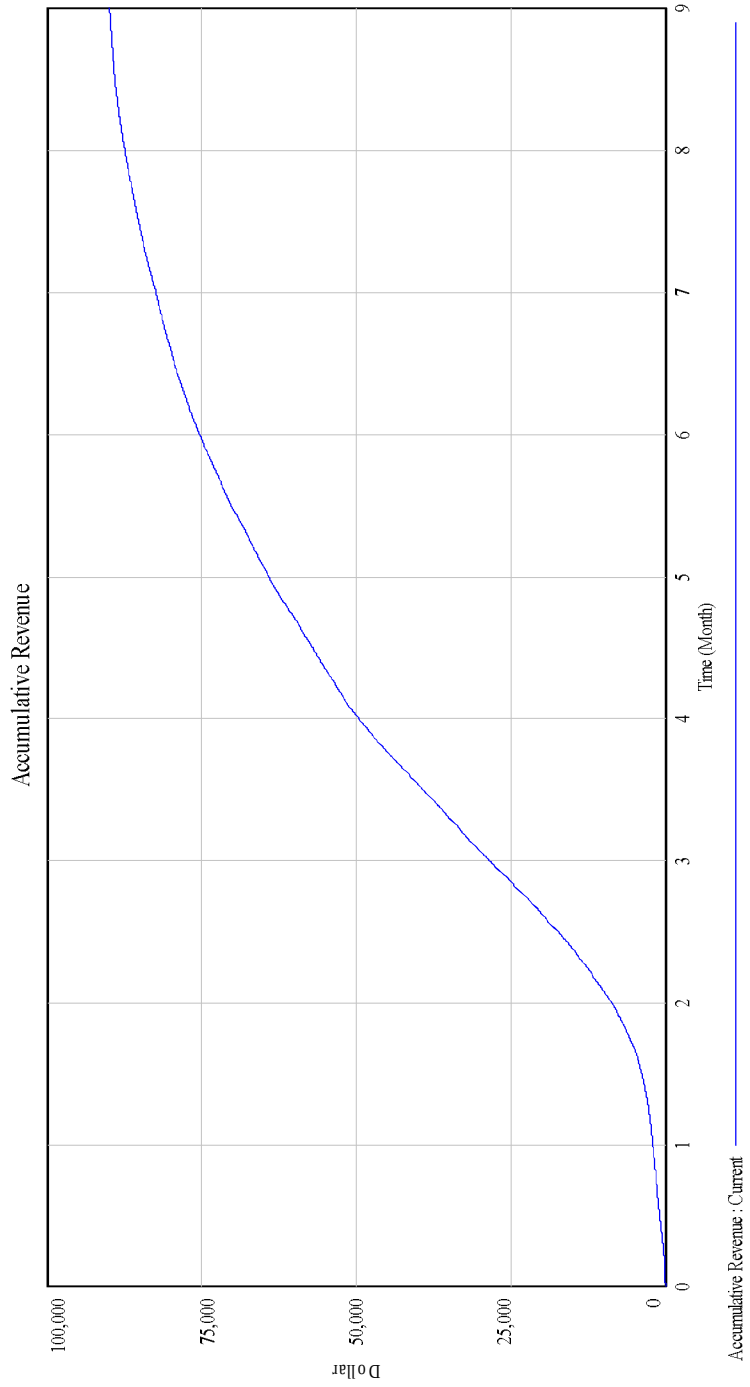

Figure A3.8 Accumulative revenue during Four Seasons (9 months)

Table A3.1 Equations in System Dynamics Model

(001) Accumulated sold 11= INTEG (selling rate 1,0) Units: tons
(002) Accumulated sold 12= INTEG (selling rate2,0) Units: tons
(003) Accumulated sold 21= INTEG (Selling rate 21,0) Units: tons
(004) Accumulated sold 22= INTEG (Selling downgrade rate 22,0)Units: tons
(005) Accumulated sold 31= INTEG (selling preprocessed rate 31,0)Units: tons
(006) Accumulated sold 32= INTEG (Selling downgrad rate 32,0)Units: tons
(007) Accumulative Revenue= INTEG (Revenue rate,0) Units: Dollar
(008) adjust yield ratio for minimal process=RANDOM NORMAL(0.2 , 0.3 , 0.25, 0.02 , 0)
Units: Dmnl
(009) adjust yield ratio for preprocesssing=RANDOM NORMAL(0.9,1.3, 1.1,0.05, 0)
Units: Dmnl
(010) Agriculture production fixed cost=Irrigation Investment+New Bamboo Clum Age Investment Units: Dollar
(011) Bamboo ratio per area=100 Units: Clump/accre
(012) "Bamboo Shoot (WIP)"= INTEG (Maturing rate-Havest rate,0) Units: tons
(013) "Cleaning & Sorting Cost"="Cleaning & Sorting Cost($/ton)"*Harvested Bamboo shoot
Units: Dollar
(014) "Cleaning & Sorting Cost($/ton)"=3.03 Units: Dollar/ton
(015) "cleaning & sorting rate 2 at farm"= Harvested Bamboo shoot*Probability of poor appearance/Time to harvest Units: tons/Month
(016) "cleaning&sorting rate 1 at farm"=Harvested Bamboo shoot/Time to harvest
Units: tons/months
(017) Cost per bamboo clump=30 Units: Dollar/Clump
(018) Demand rate for minimal process=
IF THEN ELSE(Time>=2:AND:Time<=7 , 5, 0)Units: tons/Month
(019) Demand rate for processing unit=IF THEN ELSE(Time>0:AND:Time<=4 , 0, IF THEN ELSE(Time>4:AND:Time<=7 , 30, 0))Units: tons/Month
(020) down grad price 12=price ratio 12*Price Units: Dollar/ton
(021) Down grad price 22=Down grad price ratio 22*Price 21 Units: Dollar/ton
(022) Down grad price 32=Price 31*Down grad price ratio 32 Units: Dollar/ton
(023) Down grad price ratio 22=0.5 Units: Dmnl
(024) Down grad price ratio 32=0.4 Units: Dmnl
(025) Effect of time on price = WITH LOOKUP (Nomal Time for price,

([(0,0)-(10,10)],(0,5),(0.2,4.984),(0.4,4.532),(0.6,3.661),(0.8,2.185),
(1,1),(1.2,1.048),(1.4,1.468),(1.6,1.877),(1.8,2.031))) Units: Dmnl

(026) Effect of time on Yield at Harvestign Stage = WITH LOOKUP (
Normal Time,([(0,0)-(2,1)],(0,0),(0.2,0.068),(0.4,0.436),(0.6,0.58),
(0.8,0.904),(1,1),(1.2,0.412),(1.4,0.17),(1.6,0.069),(1.8,0.014)))Units: Dmnl

(027) Electricity Cost for Irrigation=3.79 Units: Dollar/accre

(028) Farming operation cost=Irrigation Operation Cost+Fetilizer Operation Cost
Units: Dollar

(029) Fertilizer for Growth Bamboo=151.52 Units: Dollar/accre

(030) Fetilizer Operation Cost=Fertilizer for Growth Bamboo*Productive Area
Units: Dollar

(031) FINAL TIME = 9 Units: Month
The final time for the simulation.

(032) Good Appearance= INTEG ("cleaning&sorting rate 1 at farm"-minimal process rate-Preprocessing rate-selling rate 1,0)
Units: tons

(033) Harvested Bamboo shoot= INTEG (Havest rate-"cleaning&sorting rate 1 at farm"-"cleaning & sorting rate 2 at farm",0)
Units: tons

(034) Havest rate="Bamboo Shoot (WIP)"/Time to harvest
Units: tons/months

(035) INITIAL TIME = 0 Units: Month
The initial time for the simulation.

(036) Inspection time 2=0.067 Units: Month

(037) Inspection time 3=0.067 Units: Month

(038) Irrigation Investment="Irrigation Investment ($/Accre)"*Productive Area
Units: Dollar

(039) "Irrigation Investment ($/Accre)"=3.79 Units: Dollar/accre

(040) Irrigation Operation Cost=Electricity Cost for Irrigation*Productive Area
Units: Dollar

(041) Maturing rate=Young Bamboo shoot/Time to maturing stage
Units: tons/Month

(042) Maximum assigned ratio for preprocessing=0.4 Units: Dmnl

(043) Maximum assigned ratio for retailer=0.4 Units: Dmnl

(044) minimal process rate=MIN(Good Appearance*Maximum assigned ratio for retailer*adjust yield ratio for minimal process/Time for minimal process, Demand rate for minimal process)
Units: tons/Month

(045) Minimal processed product for retailer= INTEG (minimal process rate-Selling rate 21-Rejection rate 2, 0) Units: tons

(046) Minmal Process cost=Minimal processed product for retailer*"Minmal Process cost($/ton)" Units: Dollar

(047) "Minmal Process cost($/ton)"=24.24 Units: Dollar/ton

(048) New Bamboo Clum Age Investment=(Cost per bamboo clump*Bamboo ratio per area*Productive Area)+Opportunity cost from loss of profit Units: Dollar

(049) Nomal Time for price=Time/reference time on price Units: Dmnl

(050) Normal Time=Time/Reference time on yield Units: Dmnl

(051) Opportunity cost from loss of profit=Profit from Old Bamboo ShootUnits: Dollar

(052) Ordering lead time=0.033 Units: Month

(053) poor appearance harvested bamboo shoot= INTEG ("cleaning & sorting rate 2 at farm"-selling rate2,0)
Units: tons

(054) Postharvest cost rate=("Cleaning & Sorting Cost"+Minmal Process cost+Preprocess cost for factory)/Time for post harvest treatment
Units: Dollar/Month

(055) Postharvest treatment cost= INTEG (Postharvest cost rate,0)Units: Dollar

(056) Preharvest teatment cost rate=("Preharvest treatment($/Ton)"*"Bamboo Shoot (WIP)")/Time to maturing stage Units: Dollar/Month

(057) Preharvest treatment cost= INTEG (Preharvest teatment cost rate,0)
Units: Dollar

(058) "Preharvest treatment($/Ton)"=50 Units: Dollar/ton

(059) Preprocess cost for factory= "Preprocess(boiled) for factory"*"Preprocess cost for factory($/ton)" Units: Dollar

(060) "Preprocess cost for factory($/ton)"=12.12 Units: Dollar/ton

(061) "Preprocess(boiled) for factory"= INTEG (Preprocessing rate-Rejection rate 3-selling preprocessed rate 31,0) Units: tons

(062) Preprocessing rate=MIN(Good Appearance*Maximum assigned ratio for preprocessing*adjust yield ratio for preprocesssing/Time for preprocessing, Demand rate for processing unit) Units: tons/months

(063) Price=reference price*Effect of time on price Units: Dollar/ton

(064) Price 21=Price*Price ratio 21 Units: Dollar/ton

(065) Price 31=reference price*Price ratio 31 Units: Dollar/ton

(066) price ratio 12=0.5 Units: Dmnl

(067) Price ratio 21=1.2 Units: Dmnl

(068) Price ratio 31=1.1 Units: Dmnl

(069) Probability of poor appearance=IF THEN ELSE(Time>=0:AND:Time<=2 , Probability of poor apperience D1 , IF THEN ELSE(Time>2:AND:Time<=4 , Probability of poor apperience D2, IF THEN ELSE(Time>4:AND:Time<=6 , Probability of poor apperience D3 , IF THEN ELSE(Time>6:AND:Time<=9 , Probability of poor apperience D4 , 0))))
Units: Dmnl

(070) Probability of poor apperience D1=RANDOM NORMAL(0.2, 0.4, 0.3, 0.05, 0)
Units: Dmnl

(071) Probability of poor apperience D2=RANDOM NORMAL(0.02,0.3,0.15,0.04,0)
Units: Dmnl

(072) Probability of poor apperience D3=RANDOM NORMAL(0.01, 0.2, 0.1, 0.01,0)
Units: Dmnl

(073) Probability of poor apperience D4=RANDOM NORMAL(0.02,0.2,0.12,0.05,0)
Units: Dmnl

(074) Probability of rejection 2=RANDOM UNIFORM(0.2, 0.4, 0.3)
Units: Dmnl

(075) Probability of rejection 3=RANDOM UNIFORM(0.1 , 0.3, 0.2)
Units: Dmnl

(076) Probability of yied loss D4=RANDOM UNIFORM(0.1 , 0.4 , 0.3)
Units: Dmnl

(077) Probability of yield lass at Havesting stage=IF THEN ELSE(Time>=0:AND:Time<=2 , Probability of yield loss D1 , IF THEN ELSE(Time>2:AND:Time<=4 , Probability of yield loss D2, IF THEN ELSE(Time>4:AND:Time<=6 , Probability yield loss D3 , IF THEN ELSE(Time>6:AND:Time<=9 , Probability of yied loss D4 , 0))))
Units: Dmnl

(078) Probability of yield loss D1=RANDOM UNIFORM(0.1 , 0.4 , 0.2)
Units: Dmnl

(079) Probability of yield loss D2=RANDOM UNIFORM(0.1 , 0.4 , 0.3)
Units: Dmnl

(080) Probability yield loss D3=RANDOM UNIFORM(0.05 , 0.2 , 0.15)
Units: Dmnl

(081) Production Cost= INTEG (Production cost rate,0) Units: Dollar
(082) Production cost rate=(Agriculture production fixed cost+Farming operation cost)/Production Period Units: Dollar/Month
(083) Production Period=9 Units: Month
(084) Productive Area=44 Units: accre
(085) Productivity per accre with risk=Yield per accre*(1-Probability of yield lass at Havesting stage) Units: tons/accre
(086) Profit from Old Bamboo Shoot=0 Units: Dollar
(087) reference price=303.03 Units: Dollar/ton
(088) reference time on price=5 Units: Month
(089) Reference time on yield=5 Units: Month
(090) Reference yield=1.389 Units: tons/accre
(091) Rejected minimal processed= INTEG (Rejection rate 2-Selling downgrade rate 22,0) Units: tons
(092) Rejected product for factory= INTEG (Rejection rate 3-S elling downgrad rate 32,0) Units: tons
(093) Rejection rate 2=(Minimal processed product for retailer* Probability of rejection 2)/Inspection time 2 Units: tons/Month
(094) Rejection rate 3=("Preprocess(boiled) for factory"* Probability of rejection 3)/Inspection time 3 Units: tons/Month
(095) Revenue 11=Good Appearance*Price Units: Dollar
(096) Revenue 12=down grad price 12*poor appearance harvested bamboo shoot Units: Dollar
(097) Revenue 21=Minimal processed product for retailer* Price 21 Units: Dollar
(098) Revenue 22=Down grad price 22* Rejected minimal processed Units: Dollar
(099) Revenue 31="Preprocess(boiled) for factory"*Price 31 Units: Dollar
(100) Revenue 32=Rejected product for factory* Down grad price 32 Units: Dollar
(101) Revenue rate=Total revenue/Time to sell Units: Dollar/Month
(102) SAVEPER = TIME STEP Units: Month [0,?]
The frequency with which output is stored.
(103) Selling downgrad rate 32=Rejected product for factory/Inspection time 3 Units: tons/Month
(104) Selling downgrade rate 22=Rejected minimal processed/ Inspection time 2 Units: tons/Month

(105) selling preprocessed rate 31="Preprocess(boiled) for factory"/
Inspection time 3 Units: tons/Month
(106) selling rate 1=Good Appearance/Time to sell Units: tons/Month
(107) Selling rate 21=Minimal processed product for retailer/Inspection time 2
Units: tons/months
(108) selling rate2=poor appearance harvested bamboo shoot/Time to sell
Units: tons/Month
(109) Shooting rate=Yield/Time to shooting stage Units: tons/Month

(110) Time for minimal process=0.067 Units: Month
(111) Time for post harvest treatment=MAX(0.067,Time to harvest)
Units: Month
(112) Time for preprocessing=0.067 Units: Month
(113) TIME STEP = 0.0078125 Units: Month [0,?]
The time step for the simulation.
(114) Time to harvest=RANDOM UNIFORM(0.067 , 0.133 , 0.11)
Units: Month
(115) Time to maturing stage=RANDOM UNIFORM(0.167 , 0.333 , 0.233)
Units: Month
(116) Time to sell=MAX(Ordering lead time , Time to harvest) Units: Month
(117) Time to shooting stage=1 Units: Month
(118) Total revenue=Revenue 11+Revenue 12+Revenue 21+Revenue 22+Revenue 31+Revenue 32 Units: Dollar
(119) Total Supply Cost=Production Cost+Preharvest treatment cost+Postharvest treatment cost Units: Dollar

(120) Yield =Productive Area*Productivity per accre with risk Units: tons
(121) Yield per accre=Effect of time on Yield at Harvestign Stage*Reference yield
Units: tons/accre
(122) Young Bamboo shoot= INTEG (Shooting rate-Maturing rate,1)
Units: tons

APPENDIX 4

FUZZY RULES FOR FUZZY INFERENCE SYSTEM (RISK PREDICTION SYSTEM)

Table A4.1 Fuzzy Rules for predicting risk magnitude

1	If (irrigation is Low) and (fertilizer is Low) and (clumpage is Young) then (prob1d1 is very_high) (1)
2	If (irrigation is Low) and (fertilizer is Low) and (clumpage is Mature) then (prob1d1 is very_high) (1)
3	If (irrigation is Low) and (fertilizer is Low) and (clumpage is Old) then (prob1d1 is very_high) (1)
4	If (irrigation is Low) and (fertilizer is Average) and (clumpage is Young) then (prob1d1 is high) (1)
5	If (irrigation is Low) and (fertilizer is Average) and (clumpage is Mature) then (prob1d1 is high) (1)
6	If (irrigation is Low) and (fertilizer is Average) and (clumpage is Old) then (prob1d1 is high) (1)
7	If (irrigation is Low) and (fertilizer is high) and (clumpage is Young) then (prob1d1 is high) (1)
8	If (irrigation is Low) and (fertilizer is high) and (clumpage is Mature) then (prob1d1 is high) (1)
9	If (irrigation is Low) and (fertilizer is high) and (clumpage is Old) then (prob1d1 is high) (1)
10	If (irrigation is High) and (fertilizer is Low) and (clumpage is Young) then (prob1d1 is high) (1)

Table A4.1 (Continued)

11	If (irrigation is High) and (fertilizer is Low) and (clumpage is Mature) then (prob1d1 is high) (1)
12	If (irrigation is High) and (fertilizer is Low) and (clumpage is Old) then (prob1d1 is high) (1)
13	If (irrigation is High) and (fertilizer is Average) and (clumpage is Young) then (prob1d1 is high) (1)
14	If (irrigation is High) and (fertilizer is Average) and (clumpage is Mature) then (prob1d1 is medium) (1)
15	If (irrigation is High) and (fertilizer is Average) and (clumpage is Old) then (prob1d1 is high) (1)
16	If (irrigation is High) and (fertilizer is high) and (clumpage is Young) then (prob1d1 is high) (1)
17	If (irrigation is High) and (fertilizer is high) and (clumpage is Mature) then (prob1d1 is low) (1)
18	If (irrigation is High) and (fertilizer is high) and (clumpage is Old) then (prob1d1 is high) (1)
19	If (irrigation is Low) and (fertilizer is Low) and (clumpage is Young) then (prob1d2 is very_high) (1)
20	If (irrigation is Low) and (fertilizer is Low) and (clumpage is Mature) then (prob1d2 is high) (1)
21	If (irrigation is Low) and (fertilizer is Low) and (clumpage is Old) then (prob1d2 is very_high) (1)
22	If (irrigation is Low) and (fertilizer is Average) and (clumpage is Young) then (prob1d2 is high) (1)
23	If (irrigation is Low) and (fertilizer is Average) and (clumpage is Mature) then (prob1d2 is medium) (1)
24	If (irrigation is Low) and (fertilizer is Average) and (clumpage is Old) then (prob1d2 is high) (1)

Table A4.1 (Continued)

25	If (irrigation is Low) and (fertilizer is high) and (clumpage is Young) then (prob1d2 is high) (1)
26	If (irrigation is Low) and (fertilizer is high) and (clumpage is Mature) then (prob1d2 is medium) (1)
27	If (irrigation is Low) and (fertilizer is high) and (clumpage is Old) then (prob1d2 is high) (1)
28	If (irrigation is High) and (fertilizer is Low) and (clumpage is Young) then (prob1d2 is high) (1)
29	If (irrigation is High) and (fertilizer is Low) and (clumpage is Mature) then (prob1d2 is medium) (1)
30	If (irrigation is High) and (fertilizer is Low) and (clumpage is Old) then (prob1d2 is high) (1)
31	If (irrigation is High) and (fertilizer is Average) and (clumpage is Young) then (prob1d2 is medium) (1)
32	If (irrigation is High) and (fertilizer is Average) and (clumpage is Mature) then (prob1d2 is low (1)
33	If (irrigation is High) and (fertilizer is Average) and (clumpage is Old) then (prob1d2 is high) (1)
34	If (irrigation is High) and (fertilizer is high) and (clumpage is Young) then (prob1d2 is low) (1)
35	If (irrigation is High) and (fertilizer is high) and (clumpage is Mature) then (prob2d1 is very_low) (1)
36	If (irrigation is High) and (fertilizer is high) and (clumpage is Old) then (prob1d2 is medium) (1)
37	If (fertilizer is Low) and (clumpage is Young) then (prob1d3 is high) (1)
38	If (fertilizer is Low) and (clumpage is Mature) then (prob1d3 is medium) (1)
39	If (fertilizer is Low) and (clumpage is Old) then (prob1d3 is high) (1)
40	If (fertilizer is Average) and (clumpage is Young) then (prob1d3 is medium) (1)

Table A4.1 (Continued)

41	If fertilizer is Average) and (clumpage is Mature) then (prob1d3 is low) (1)
42	If (fertilizer is Average) and (clumpage is Old) then (prob1d3 is medium) (1)
43	If (fertilizer is high) and (clumpage is Young) then (prob1d3 is low) (1)
44	If (fertilizer is high) and (clumpage is Mature) then (prob1d3 is very_low) (1)
45	If (fertilizer is high) and (clumpage is Old) then (prob1d3 is low) (1)
46	If (irrigation is Low) and (fertilizer is Low) and (clumpage is Young) then (prob1d4 is very_high) (1)
47	If (irrigation is Low) and (fertilizer is Low) and (clumpage is Mature) then (prob1d4 is high) (1)
48	If (irrigation is Low) and (fertilizer is Low) and (clumpage is Old) then (prob1d4 is very_high) (1)
49	If (irrigation is Low) and (fertilizer is Average) and (clumpage is Young) then (prob1d4 is medium) (1)
50	If (irrigation is Low) and (fertilizer is Average) and (clumpage is Mature) then (prob1d4 is medium) (1)
51	If (irrigation is Low) and (fertilizer is Average) and (clumpage is Old) then (prob1d4 is medium) (1)
52	If (irrigation is Low) and (fertilizer is high) and (clumpage is Young) then (prob1d4 is low) (1)
53	If (irrigation is Low) and (fertilizer is high) and (clumpage is Mature) then (prob1d4 is low) (1)
54	If (irrigation is Low) and (fertilizer is high) and (clumpage is Old) then (prob1d4 is low) (1)
55	If (irrigation is High) and (fertilizer is Low) and (clumpage is Young) then (prob1d4 is high) (1)
56	If (irrigation is High) and (fertilizer is Low) and (clumpage is Mature) then (prob1d4 is medium) (1)

Table A4.1 (Continued)

57	If (irrigation is High) and (fertilizer is Low) and (clumpage is Old) then (prob1d4 is high) (1)
58	If (irrigation is High) and (fertilizer is Average) and (clumpage is Young) then (prob1d4 is low) (1)
59	If (irrigation is High) and (fertilizer is Average) and (clumpage is Mature) then (prob1d4 is low) (1)
60	If (irrigation is High) and (fertilizer is Average) and (clumpage is Old) then (prob1d4 is low) (1)
61	If (irrigation is High) and (fertilizer is high) and (clumpage is Young) then (prob1d4 is very_low) (1)
62	If (irrigation is High) and (fertilizer is high) and (clumpage is Mature) then (prob1d4 is very_low) (1)
63	If (irrigation is High) and (fertilizer is high) and (clumpage is Old) then (prob1d4 is very_low) (1)
64	If (fertilizer is Low) and (preharvest is ordinary) then (prob2 is very_high) (1)
65	If (fertilizer is Low) and (preharvest is premium) then (prob2 is high) (1)
66	If (fertilizer is Average) and (preharvest is ordinary) then (prob2 is medium) (1)
67	If (fertilizer is Average) and (preharvest is premium) then (prob2 is high) (1)
68	If (fertilizer is high) and (preharvest is ordinary) then (prob2 is medium) (1)
69	If (fertilizer is high) and (preharvest is premium) then (prob2 is very_low) (1)

APPENDIX 5

DESIGN OF EXPERIMENT: INPUT AND OUTPUT

Table A5.1 Input Factors, Output, and Notation for Fuzzy Inference System (Risk Prediction System)

Factor	Level	Notation
Elementary Input factors (fuzzy number)	(1) Irrigation Capital Investment Level	Irrigation
	(2) Fertilizer Capital Investment Level	Fertilizer
	(3) Clump Age	Clumpage
	(4) Pre-harvest treatment Capital Investment Level	Preharvest
Output (Crisp Value)	(1) Risk Magnitude : Probability of Yield Loss for Season 1	Prob1d1
	(2) Risk Magnitude : Probability of Yield Loss for Season 2	Prob1d2
	(3) Risk Magnitude : Probability of Yield Loss for Season 3	Prob1d3
	(4) Risk Magnitude : Probability of Yield Loss for Season 4	Prob1d4
	(5) Risk Magnitude: Probability of Poor Appearances	Prob2

Table A5.2 Experimental results for Policy I Block I (Clump Age: Young)

Input Factor for FIS				Output from FIS	Output (SD Model)	
I	F	Ag	Pr	Prob1d1 Prob1d2 Prob1d3 Prob1d3 Prob2	Cost	Profit
4	152	1	50	0.9248 0.9248 0.7500 0.9248 0.9248	10485.00	62826.20
4	152	1	100	0.9248 0.9248 0.7500 0.9248 0.7500	13477.50	61002.54
4	152	3.5	50	0.9199 0.7500 0.5000 0.7500 0.9248	10914.50	69574.50
4	152	3.5	100	0.9199 0.7500 0.5000 0.7500 0.7500	14257.50	67511.20
4	400	1	50	0.7500 0.7500 0.5000 0.5000 0.5000	21937.60	63761.60
4	400	1	100	0.7500 0.7500 0.5000 0.5000 0.2500	25335.10	62730.00
4	400	3.5	50	0.7500 0.5000 0.2500 0.5000 0.5000	22449.20	72231.80
4	400	3.5	100	0.7500 0.5000 0.2500 0.5000 0.2500	26258.80	71023.50
30	152	1	50	0.7500 0.7500 0.7500 0.7500 0.9248	11831.30	67369.20
30	152	1	100	0.7500 0.7500 0.7500 0.7500 0.7500	14993.60	65472.30
30	152	3.5	50	0.7500 0.5000 0.5000 0.5000 0.9248	12333.60	75913.10
30	152	3.5	100	0.7500 0.5000 0.5000 0.5000 0.7500	15909.50	73743.00
30	400	1	50	0.7500 0.5000 0.5000 0.2500 0.5000	23397.20	69588.50
30	400	1	100	0.7500 0.5000 0.5000 0.2500 0.2500	27054.80	68495.00
30	400	3.5	50	0.5000 0.2500 0.2500 0.2500 0.5000	23886.80	79573.20
30	400	3.5	100	0.5000 0.2500 0.2500 0.2500 0.2500	27942.20	78366.80

I: Irrigation, F: Fertilizer, A; Clump Age, Pr: Pre-harvest Treatment

Table A5.3 Experimental results for Policy I Block II (Clump Age: Mature)

Input Factor for FIS				Output from FIS	Output (SD Model)	
I	F	Ag	Pr	Prob1d1 Prob1d2 Prob1d3 Prob1d3 Prob2	Cost	Profit
4	152	2	50	0.9167 0.9167 0.7500 0.9167 0.9248	10495.20	63088.90
4	152	2	100	0.9167 0.9167 0.7500 0.9167 0.7500	13494.10	61263.70
4	152	4	50	0.9248 0.7500 0.5000 0.7500 0.9248	10913.70	69534.70
4	152	4	100	0.9248 0.7500 0.5000 0.7500 0.7500	14256.00	67471.30
4	152	6	50	0.9107 0.9107 0.7500 0.9107 0.9248	10502.10	63284.20
4	152	6	100	0.9107 0.9107 0.7500 0.9107 0.7500	13507.50	61455.80
4	400	2	50	0.7500 0.7500 0.5000 0.5000 0.5000	22000.70	64377.40
4	400	2	100	0.7500 0.7500 0.5000 0.5000 0.2500	25448.20	63313.20
4	400	4	50	0.7500 0.5000 0.2500 0.5000 0.5000	22449.22	72231.78
4	400	4	100	0.7500 0.5000 0.2500 0.5000 0.2500	26258.80	71023.50
4	400	6	50	0.7500 0.7500 0.5000 0.5000 0.5000	22000.70	64377.40
4	400	6	100	0.7500 0.7500 0.5000 0.5000 0.2500	25448.20	63313.20
30	152	2	50	0.7500 0.7500 0.7500 0.7500 0.9248	11831.30	67369.20
30	152	2	100	0.7500 0.7500 0.7500 0.7500 0.7500	14993.60	65472.30
30	152	4	50	0.7500 0.5000 0.5000 0.5000 0.9248	12333.60	75913.10
30	152	4	100	0.7500 0.5000 0.5000 0.5000 0.7500	15909.50	73743.00
30	152	6	50	0.7500 0.7500 0.7500 0.7500 0.9248	11831.30	67369.20
30	152	6	100	0.7500 0.7500 0.7500 0.7500 0.7500	14993.60	65472.30
30	400	2	50	0.7500 0.5000 0.5000 0.2500 0.5000	23397.20	69588.50
30	400	2	100	0.7500 0.5000 0.5000 0.2500 0.2500	27054.80	68495.00
30	400	4	50	0.5000 0.2500 0.2500 0.2500 0.5000	23886.80	79573.20
30	400	4	100	0.5000 0.2500 0.2500 0.2500 0.2500	27942.20	78366.80
30	400	6	50	0.7500 0.7500 0.5000 0.2500 0.5000	23209.10	64264.60
30	400	6	100	0.7500 0.7500 0.5000 0.2500 0.2500	26711.20	63189.80

I: Irrigation, F: Fertilizer, A; Clump Age, Pr: Pre-harvest Treatment

Table A5.4 Experimental results for Policy I Block III (Clump Age: Old)

Input Factor for FIS				Output from FIS	Output (SD Model)	
I	F	Ag	Pr	Prob1d1 Prob1d2 Prob1d3 Prob1d3 Prob2	Cost	Profit
4	152	5	50	0.9144 0.7500 0.5000 0.7500 0.9248	10915.30	69618.80
4	152	5	100	0.9144 0.7500 0.5000 0.7500 0.7500	14259.20	67555.90
4	152	8	50	0.9248 0.9248 0.7500 0.9248 0.9248	10485.80	62825.40
4	152	8	100	0.9248 0.9248 0.7500 0.9248 0.7500	13477.50	61002.90
4	400	5	50	0.7500 0.5000 0.2500 0.5000 0.5000	22449.20	72231.80
4	400	5	100	0.7500 0.5000 0.2500 0.5000 0.2500	26258.80	71023.50
4	400	8	50	0.7500 0.7500 0.5000 0.5000 0.5000	22000.70	64737.40
4	400	8	100	0.7500 0.7500 0.5000 0.5000 0.2500	25448.20	63313.20
30	152	5	50	0.7500 0.5000 0.5000 0.5000 0.9248	12333.60	75913.10
30	152	5	100	0.7500 0.5000 0.5000 0.5000 0.7500	15909.50	73743.00
30	152	8	50	0.7500 0.7500 0.7500 0.7500 0.9248	11831.30	67369.20
30	152	8	100	0.7500 0.7500 0.7500 0.7500 0.7500	14993.60	65472.30
30	400	5	50	0.5000 0.2500 0.2500 0.2500 0.5000	11908.00	70563.10
30	400	5	100	0.5000 0.2500 0.2500 0.2500 0.2500	15094.30	69655.30
30	400	8	50	0.7500 0.7500 0.5000 0.2500 0.5000	12296.80	75186.90
30	400	8	100	0.7500 0.7500 0.5000 0.2500 0.2500	15798.90	74102.10

I: Irrigation, F: Fertilizer, A; Clump Age, Pr: Pre-harvest Treatment

Table A5.5 Experimental results for Policy II Block I (Clump Age: Young)

Input Factor for FIS				Output from FIS	Output (SD Model)	
I	F	Ag	Pr	Prob1d1 Prob1d2 Prob1d3 Prob1d3 Prob2	Cost	Profit
15	500	1	70	0.7500 0.7500 0.5000 0.5000 0.5000	28240.20	58137.90
15	500	1	114	0.7500 0.7500 0.5000 0.5000 0.2500	31281.00	57480.40
15	500	3.5	70	0.7500 0.5000 0.2500 0.5000 0.5000	28830.90	65850.10
15	500	3.5	114	0.7500 0.5000 0.2500 0.5000 0.2500	32191.10	65091.20
15	758	1	70	0.7500 0.7500 0.2500 0.2500 0.5000	40019.10	50265.50
15	758	1	114	0.7500 0.7500 0.2500 0.2500 0.0752	43339.90	51384.80
15	758	3.5	70	0.7500 0.5000 0.0801 0.2500 0.5000	40500.40	57189.60
15	758	3.5	114	0.7500 0.5000 0.0801 0.2500 0.0752	44086.30	58391.70
40	500	1	70	0.7500 0.5000 0.5000 0.2500 0.5000	29675.40	63310.30
40	500	1	114	0.7500 0.5000 0.5000 0.2500 0.2500	32901.50	62648.30
40	500	3.5	70	0.5000 0.2500 0.2500 0.2500 0.5000	30321.40	73138.60
40	500	3.5	114	0.5000 0.2500 0.2500 0.2500 0.2500	33898.40	72410.60
40	758	1	70	0.7500 0.2500 0.2500 0.0752 0.5000	41677.90	60384.10
40	758	1	114	0.7500 0.2500 0.2500 0.0752 0.0752	45310.90	61757.10
40	758	3.5	70	0.2500 0.0801 0.0801 0.0801 0.5000	42188.30	69836.70
40	758	3.5	114	0.2500 0.0801 0.0801 0.0801 0.0752	46104.00	71432.30

I: Irrigation, F: Fertilizer, A; Clump Age, Pr: Pre-harvest Treatment

Table A5.6 Experimental results for Policy II Block II (Clump Age: Mature)

Input Factor for FIS				Output from FIS					Output (SD Model)	
I	F	Ag	Pr	Prob1d1	Prob1d2	Prob1d3	Prob1d3	Prob2	Cost	Profit
15	500	2	70	0.7500	0.7500	0.5000	0.5000	0.5000	28830.90	65850.10
15	500	2	114	0.7500	0.7500	0.5000	0.5000	0.2500	32191.10	65091.20
15	500	4	70	0.7500	0.5000	0.2500	0.5000	0.5000	28240.20	58137.90
15	500	4	114	0.7500	0.5000	0.2500	0.5000	0.2500	31281.00	57480.40
15	500	6	70	0.7500	0.7500	0.5000	0.5000	0.5000	40019.10	50265.50
15	500	6	114	0.7500	0.7500	0.5000	0.5000	0.2500	43339.90	51384.80
15	758	2	70	0.7500	0.7500	0.2500	0.2500	0.5000	40507.10	57237.80
15	758	2	114	0.7500	0.7500	0.2500	0.2500	0.0752	44096.60	58439.40
15	758	4	70	0.7500	0.5000	0.0752	0.2500	0.5000	40019.10	50265.50
15	758	4	114	0.7500	0.5000	0.0752	0.2500	0.0752	43339.90	51384.80
15	758	6	70	0.7500	0.7500	0.2500	0.2500	0.5000	29675.40	63310.30
15	758	6	114	0.7500	0.7500	0.2500	0.2500	0.0752	32901.50	62648.30
40	500	2	70	0.7500	0.5000	0.5000	0.2500	0.5000	30321.40	73138.60
40	500	2	114	0.7500	0.5000	0.5000	0.2500	0.2500	33898.40	72410.60
40	500	4	70	0.5000	0.2500	0.2500	0.2500	0.5000	29426.20	58057.50
40	500	4	114	0.5000	0.2500	0.2500	0.2500	0.2500	32515.10	57385.90
40	500	6	70	0.7500	0.7500	0.5000	0.2500	0.5000	41675.10	60350.90
40	500	6	114	0.7500	0.7500	0.5000	0.2500	0.2500	45306.60	61723.40
40	758	2	70	0.7500	0.2500	0.2500	0.0833	0.5000	42201.50	70008.50
40	758	2	114	0.7500	0.2500	0.2500	0.0833	0.0752	46124.50	71604.50
40	758	4	70	0.2500	0.0752	0.0752	0.0752	0.5000	41423.80	55073.50
40	758	4	114	0.2500	0.0752	0.0752	0.0752	0.0752	44915.00	56323.00
40	758	6	70	0.7500	0.5000	0.2500	0.0893	0.5000	28830.90	65850.10
40	758	6	114	0.7500	0.5000	0.2500	0.0893	0.0752	32191.10	65091.20

I: Irrigation, F: Fertilizer, A; Clump Age, Pr: Pre-harvest Treatment

Table A5.7 Experimental results for Policy II Block III (Clump Age: Old)

Input Factor for FIS				**Output from FIS**	**Output (SD Model)**	
I	F	Ag	Pr	Prob1d1 Prob1d2 Prob1d3 Prob1d3 Prob2	Cost	Profit
15	500	5	70	0.7500 0.5000 0.2500 0.5000 0.5000	28830.90	65850.10
15	500	5	114	0.7500 0.5000 0.2500 0.5000 0.2500	32191.10	65091.20
15	500	8	70	0.7500 0.7500 0.5000 0.5000 0.5000	28240.20	58137.90
15	500	8	114	0.7500 0.7500 0.5000 0.5000 0.2500	31281.00	57480.40
15	758	5	70	0.7500 0.5000 0.0856 0.2500 0.5000	40492.90	54135.40
15	758	5	114	0.7500 0.5000 0.0856 0.2500 0.0752	44074.70	58339.30
15	758	8	70	0.7500 0.7500 0.2500 0.2500 0.5000	40019.10	50265.50
15	758	8	114	0.7500 0.7500 0.2500 0.2500 0.0752	43339.90	51384.80
40	500	5	70	0.5000 0.2500 0.2500 0.2500 0.5000	30321.40	73138.60
40	500	5	114	0.5000 0.2500 0.2500 0.2500 0.2500	33898.40	72410.60
40	500	8	70	0.7500 0.7500 0.5000 0.2500 0.5000	29426.20	58057.50
40	500	8	114	0.7500 0.7500 0.5000 0.2500 0.2500	32515.10	57385.90
40	758	5	70	0.2500 0.0856 0.0856 0.0856 0.5000	42173.40	69644.60
40	758	5	114	0.2500 0.0856 0.0856 0.0856 0.0752	46080.90	71238.10
40	758	8	70	0.7500 0.5000 0.2500 0.0752 0.5000	41428.60	55131.00

Table A5.8 Experimental results for Policy III Block I (Clump Age: Young)

Input Factor for FIS				Output from FIS	Output (SD Model)	
I	F	Ag	Pr	Prob1d1 Prob1d2 Prob1d3 Prob1d3 Prob2	Cost	Profit
4	230	1	50	0.9185 0.9185 0.7500 0.9185 0.9185	13926.00	59638.10
4	230	1	100	0.9185 0.9185 0.7500 0.9185 0.7500	16922.80	57773.30
4	230	3.5	50	0.9185 0.7500 0.5000 0.7500 0.9185	14347.70	66197.20
4	230	3.5	100	0.9185 0.7500 0.5000 0.7500 0.7500	17689.90	64090.60
4	450	1	50	0.7500 0.7500 0.5000 0.5000 0.5000	24200.40	62177.70
4	450	1	100	0.7500 0.7500 0.5000 0.5000 0.2500	27648.00	61113.40
4	450	3.5	50	0.7500 0.5000 0.2500 0.5000 0.5000	24648.90	70032.10
4	450	3.5	100	0.7500 0.5000 0.2500 0.5000 0.2500	28458.50	68823.80
4	670	1	50	0.7500 0.7500 0.2500 0.2500 0.5000	34205.00	56079.60
4	670	1	100	0.7500 0.7500 0.2500 0.2500 0.0820	37691.20	56954.20
4	670	3.5	50	0.7500 0.5000 0.0820 0.2500 0.5000	34568.00	63100.70
4	670	3.5	100	0.7500 0.5000 0.0820 0.2500 0.0820	38622.40	63747.60
30	230	1	50	0.7500 0.7500 0.7500 0.7500 0.9185	15264.50	63979.70
30	230	1	100	0.7500 0.7500 0.7500 0.7500 0.7500	18425.80	62040.10
30	230	3.5	50	0.7500 0.5000 0.5000 0.5000 0.9185	15767.00	72528.40
30	230	3.5	100	0.7500 0.5000 0.5000 0.5000 0.7500	19341.70	70310.80
30	450	1	50	0.7500 0.5000 0.5000 0.2500 0.5000	25597.00	67388.70
30	450	1	100	0.7500 0.5000 0.5000 0.2500 0.2500	29254.70	66295.10
30	450	3.5	50	0.5000 0.2500 0.2500 0.2500 0.5000	26068.70	77491.30
30	450	3.5	100	0.5000 0.2500 0.2500 0.2500 0.2500	30142.10	76166.90
30	670	1	50	0.7500 0.2500 0.2500 0.0833 0.5000	35768.40	66257.60
30	670	1	100	0.7500 0.2500 0.2500 0.0833 0.0820	39876.20	67063.80
30	670	3.5	50	0.2500 0.0833 0.0820 0.0833 0.5000	36151.30	75768.70
30	670	3.5	100	0.2500 0.0833 0.0820 0.0833 0.0820	40576.40	76749.60

I: Irrigation, F: Fertilizer, A; Clump Age, Pr: Pre-harvest Treatment

Table A5.9 Experimental results for Policy III Block II (Clump Age: Mature)

Input Factor for FIS				Output from FIS	Output (SD Model)	
I	F	Ag	Pr	Prob1d1 Prob1d2 Prob1d3 Prob1d3 Prob2	Cost	Profit
4	230	2	50	0.9167 0.9167 0.7500 0.9167 0.9185	13928.10	59696.70
4	230	2	100	0.9167 0.9167 0.7500 0.9167 0.7500	16926.70	57831.10
4	230	4	50	0.9185 0.7500 0.5000 0.7500 0.9185	14347.70	66197.20
4	230	4	100	0.9185 0.7500 0.5000 0.7500 0.7500	17689.90	64090.60
4	230	6	50	0.9107 0.9107 0.7500 0.9107 0.9185	13935.00	59892.10
4	230	6	100	0.9107 0.9107 0.7500 0.9107 0.7500	16939.50	58023.80
4	450	2	50	0.7500 0.7500 0.5000 0.5000 0.5000	24200.40	62177.70
4	450	2	100	0.7500 0.7500 0.5000 0.5000 0.2500	27648.00	61113.40
4	450	4	50	0.7500 0.5000 0.2500 0.5000 0.5000	24648.90	70032.10
4	450	4	100	0.7500 0.5000 0.2500 0.5000 0.2500	28458.50	68823.80
4	450	6	50	0.7500 0.7500 0.5000 0.5000 0.5000	24200.40	62177.70
4	450	6	100	0.7500 0.7500 0.5000 0.5000 0.2500	27648.00	61113.40
4	670	2	50	0.7500 0.7500 0.2500 0.2500 0.5000	34205.00	56079.60
4	670	2	100	0.7500 0.7500 0.2500 0.2500 0.0820	37961.20	56684.20
4	670	4	50	0.7500 0.5000 0.0820 0.2500 0.5000	34568.00	63100.70
4	670	4	100	0.7500 0.5000 0.0820 0.2500 0.0820	38622.40	63747.60
4	670	6	50	0.7500 0.7500 0.2500 0.2500 0.5000	34205.00	56079.60
4	670	6	100	0.7500 0.7500 0.2500 0.2500 0.0820	37961.20	56684.20
30	230	2	50	0.7500 0.7500 0.7500 0.7500 0.9185	15264.50	63979.70
30	230	2	100	0.7500 0.7500 0.7500 0.7500 0.7500	18425.80	62040.10
30	230	4	50	0.7500 0.5000 0.5000 0.5000 0.9185	15767.00	72528.40
30	230	4	100	0.7500 0.5000 0.5000 0.5000 0.7500	19341.70	70310.80
30	230	6	50	0.7500 0.7500 0.7500 0.7500 0.9185	15264.50	63979.70
30	230	6	100	0.7500 0.7500 0.7500 0.7500 0.7500	18425.80	62040.10

I: Irrigation, F: Fertilizer, A; Clump Age, Pr: Pre-harvest Treatment

Table A5.10 Experimental results for Policy III Block III (Clump Age: Old)

Input Factor for FIS				Output from FIS	Output (SD Model)	
I	F	Ag	Pr	Prob1d1 Prob1d2 Prob1d3 Prob1d3 Prob2	Cost	Profit
4	230	5	50	0.9144 0.7500 0.5000 0.7500 0.9185	14348.40	66230.60
4	230	5	100	0.9144 0.7500 0.5000 0.7500 0.7500	17691.10	64124.00
4	230	8	50	0.9185 0.9185 0.7500 0.9185 0.9185	13926.00	59638.10
4	230	8	100	0.9185 0.9185 0.7500 0.9185 0.7500	16922.80	57773.30
4	450	5	50	0.7500 0.5000 0.2500 0.5000 0.5000	24648.90	70032.10
4	450	5	100	0.7500 0.5000 0.2500 0.5000 0.2500	28458.50	68823.80
4	450	8	50	0.7500 0.7500 0.5000 0.5000 0.5000	24200.40	62177.70
4	450	8	100	0.7500 0.7500 0.5000 0.5000 0.2500	27648.00	61113.40
4	670	5	50	0.7500 0.5000 0.0856 0.2500 0.5000	34564.20	63064.10
4	670	5	100	0.7500 0.5000 0.0856 0.2500 0.0820	38615.60	63712.40
4	670	8	50	0.7500 0.7500 0.2500 0.2500 0.5000	34205.00	56079.60
4	670	8	100	0.7500 0.7500 0.2500 0.2500 0.0820	37961.20	56684.20
30	230	5	50	0.7500 0.5000 0.5000 0.5000 0.9185	15767.00	72528.40
30	230	5	100	0.7500 0.5000 0.5000 0.5000 0.7500	19341.70	70310.80
30	230	8	50	0.7500 0.7500 0.7500 0.7500 0.9185	15264.50	63979.70
30	230	8	100	0.7500 0.7500 0.7500 0.7500 0.7500	18425.80	62040.10
30	450	5	50	0.5000 0.2500 0.2500 0.2500 0.5000	26086.70	77373.30
30	450	5	100	0.5000 0.2500 0.2500 0.2500 0.2500	30142.10	76166.90
30	450	8	50	0.7500 0.7500 0.5000 0.2500 0.5000	25409.00	62074.70
30	450	8	100	0.7500 0.7500 0.5000 0.2500 0.2500	28911.10	60989.90
30	670	5	50	0.2500 0.0856 0.0856 0.0856 0.5000	36145.20	75672.80
30	670	5	100	0.2500 0.0856 0.0856 0.0856 0.0820	40565.40	76654.60
30	670	8	50	0.7500 0.5000 0.2500 0.0833 0.5000	35580.40	60943.40

Table A5.11 Experimental results for Policy IV Block I (Clump Age: Young)

Input Factor for FIS				Output from FIS					Output (SD Model)	
I	F	Ag	Pr	Prob1d1	Prob1d2	Prob1d3	Prob1d3	Prob2	Cost	Profit
15	230	1	70	0.9162	0.9162	0.7500	0.9162	0.9167	15601.50	58051.80
15	230	1	114	0.9162	0.9162	0.7500	0.9162	0.7500	18243.70	56531.20
15	230	3.5	70	0.9162	0.7500	0.5000	0.7500	0.9167	16157.00	64419.80
15	230	3.5	114	0.9162	0.7500	0.5000	0.7500	0.7500	19101.80	62698.20
15	450	1	70	0.7500	0.7500	0.5000	0.5000	0.5000	26040.30	60337.80
15	450	1	114	0.7500	0.7500	0.5000	0.5000	0.2500	29081.20	59680.20
15	450	3.5	70	0.7500	0.5000	0.2500	0.5000	0.5000	26631.00	68050.00
15	450	3.5	114	0.7500	0.5000	0.2500	0.5000	0.2500	29991.30	67291.00
15	670	1	70	0.7500	0.7500	0.2500	0.2500	0.5000	36148.00	54136.60
15	670	1	114	0.7500	0.7500	0.2500	0.2500	0.0820	39466.70	55178.70
15	670	3.5	70	0.7500	0.5000	0.0820	0.2500	0.5000	36626.70	61042.00
15	670	3.5	114	0.7500	0.5000	0.0820	0.2500	0.0820	40208.90	62161.10
40	230	1	70	0.7500	0.7500	0.7500	0.7500	0.9167	16957.80	62299.10
40	230	1	114	0.7500	0.7500	0.7500	0.7500	0.7500	19742.90	60723.00
40	230	3.5	70	0.7500	0.5000	0.5000	0.5000	0.9167	17624.10	70685.20
40	230	3.5	114	0.7500	0.5000	0.5000	0.5000	0.7500	20773.40	68879.10
40	450	1	70	0.7500	0.5000	0.5000	0.2500	0.5000	27475.10	65510.60
40	450	1	114	0.7500	0.5000	0.5000	0.2500	0.2500	30701.20	64848.60
40	450	3.5	70	0.5000	0.2500	0.2500	0.2500	0.5000	28121.10	75338.90
40	450	3.5	114	0.5000	0.2500	0.2500	0.2500	0.2500	31698.10	74610.90
40	670	1	70	0.7500	0.2500	0.2500	0.0820	0.5000	37803.00	64229.00
40	670	1	114	0.7500	0.2500	0.2500	0.0820	0.0820	41432.80	65514.20
40	670	3.5	70	0.2500	0.0820	0.0820	0.0820	0.5000	38310.90	73643.10
40	670	3.5	114	0.2500	0.0820	0.0820	0.0820	0.0820	42221.40	75140.60

I: Irrigation, F: Fertilizer, A; Clump Age, Pr: Pre-harvest Treatment

Table A5.12 Experimental results for Policy IV Block II

(Clump Age: Mature)

Input Factor for FIS				Output from FIS	Output (SD Model)	
I	F	Ag	Pr	Prob1d1 Prob1d2 Prob1d3 Prob1d3 Prob2	Cost	Profit
15	230	2	70	0.9162 0.9162 0.7500 0.9162 0.9167	15601.50	58051.80
15	230	2	114	0.9162 0.9162 0.7500 0.9162 0.7500	18194.40	56543.40
15	230	4	70	0.9162 0.7500 0.5000 0.7500 0.9167	16157.00	64419.80
15	230	4	114	0.9162 0.7500 0.5000 0.7500 0.7500	19101.80	62698.20
15	230	6	70	0.9107 0.9107 0.7500 0.9107 0.9167	15610.00	58228.80
15	230	6	114	0.9107 0.9107 0.7500 0.9107 0.7500	18256.90	56706.40
15	450	2	70	0.7500 0.7500 0.5000 0.5000 0.5000	26040.30	60337.80
15	450	2	114	0.7500 0.7500 0.5000 0.5000 0.2500	29081.20	59680.20
15	450	4	70	0.7500 0.5000 0.2500 0.5000 0.5000	26631.00	68050.00
15	450	4	114	0.7500 0.5000 0.2500 0.5000 0.2500	29991.30	67291.00
15	450	6	70	0.7500 0.7500 0.5000 0.5000 0.5000	26040.30	60337.80
15	450	6	114	0.7500 0.7500 0.5000 0.5000 0.2500	29081.20	59680.20
15	670	2	70	0.7500 0.7500 0.2500 0.2500 0.5000	36148.00	54136.60
15	670	2	114	0.7500 0.7500 0.2500 0.2500 0.0820	39466.70	55178.70
15	670	4	70	0.7500 0.5000 0.0820 0.2500 0.5000	36626.70	61042.00
15	670	4	114	0.7500 0.5000 0.0820 0.2500 0.0820	40208.90	62161.10
15	670	6	70	0.7500 0.7500 0.2500 0.2500 0.5000	36148.00	54136.60
15	670	6	114	0.7500 0.7500 0.2500 0.2500 0.0820	39466.70	55178.70
40	230	2	70	0.7500 0.7500 0.7500 0.7500 0.9167	16957.80	62299.10
40	230	2	114	0.7500 0.7500 0.7500 0.7500 0.7500	19742.90	60723.00
40	230	4	70	0.7500 0.5000 0.5000 0.5000 0.9167	17624.10	70685.20
40	230	4	114	0.7500 0.5000 0.5000 0.5000 0.7500	20773.40	68879.10
40	230	6	70	0.7500 0.7500 0.7500 0.7500 0.9167	16957.80	62299.10
40	230	6	114	0.7500 0.7500 0.7500 0.7500 0.7500	19742.90	60723.00

I: Irrigation, F: Fertilizer, A; Clump Age, Pr: Pre-harvest Treatment

Table A5.13 Experimental results for Policy IV Block III (Clump Age: Old)

Input Factor for FIS				Output from FIS	Output (SD Model)	
I	**F**	**Ag**	**Pr**	Prob1d1 Prob1d2 Prob1d3 Prob1d3 Prob2	Cost	Profit
15	230	5	70	0.9144 0.7500 0.5000 0.7500 0.9167	16157.40	64434.30
15	230	5	114	0.9144 0.7500 0.5000 0.7500 0.7500	19102.40	62712.70
15	230	8	70	0.9162 0.9162 0.7500 0.9162 0.9167	15601.50	58051.80
15	230	8	114	0.9162 0.9162 0.7500 0.9162 0.7500	18243.70	56531.20
15	450	5	70	0.7500 0.5000 0.2500 0.5000 0.5000	26631.00	68050.00
15	450	5	114	0.7500 0.5000 0.2500 0.5000 0.2500	29991.30	67291.00
15	450	8	70	0.7500 0.7500 0.5000 0.5000 0.5000	26040.30	60337.80
15	450	8	114	0.7500 0.7500 0.5000 0.5000 0.2500	29081.20	59680.20
15	670	5	70	0.7500 0.5000 0.0856 0.2500 0.5000	36621.80	61006.50
15	670	5	114	0.7500 0.5000 0.0856 0.2500 0.0820	40202.40	62125.60
15	670	8	70	0.7500 0.7500 0.2500 0.2500 0.5000	36148.00	54136.60
15	670	8	114	0.7500 0.7500 0.2500 0.2500 0.0820	39466.70	55178.70
40	230	5	70	0.7500 0.5000 0.5000 0.5000 0.9167	17624.10	70685.20
40	230	5	114	0.7500 0.5000 0.5000 0.5000 0.7500	20773.40	68879.10
40	230	8	70	0.7500 0.7500 0.7500 0.7500 0.9167	16957.80	62299.10
40	230	8	114	0.7500 0.7500 0.7500 0.7500 0.7500	19742.90	60723.00
40	450	5	70	0.5000 0.2500 0.2500 0.2500 0.5000	28121.10	75338.90
40	450	5	114	0.5000 0.2500 0.2500 0.2500 0.2500	31698.10	74610.90
40	450	8	70	0.7500 0.7500 0.5000 0.2500 0.5000	27225.90	60257.80
40	450	8	114	0.7500 0.7500 0.5000 0.2500 0.2500	30314.80	59586.20
40	670	5	70	0.2500 0.0856 0.0856 0.0856 0.5000	38301.20	73516.80
40	670	5	114	0.2500 0.0856 0.0856 0.0856 0.0820	42206.30	75013.70
40	670	8	70	0.7500 0.5000 0.2500 0.0820 0.5000	37554.10	58975.40