

Cambodia Agriculture Sector

Diagnostic Report

Prepared for AusAID

by

Agrifood Consulting International

and

CamConsult

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AGRIFOOD CONSULTING INTERNATIONAL



Preface

A report prepared for AusAID by Agrifood Consulting International and CamConsult.

This report¹ is a Final Report for the Diagnostic Study, Phase 1 of Design, Agricultural Program, Cambodia, 2007-12.

The Diagnostic study was conducted between 13th of February and 27th March 2006 and consisted of a review of the existing literature, meetings with key informants representing a broad cross-section of the government, donor, NGO, farmer and private sector community, and field trips to the provinces of Kampong Speu, Svay Reing, Kampong Thom and Battambang. A Draft Report was submitted on April 12, 2006. Based on comments of a Peer Review, this Final Report has been prepared.

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The views expressed in this report are those of the consultants and do not necessarily reflect the views of AusAID or the Royal Government of Cambodia.

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Table of Contents

Preface.....	2
Table of Contents.....	3
List of Tables.....	12
List of Figures	20
List of Boxes.....	22
List of Maps.....	23
List of Abbreviations and Acronyms	25
1 Executive Summary.....	27
2 Introduction	33
2.1 Overall AusAID Cambodia Agricultural Program (ACAP).....	33
2.2 Objective of the Diagnostic Study	33
2.3 Outline of Report	33
3 Background to the Study	35
3.1 Features of Agricultural Sector in Cambodia	35
3.2 Characterization of Agro-ecological Zones and Dominant Farming Systems	36
3.3 Performance of Agricultural Sector	39
3.3.1 Productivity.....	39
3.3.2 Land Use	41
3.3.3 Annual Crop Production.....	44
3.4 Policy Context.....	47
3.5 Past and Ongoing Projects and Programs.....	50
3.5.1 Adventist Development and Relief Agency (ADRA)	51
3.5.2 AGRISUD Siem Reap and Banteay Meanchey.....	51
3.5.3 Agricultural Productivity Improvement Project (APIP)	52
3.5.4 Agricultural Quality Improvement Project (AQIP)	52
3.5.5 Agricultural Sector Development Project	53
3.5.6 Cambodia-Australia Agricultural Extension Project (CAAEP)	54
3.5.7 Cambodia Agriculture Research and Development Institute – Assistance Project (CARDI-AP)	54
3.5.8 CEDAC	55
3.5.9 CEDAC Organic Certification and Farm Group Forming Project	55
3.5.10 DANIDA-DFID NREM Programme and Pro-Poor Rural Business Component 55	
3.5.11 Economic and Social Development of the Northern Provinces (ECOSORN) 56	
3.5.12 Food and Agriculture Organization (FAO) Integrated Pest Management (IPM) 56	
3.5.13 HURREDO	57
3.5.14 International Development Enterprises (IDE)	58
3.5.15 Mekong Private Sector Development Facility (MPDF)	58
3.5.16 Srer Khmer	58
3.6 AusAID Country Strategy	59
3.6.1 Increase Productivity and Incomes of the Rural Poor	60
3.6.2 Reduce Vulnerability of the Poor	62
4 Field Work Findings.....	64
4.1 Approach to Field Work.....	64
5 Where is the Value? Value Chain Analysis	66
5.1 Introduction.....	66
5.2 Value Added – Farmers	66

5.3	Value Added – Traders	67
5.3.1	Value Added – Millers	68
5.3.2	Value Added – Processors	69
6	Who is Generating Value? The Agroentrepreneurs of Rice-based Systems.....	70
6.1	Entrepreneurship	70
6.2	Seizing Market Opportunities - The Vegetable Trader.....	70
6.3	Willingness to Take Risk - The Paddy Trader/Rice Miller.....	71
6.4	Making Innovations - The Integrated Farmer.....	71
6.5	Continuously Learning New Technologies - The Intensive Farmer	72
6.6	The Importance of a Distribution Network - The Sauces Processor.....	72
6.7	Learning New Technologies to Improve Quality - The Rice Noodles Processor..	72
6.8	Establishing Effective Value Chains - Angkor Kasekam.....	73
6.9	It is not only about Capital and Transportation Cost - The Large Miller	74
6.10	Summary	75
7	How is Value Generated? Unlocking Value in the Rice-based Systems	77
7.1	Definition of Value Added.....	77
7.2	Ways to Increase Value Added in Rice-based Farming Systems	77
7.2.1	Implications of the Definition of Value Added	78
7.3	Increasing Value Added at the Farm Level	78
7.3.1	Increase the price.....	78
7.3.2	Increase the quantity.....	82
7.3.3	Reduce the cost.	84
7.4	Increasing Value Added at the Trader/Miller/Processor Level.....	85
7.4.1	Increase the price.....	85
7.4.2	Increase the quantity.....	87
7.4.3	Reduce the cost.	88
8	What Prevents Value to be Increased? Constraints Analysis	89
8.1	Farmers' Constraints	89
8.2	Traders' Constraints	89
8.3	Millers and Food Processors' Constraints	90
8.4	Service Providers' Constraints	90
8.5	Prioritizing the Constraints	91
8.6	Quantification of Value Added along the Value Chain.....	93
9	How could the Poor benefit from higher Value in Rice-based Farming Systems? ...	104
9.1	Different Categories of Poor.....	104
9.2	Need to Start from Some Basic Assets.....	105
9.3	Paths of Poverty Reduction.....	106
9.3.1	Creation of Employment Opportunities.....	106
9.3.2	Productivity Increase for Smallholders	107
9.3.3	Enterprise Development	108
10	Lessons Learned.....	111
10.1	About Program Implementation	111
10.2	About Farmers' Organizations and Market Linkages.....	112
10.3	About Value Addition.....	112
11	Problem Analysis	115
11.1	Core Problem, Impacts, and Causes	115
11.2	Identification of the Core Problem for Program Formulation	115
11.2.1	Low and Variable Growth of Agriculture	115
11.2.2	In spite of rice self-sufficiency, poverty is still widespread.....	116
11.2.3	A vision of Cambodia Agriculture Based on Increasing Value-Added.....	117
11.2.4	Unlocking the value in Rice-based farming systems	117
11.2.5	The Core Problem.....	118

11.3	Impacts of the Core Problem	118
11.4	Causes of the Core Problem	120
11.5	Cross cutting factors	124
12	Strategic Options for Program Formulation	127
12.1	Identification of Strategic Options	127
12.2	Supply-driven Technologies Option	127
12.2.1	Description and Rationale	127
12.2.2	SWOT Analysis	128
12.2.3	Expected Costs and Benefits	128
12.2.4	Assessment	128
12.2.5	Example 1 of the Supply-Driven Technologies Option: The Farmer Field Schools Approach	129
12.2.6	Example 2 of the Supply-Driven Technologies Option: a Research Program to Select and Improve Aromatic Varieties of Paddy	130
12.3	Demand-driven Technologies Option	131
12.3.1	Description and Rationale	131
12.3.2	SWOT Analysis	131
12.3.3	Expected Cost and Benefits	131
12.3.4	Assessment	132
12.4	Credit Interventions Option	132
12.4.1	Description and Rationale	132
12.4.2	SWOT Analysis	133
12.4.3	Expected Costs and Benefits	133
12.4.4	Assessment	133
12.5	Policy and Institutional Reforms	135
12.5.1	Description and Rationale	135
12.5.2	SWOT Analysis	136
12.5.3	Expected Costs and Benefits	136
12.5.4	Assessment	136
12.6	Infrastructure Development	137
12.6.1	Description and Rationale	137
12.6.2	SWOT Analysis	137
12.6.3	Expected Costs and Benefits	138
12.6.4	Assessment	138
12.7	Value Chain Linkages	138
12.7.1	Description and Rationale	138
12.7.2	SWOT Analysis	138
12.7.3	Expected Costs and Benefits	139
12.7.4	Assessment	139
12.8	Summary of Alternative Strategy Options	140
13	Approach to Program Formulation	143
13.1	Introduction	143
13.2	General Features of the Program	143
13.3	Guiding Principles	144
13.4	Focus	144
13.5	Prioritizing the Constraints to be addressed by the Program	146
13.5.1	Constraints the Program could not address (except at a general level of policy dialogue)	147
13.5.2	Constraints the Program should not address	148
13.5.3	Constraints the Program could address	149
13.5.4	Constraints the Program should address	149
13.6	Selection of Provinces for Farming System Interventions	150

13.6.1	Process of Selection	150
14	Proposed Components of the Agricultural Program	154
14.1	Program Framework.....	154
14.2	A Fully Integrated Value Chain Program.....	158
14.3	The Value Chain Development Component (V CDC).....	158
14.3.1	Target Groups	159
14.3.2	Service Providers and Demand-driven Investments	159
14.3.3	Coordination with Other Projects and Initiatives	160
14.4	The Policy, Capacity, and Management Component (PCMC)	160
14.5	Common Thread	163
14.6	Inputs, Outputs, Activities, and Indicators	163
14.6.1	Indicators.....	164
14.7	Indicative Sub-Projects for Funding	165
15	Economic Analysis and Viability of Matching Grant Projects	173
15.1	Introduction.....	173
15.2	Project Proposal for the Rehabilitation of a Smallscale Irrigation Scheme, Vegetable Production and Marketing under a Commune Marketing Plan	173
15.2.1	Outline of Proposed Grant Aided Support	173
15.2.2	Interventions Proposed for Supporting the Proposal.....	174
15.2.3	Details of Indicative Model	174
15.2.4	Impact on Poverty Reduction.....	175
15.2.5	Financial Viability	176
15.2.6	Sensitivity Tests	176
15.3	Project Proposal for a Horticulture Produce Collection, Grading and Packing Center	177
15.3.1	Outline of Proposed Grant Aided Support	177
15.3.2	Interventions Proposed for Supporting the Proposal.....	177
15.3.3	Details of Indicative Model	178
15.3.4	Impact on Poverty Reduction.....	179
15.3.5	Financial Viability	179
15.3.6	Sensitivity Tests	179
15.4	Project Proposal for a Contract Farming System Linking Farmers to Milling Enterprise	180
15.4.1	Outline of Proposed Grant Aided Support	180
15.4.2	Interventions Proposed for Supporting Proposal	180
15.4.3	Details of Indicative Model	181
15.4.4	Financial Viability	183
15.4.5	Impact on Poverty Reduction.....	183
15.4.6	Sensitivity Tests	183
16	Institutional Framework.....	192
16.1	General Principles	192
16.2	Steering Committee.....	193
16.3	Monitoring and Evaluation Unit	193
16.4	Program Management.....	194
16.4.1	Program Management Unit.....	194
16.4.2	Provincial Coordination Units.....	194
16.5	The Provincial Committees	195
16.6	The Commune Councils.....	196
16.7	The Technical Assistance	196
16.8	Matching Grant Scheme.....	196
16.9	Roles of Stakeholders	200
17	Expected Impacts and Risks of the Proposed Program	201

17.1	Impacts on Poverty Reduction and Pro-Poor Development	201
17.2	Impacts on Social and Gender Development	202
17.2.1	Improved Opportunity.....	203
17.2.2	Vulnerability Reduction	203
17.2.3	Capability Development	203
17.2.4	Risks.....	204
18	Recommendations for the Design Phase	206
19	References.....	208
Appendix A	TOR of the Diagnostic Study.....	215
A.1	Background and Justification	215
A.2	Objectives of the Study	216
A.3	Outputs.....	217
A.4	The Scope of Work	217
A.5	Main Activities	219
A.6	Organisation, Study Team Composition and Team Member Qualifications	220
A.7	Reporting.....	221
A.8	Duration and Timing.....	222
Appendix B	Consultant's Team.....	224
B.1	Profiles	224
Appendix C	Report on the Work of the Consultant's Team	226
C.1	Mobilization of Consultants	226
C.2	Consultations in Phnom Penh.....	226
C.3	Inception Note	226
C.4	Office	226
C.5	Field Work	226
C.6	Workshops	227
C.7	Debriefing Note/Aide Memoire.....	227
C.8	Debriefing Meeting	227
C.9	Presentation of Debriefing Note/Aide Memoire to MAFF	227
C.10	Draft Final Report	227
Appendix D	Persons Met	228
D.1	Ministry of Agriculture, Forestry, and Fisheries	228
D.2	Ministry of Water Resources and Meteorology.....	228
D.3	EU (European Union).....	228
D.4	AusAID	228
D.5	Peer Reviewers.....	228
D.6	AusAID Projects Team Leaders	228
D.7	Case Studies.....	229
D.8	Focus Group Discussions	229
D.9	Value Chain Interviews	229
D.10	Key Informant Interviews.....	230
Appendix E	Field Work Methodology.....	232
E.1	Selection of Provinces to Conduct Field Visits	232
E.2	Methodology for Field Work and Field Work Activities	232
E.2.1	Case Studies	232
E.2.2	Focus Group Discussions	233
E.2.3	Key Informant Interviews.....	233
E.2.4	Value Chain Questionnaire	233
Appendix F	Summary of Case Studies.....	234
Appendix G	Summary of Focus Group Discussions.....	270
Appendix H	Summary of Key Informant Interviews	294
Appendix I	Review of the Farmer Field School Approach to Extension	360

I.1	Vietnamese experiences with the Farmer Field School approach	360
I.2	Bangladesh experiences with the Farmer Field School approach	361
I.3	Cambodian experiences with the Farmer Field School approach.....	361
Appendix J	Value Chain Analysis	365
J.1	Overview of Methodology	365
J.2	Rice Value Chain	367
J.2.1	Introduction.....	367
J.2.2	Rice Production in Cambodia.....	367
J.2.3	Producers	369
J.2.3.1	Overview	369
J.2.3.2	Seed Inputs.....	369
J.2.3.3	Fertilizer Inputs	371
J.2.3.4	Pesticide Inputs	373
J.2.3.5	Irrigation Inputs	374
J.2.3.6	Labor Inputs	375
J.2.3.7	Costs and Margins for Rice	376
J.2.3.8	Constraints.....	379
J.2.3.9	Service Providers' Constraints	379
J.2.4	Collectors and Paddy Traders.....	380
J.2.4.1	Costs and Margins.....	381
J.2.4.2	Unofficial Fees and Charges	382
J.2.4.3	Constraints.....	385
J.2.5	Millers	386
J.2.5.1	Costs and Margins.....	389
J.2.5.2	Constraints.....	391
J.2.6	Wholesalers and Retailers	394
J.2.6.1	Costs and Margins.....	395
J.2.6.2	Constraints.....	396
J.2.7	Rice Exporters	396
J.2.7.1	Costs and Margins.....	396
J.2.7.2	Constraints.....	396
J.2.8	End Users and Processors of Rice	397
J.2.8.1	Constraints.....	398
J.2.9	Marketing Margins.....	399
J.2.10	Marketing Chain	400
J.2.11	Marketing Flows of Paddy and Rice.....	401
J.2.12	Major Constraints along the Value Chain for Rice	404
J.3	Vegetable Value Chain	406
J.3.1	Vegetable Production in Cambodia.....	406
J.3.2	Producers	406
J.3.2.1	Overview	406
J.3.2.2	Input Traders.....	407
J.3.2.3	Fertilizer Inputs	408
J.3.2.4	Pesticide Inputs	409
J.3.2.5	Irrigation Inputs	410
J.3.2.6	Labor Inputs	411
J.3.2.7	Production of Vegetables.....	411
J.3.2.8	Costs and Margins.....	416
J.3.2.9	Constraints.....	418
J.3.3	Collectors and Traders	418
J.3.4	Wholesalers, Retailers, Importers and Processors.....	419
J.3.4.1	Importers.....	420

J.3.4.2	Wholesalers	421
J.3.4.3	Retailers	422
J.3.4.4	Processors	423
J.3.4.5	Costs and Margins	424
J.3.5	End Users and Consumers	424
J.3.6	Access to Credit	425
J.3.7	Marketing Margins	425
J.3.8	Marketing Chain	426
J.3.9	Major Constraints along the Value Chain for Vegetables	427
J.3.9.1	Major Constraints for Growers	427
J.3.9.2	Major Constraints for Traders	428
J.3.9.3	Major Constraints along the Value Chain	428
J.4	Fish Value Chain	432
J.4.1	Fish Production in Cambodia	432
J.4.2	Producers	432
J.4.2.1	Returns to Fishing	434
J.4.3	Traders	434
J.4.3.1	Costs and Margins	435
J.4.4	Distributors	435
J.4.5	Exporters	436
J.4.5.1	Costs and Margins	437
J.4.6	Retailers	437
J.4.6.1	Costs and Margins	438
J.4.7	Marketing Margins	439
J.4.8	Marketing Chain	439
J.4.8.1	Fresh Fish – Inland	439
J.4.8.2	Fresh Fish – Marine, and Other Seafood	439
J.4.8.3	Smoked and Dried Fish	440
J.4.9	Major Constraints along the Value Chain for Fish	440
J.4.9.1	Spoilage and Weight Loss	440
J.4.9.2	Monopolistic Control of Distribution	441
J.4.9.3	Fees Charged along Trade Route	442
J.4.9.4	Transportation and Ice Costs	443
J.4.9.5	Financing Costs	443
J.5	Tables	445
J.6	Figures	543
J.7	Maps	556
Appendix K	COMPETITIVENESS AND CONSTRAINTS ALONG THE VALUE CHAIN	
	564	
K.1	Competitiveness and Comparative Advantage of Cambodian Rice	564
K.2	Quantifying Value Added Interventions along the Rice-Based Value Chain using CAMSEM	575
K.2.1	Introduction	575
K.2.2	Description and Specification of CAMSEM	576
K.2.2.1	Price Block	577
K.2.2.2	Supply Block	578
K.2.2.3	Consumption Block	579
K.2.2.4	Income Block	580
K.2.2.5	Market Clearing	580
K.2.3	Policy Simulations	580
K.2.4	Simulation Results	581
K.2.4.1	Simulation Results for Rice	581

K.2.4.1.1	Improvements in Productivity	581
K.2.4.1.2	Improvements in Technology	584
K.2.4.1.3	Improvements in Quality	587
K.2.4.2	Simulation Results for Maize	590
K.2.4.2.1	Improvements in Productivity	590
K.2.4.2.2	Improvements in Technology	593
K.2.4.2.3	Improvements in Quality	594
K.2.4.3	Simulation Results for Vegetables.....	596
K.2.4.3.1	Improvements in Productivity	596
K.2.4.3.2	Improvements in Technology	597
K.2.4.3.3	Improvements in Quality	599
K.2.4.4	Simulation Results for Soybeans, Cassava and Sweet Potato.....	600
K.2.4.4.1	Improvements in Productivity	600
K.2.4.4.2	Improvements in Technology	602
K.2.4.4.3	Improvements in Quality	603
K.2.4.5	Simulation Results for Fish Products.....	605
K.2.4.5.1	Improvements in Technology	605
K.2.4.5.2	Improvements in Quality	606
K.2.4.6	Improvements in Infrastructure	607
K.2.4.7	Simulation Results for Rice and Vegetable Value Chain Improvements	610
K.2.4.8	Improvements in Productivity	610
K.2.4.9	Improvements in Technology	612
K.2.4.10	Improvements in Quality	613
K.2.5	Quantification of Value Added along the Value Chain	615
Appendix L	Summary of Strategy Workshop (10, March 2006).....	625
L.1	Opening Session.....	625
L.2	Session 1: Lessons Learned Relevant to the Development of Rice Based Farming Systems	633
L.2.1	Overview Presentation	633
L.2.2	Working Group 1	635
L.2.3	Working Group 2	636
L.2.4	Working Group 3	637
L.2.5	Working Group 4	638
L.3	Session 2: SWOT Analysis of the Potential of Rice Based Farming Systems.....	639
L.3.1	Overview Presentation	639
L.3.2	Working Group 1	644
L.3.3	Working Group 2	645
L.3.4	Working Group 3	646
L.3.5	Working Group 4	647
L.4	Session 3: Alternative Strategic Options for Program Formulation	648
L.4.1	Overview Presentation	648
L.4.2	Working Group 1	651
L.4.3	Working Group 2	651
L.4.4	Working Group 3	652
L.4.5	Working Group 4	652
L.5	Session 4: Priorities for Program Formulation	653
L.5.1	Overview Presentation	653
L.5.2	Working Group 1	655
L.5.3	Working Group 2	656
L.5.4	Working Group 3	657
L.5.5	Working Group 4	658
L.6	Concluding Remarks.....	659

Appendix M	Summary of Final Workshop (24 March 2006)	662
M.1	Opening Session	662
M.2	Session 1: Fieldwork Finding	667
M.2.1	Presentation of Session 1	667
M.2.2	Working Group 1 Findings	680
M.2.3	Working Group 2 Findings	681
M.2.4	Working Group 3 Findings	681
M.2.5	Working Group 4 Findings	682
M.3	Session 2	682
M.3.1	Presentation	682
M.3.2	Working Group 1 Findings	688
M.3.3	Working Group 2 Findings	688
M.3.4	Working Group 3 Findings	689
M.3.5	Working Group 4 Findings	689
M.4	Session 3 Presentation	690
Appendix N	Response to RGC Comments to Aide-Memoire	705
Appendix O	Draft TOR for the Design Phase Consultant's Team	709
O.1	International Consultants	709
O.1.1	Lead Consultant/Program Design Specialist (international, 2.5 person months)	709
O.1.2	Value Chain Specialist (international, 2.5 person months)	709
O.1.3	Farming Systems and Commercial Agriculture Specialist (international, 2 person months)	709
O.2	Domestic Consultants	710
O.2.1	Farming System Specialist (domestic, 2 person month)	710
O.2.2	Water Management and Irrigation Specialist (domestic, 2 person month)	710
O.2.3	Enterprise Development Specialist (domestic, 2 person month)	711
O.2.4	Socioeconomist (domestic, 2 person month)	711
Appendix P	Tables and Figures	712

List of Tables

Table 1 Main Poverty Trends 1993/94 – 2004	40
Table 2 Donor Initiatives in Agricultural Development and Agribusiness Support	63
Table 3 Revenues, Costs, Gross Income, and Margins for different crops and farming systems	66
Table 4 Revenues, Costs, Gross Income, and Margins for Paddy Traders	67
Table 5 Revenues, Costs, Gross Income, and Margins for Millers	68
Table 6 Revenues, Costs, Gross Income, and Margins for processors	69
Table 7 Revenues, Costs, Gross Income, and Margins for Paddy Traders	86
Table 8 Percentage of Responses related to Main Constraints	91
Table 9 Priority Constraints for different Stakeholders	92
Table 10 Estimated Value Added from Value Chain Interventions	96
Table 11 Effects of Different Program Interventions on Incomes	97
Table 12 Main Paths for Poverty Reduction in a Program to Develop Rice-Based Farming Systems	106
Table 13 Kampong Thom Rice and Vegetable Farmer	107
Table 14 Landholding and Land Distribution	109
Table 15 Average Landholding by Landholding Group	110
Table 16 Operator and Landholding by Agro-ecological Zone	110
Table 17 Perceptions by Millers about Moisture Content of Paddy and Objective Measurement	123
Table 18 Summary Decision Matrix of Alternative Strategic Options to the Core Problems of Low and Unstable Value Added	141
Table 19 Process of Selection of Provinces for Field Work.	153
Table 20 Example of Eligible Proposals under the Matching Grant Fund	166
Table 21 Financial Analysis for Small-Scale Irrigation and Vegetable Production and Marketing	185
Table 22 Sensitivity Analysis for Small-Scale Irrigation and Vegetable Production and Marketing	186
Table 23 Financial Analysis for Produce, Collection, Grading and Packing Center	187
Table 24 Sensitivity Analysis for Produce, Collection, Grading and Packing Center	188
Table 25 Financial Analysis for Contract Farming System for Paddy	189
Table 26 Sensitivity Analysis for Contract Farming System for Paddy	191
Table 27 Example Scoring Matrix for Proposal Evaluation – Technical Screening	198
Table 28 Role of Different Stakeholders in the Program	200
Table 29 Tentative Schedule for the Design Phase	207
Table 30 Summary of Field Work Activities	232
Table 31 Rice Yields Before and After Participating in PRASAC II FFS Program	364
Table 32 Comparison of Changes in Rice Yields by Explanatory Variables	364
Table 33 Comparison of Changes in Rice Yields Due to Farmer Field Schools	364
Table 34 Yields and Farmer Returns Under IPM and FFS in Cambodia	364
Table 35 Performance of Annual Crops Over Time 1991 to 2000	445
Table 36 Growth Rate of Main Crops in Cambodia, 1995-2004	446
Table 37 Characteristics of Rice Production Systems	447
Table 38 Area and Production of Paddy in Cambodia by Province, 2004-2005	448
Table 39 Food Balance for Rice Production	449
Table 40 Relative Adoption of Traditional and Improved Varieties of Rice	450
Table 41 Farmer Reasons for Adoption of IR66	450
Table 42 Historical Profiles of CAR Varieties	450
Table 43 Characteristics of Selected Rice Varieties Released by CARDI	451

Table 44 Source of Seeds	452
Table 45 Utilization of Production	453
Table 46 Fertilizer Application Rates	453
Table 47 Irrigation Specifications.....	454
Table 48 Existing Irrigation Schemes in Cambodia.....	455
Table 49 Farmer Consumption and Sales of Paddy	456
Table 50 Average Land Holdings for Value Chain Respondents by Province	456
Table 51 Average Rice Production Statistics for Value Chain Respondents	456
Table 52 Returns and Production Costs.....	457
Table 53 Production Cost Computation.....	458
Table 54 Marketing Margins for Selected Crops	459
Table 55 Contract vs. Non-Contract Farming: A Case Study of Organic Fragrant Rice (Kampong Speu).....	463
Table 56 Contract vs. Non-Contract Cropping Models.....	464
Table 57 Comparison of Gross Margins Per Hectare by Farm Size and Agroecological Zone.....	464
Table 58 Partial Budget for Wet Season Rice (Battambang Province, Tonle Sap Zone)	465
Table 59 Partial Budget for Wet Season Rice (Pursat Province, Tonle Sap Zone)	466
Table 60 Partial Budget for Wet Season Rice (Sihanoukville Province, Coastal Zone) ..	467
Table 61 Partial Budget for Wet Season Rice (Kampot Province, Coastal Zone)	468
Table 62 Partial Budget for Wet Season Rice (Kampong Cham/Kampong Speu Province, Mekong Zone).....	469
Table 63 Partial Budget for Wet Season Rice (Ratanakiri Province, Northeast Zone)	470
Table 64 Partial Budget for Wet Season Rice (Kratie Province, Northeast Zone)	471
Table 65 Partial Budget for Dry Season Rice (Pursat/Battambang Provinces, Tonle Sap Zone).....	472
Table 66 Partial Budget for Dry Season Rice (Kratie, Northeast Zone)	473
Table 67 Partial Budget for Dry Season Rice (Kampong Cham/Kampong Speu Provinces, Mekong Zone).....	474
Table 68 Costs and Returns for Rice Production in Kampong Speu Province	475
Table 69 Costs and Returns for Rice Production in Svay Rieng Province.....	476
Table 70 Costs and Returns for Rice Production in Battambang Province.....	477
Table 71 Costs and Returns for Rice Production in Kampong Thom Province	478
Table 72 Costs and Returns for Rice Production in Cambodia – Selected Provinces.....	479
Table 73 Partial Budget for Paddy Collector, Takeo	480
Table 74 Costs and Returns for Traders – Kampong Speu	481
Table 75 Costs and Returns for Traders – Svay Rieng.....	482
Table 76 Costs and Returns for Traders – Kampong Thom	483
Table 77 Costs and Returns for Traders – Kampong Speu Average.....	484
Table 78 Costs and Returns for Traders – Svay Rieng Average	485
Table 79 Costs and Returns for Traders – Kampong Thom Average.....	486
Table 80 Costs and Returns for Traders –Average.....	487
Table 81 Location of Sales by Traders - Value Chain Respondents	488
Table 82 Costs and Returns for Processors.....	488
Table 83 Coefficients for Rice Production and Food Balance.....	489
Table 84 Milling Recovery by Custom and Commercial Mills	489
Table 85 Milling Efficiency of Custom and Commercial Mills	489
Table 86 Milling Recovery Rates, Selected Custom and Commercial Mills.....	489
Table 87 Characteristics of Custom and Commercial Rice Mills, Business Structure,	490
Table 88 Characteristics of Custom and Commercial Rice Mills, Financial Management and Financial Planning Capacity	490

Table 89 Characteristics of Custom and Commercial Rice Mills, Mill Production, Technology and Operations	491
Table 90 Technical Characteristics of Custom Mills.....	491
Table 91 Technical Characteristics of Commercial Mills.....	491
Table 92 Sales of Milling By-Products - 2001.....	492
Table 93 Estimated Milling Capacity 1998-1999	492
Table 94 Financial Sources for Millers.....	492
Table 95 Performance of Cambodian Rice Mills 1999	493
Table 96 Sales of White Rice by Millers	493
Table 97 Mill Utilization Rates - 2000	493
Table 98 Number of Mills by Province - 2000.....	493
Table 99 Partial Budgets for Custom Mills	494
Table 100 Partial Budgets for Commercial Mills.....	495
Table 101 Costs and Returns for Rice Milling – Kampong Speu	496
Table 102 Costs and Returns for Rice Milling – Svay Rieng.....	497
Table 103 Costs and Returns for Rice Milling – Battambang.....	498
Table 104 Costs and Returns for Rice Milling – Kampong Thom	499
Table 105 Costs and Returns for Rice Milling – Average of Interviewed Millers in Kampong Speu and Svay Rieng.....	500
Table 106 Costs and Returns for Rice Milling – Average of Interviewed Millers in Battambang and Kampong Thom	501
Table 107 Costs and Returns for Rice Milling – Average of Interviewed Millers	502
Table 108 Location of Sales by Millers - Value Chain Respondents	503
Table 109 Moisture Meter Tests of Paddy Moisture – Selected Mills and Traders.....	504
Table 110 Perceptions by Millers about Moisture Content of Paddy and Objective Measurement.....	504
Table 111 Trade Flows of Rice and Paddy	505
Table 112 Comparison of Retailers in Cambodia.....	505
Table 113 Preferences for Different Varieties of Rice in Cambodia.....	506
Table 114 Preference Criteria for Purchasing Rice	506
Table 115 Consumer and Restaurant Preferences for Rice - 2001	507
Table 116 Marketing Costs and Margins for Rice, 1998	507
Table 117 Marketing Costs and Margins for Rice, 2002	507
Table 118 Summary Table for Rice Marketing Margins – 1998 - 2002.....	508
Table 119 Marketing Costs and Margins for Rice, 2006	508
Table 120 Major Constraints in the Cambodian Rice Sector	509
Table 121 Major Constraints in the Farming Sector.....	510
Table 122 Major Constraints in the Milling Sector.....	510
Table 123 Major Constraints in the Retail Sector.....	510
Table 124 Major Constraints in the Export Sector.....	511
Table 125 Priority Constraints as indicated by the stakeholders	511
Table 126 Comparison of Gross Margins Per Hectare by Farm Size and Agroecological Zone for Vegetables	512
Table 127 Partial Budget for White Yam (Kratie Province, Northeast Zone)	513
Table 128 Partial Budget for Cucumber (Sihanoukville Province, Coastal Zone).....	514
Table 129 Partial Budget for Cucumber (Pursat Province, Tonle Sap Zone)	515
Table 130 Partial Budget for Cucumber (Battambang Province, Tonle Sap Zone)	516
Table 131 Partial Budget for Long Bean (Sihanoukville Province, Coastal Zone).....	517
Table 132 Partial Budget for Long Bean (Pursat Province, Tonle Sap Zone)	518
Table 133 Partial Budget for Lettuce (Sihanoukville Province, Coastal Zone)	519
Table 134 Partial Budget for Lettuce (Pursat Province, Tonle Sap Zone)	520
Table 135 Partial Budget for Lettuce (Battambang Province, Tonle Sap Zone)	521

Table 136 Partial Budget for Peanut (Ratanakiti Province, Northeast Zone).....	522
Table 137 Partial Budget for Peanut (Kratie Province, Northeast Zone)	523
Table 138 Partial Budget for Peanut (Pursat Province, Tonle Sap Zone).....	524
Table 139 Partial Budget for Peanut (Battambang Province, Tonle Sap Zone)	525
Table 140 Partial Budget for Watermelon (Kampot Province, Coastal Zone).....	526
Table 141 Partial Budget for Watermelon (Sihanoukville Province, Coastal Zone).....	527
Table 142 Partial Budget for Watermelon (Pursat Province, Tonle Sap Zone)	528
Table 143 Partial Budget for Watermelon (Battambang Province, Tonle Sap Zone)	529
Table 144 Partial Budget for Cabbage (Pursat Province, Tonle Sap Zone)	530
Table 145 Partial Budget for Cabbage (Battambang Province, Tonle Sap Zone)	531
Table 146 Costs and Returns for Vegetable Production in Cambodia – Kampong Speu Province.....	532
Table 147 Costs and Returns for Vegetable Production in Cambodia – Selected Provinces	533
Table 148 Input Dealers Business Characteristics.....	534
Table 149 Farmer Availability and Preference ranking	534
Table 150 Advantages & Disadvantages of Farmers’ Preferred Crops	534
Table 151 Ratio of Local vs. Imported Vegetables.....	535
Table 152 Origin of Vegetables Traded in Svay Rieng	535
Table 153 Geographic Sourcing of Vegetables in Svay Rieng Province	536
Table 154 Wholesaler Availability and Preference for Vegetables	537
Table 155 Retailer Availability and Preference for Vegetables	537
Table 156 Processor Availability and Preference for Vegetables	538
Table 157 Importer Availability and Preference for Vegetables	538
Table 158 Vegetable Sales across Seasons in Svay Rieng	538
Table 159 Preferred Vegetables as Percentage of Total Sales in Svay Rieng.....	539
Table 160 Daily Sales Volumes of Vegetables in Svay Rieng	539
Table 161 Margins and Income Estimates for Vegetables in Svay Rieng	539
Table 162 Access to Credit for Vegetables in Svay Rieng.....	539
Table 163 Consumer Vegetable Preferences	539
Table 164 Estimated Annual Income of Fishery Dependent Households.....	540
Table 165 Percentage of Households Involved in Fishing	540
Table 166 Average Annual Catch per Household	540
Table 167 Costs of Marketing Fish from the Tonle Sap Lake to Phnom Penh	541
Table 168 Marketing Margins for Fish Trading - Kompong Luong to Phnom Penh.....	541
Table 169 Costs for Exporting Fish	541
Table 170 Margins and Costs for Fish Exports	542
Table 171 Calculation of NPCs and DRCs for Dry Season Rice in Cambodia - 2005....	568
Table 172 Relative Importance of Tradable and Non-Tradable Costs for Dry Season Rice in Cambodia.....	570
Table 173 Calculation of NPCs and DRCs for Wet Season Rice in Cambodia - 2005....	571
Table 174 Relative Importance of Tradable and Non-Tradable Costs for Wet Season Rice in Cambodia.....	573
Table 175 Sensitivity Analysis of NPC for Changes in Phnom Penh Prices.....	574
Table 176 Sensitivity Analysis of DRC to Labor Costs – Phnom Penh Prices	574
Table 177 Sensitivity Analysis of DRC to Farm Productivity Changes – Phnom Penh Prices	574
Table 178 Sensitivity Analysis of DRC to Post Harvest Productivity Changes – Phnom Penh Prices	574
Table 179 Sets Used in CAMSEM.....	577
Table 180 Variables Used in CAMSEM.....	577
Table 181 Increase in Agricultural Productivity of Dry Season Rice - Change in Prices .	582

Table 182 Increase in Agricultural Productivity of Dry Season Rice - Change in Volumes	583
Table 183 Increase in Agricultural Productivity of Dry Season Rice - Change in Net Imports	583
Table 184 Increase in Agricultural Productivity of Dry Season Rice - Changes in Income	583
Table 185 Increase in Agricultural Productivity of Wet Season Rice - Change in Prices	583
Table 186 Increase in Agricultural Productivity of Wet Season Rice - Change in Volumes	584
Table 187 Increase in Agricultural Productivity of Wet Season Rice - Change in Net Imports	584
Table 188 Increase in Agricultural Productivity of Wet Season Rice - Changes in Income	584
Table 189 Improvements in Milling Technology for Rice - Change in Prices.....	585
Table 190 Improvements in Milling Technology for Rice - Change in Volumes.....	585
Table 191 Improvements in Milling Technology for Rice - Change in Net Imports	585
Table 192 Improvements in Milling Technology for Rice - Changes in Income	586
Table 193 Improvements in Postharvest Technology for Rice - Change in Prices	586
Table 194 Improvements in Postharvest Technology for Rice - Change in Volumes.....	586
Table 195 Improvements in Postharvest Technology for Rice - Change in Net Imports	587
Table 196 Improvements in Postharvest Technology for Rice - Changes in Income	587
Table 197 Improvements in Quality for Dry Season Rice - Change in Prices	588
Table 198 Improvements in Quality for Dry Season Rice - Change in Volumes	588
Table 199 Improvements in Quality for Dry Season Rice - Change in Net Imports.....	588
Table 200 Improvements in Quality for Dry Season Rice - Changes in Income	589
Table 201 Improvements in Quality for Wet Season Rice - Change in Prices.....	589
Table 202 Improvements in Quality for Wet Season Rice - Change in Volumes.....	589
Table 203 Improvements in Quality for Wet Season Rice- Change in Net Imports	589
Table 204 Improvements in Quality for Wet Season Rice - Changes in Income	590
Table 205 Increase in Agricultural Productivity of Maize - Change in Prices.....	591
Table 206 Increase in Agricultural Productivity of Maize - Change in Volumes.....	591
Table 207 Increase in Agricultural Productivity of Maize - Change in Net Imports	591
Table 208 Increase in Agricultural Productivity of Maize - Changes in Income	592
Table 209 Increase in Agricultural Productivity of Maize with Exports - Change in Prices	592
Table 210 Increase in Agricultural Productivity of Maize with Exports - Change in Volumes	592
Table 211 Increase in Agricultural Productivity of Maize with Exports - Change in Net Imports	592
Table 212 Increase in Agricultural Productivity of Maize with Exports - Changes in Income	593
Table 213 Improvements in Postharvest Technology for Maize - Change in Prices	593
Table 214 Improvements in Postharvest Technology for Maize - Change in Volumes ...	594
Table 215 Improvements in Postharvest Technology for Maize - Change in Net Imports.....	594
Table 216 Improvements in Postharvest Technology for Maize - Changes in Income....	594
Table 217 Improvements in Quality for Maize - Change in Prices	595
Table 218 Improvements in Quality for Maize - Change in Volumes	595
Table 219 Improvements in Quality for Maize - Change in Net Imports	595
Table 220 Improvements in Quality for Maize - Changes in Income	596
Table 221 Increase in Agricultural Productivity of Vegetables - Change in Prices	596
Table 222 Increase in Agricultural Productivity of Vegetables - Change in Volumes	597
Table 223 Increase in Agricultural Productivity of Vegetables - Change in Net Imports	597

Table 224 Increase in Agricultural Productivity of Vegetables - Changes in Income.....	597
Table 225 Improvements in Postharvest Technology for Vegetables - Change in Prices.....	598
Table 226 Improvements in Postharvest Technology for Vegetables - Change in Volumes	598
Table 227 Improvements in Postharvest Technology for Vegetables - Change in Net Imports	598
Table 228 Improvements in Postharvest Technology for Vegetables - Changes in Income	598
Table 229 Improvements in Quality for Vegetables - Change in Prices.....	599
Table 230 Improvements in Quality for Vegetables - Change in Volumes	599
Table 231 Improvements in Quality for Vegetables - Change in Net Imports.....	600
Table 232 Improvements in Quality for Vegetables - Changes in Income	600
Table 233 Increase in Agricultural Productivity of Other Food Crops - Change in Prices	601
Table 234 Increase in Agricultural Productivity of Other Food Crops - Change in Volumes	601
Table 235 Increase in Agricultural Productivity of Other Food Crops - Change in Net Imports	601
Table 236 Increase in Agricultural Productivity of Other Food Crops - Changes in Income	601
Table 237 Improvements in Postharvest Technology for Other Food Crops - Change in Prices	602
Table 238 Improvements in Postharvest Technology for Other Food Crops - Change in Volumes	602
Table 239 Improvements in Postharvest Technology for Other Food Crops - Change in Net Imports	603
Table 240 Improvements in Postharvest Technology for Other Food Crops - Changes in Income	603
Table 241 Improvements in Quality for Other Food Crops - Change in Prices.....	604
Table 242 Improvements in Quality for Other Food Crops - Change in Volumes.....	604
Table 243 Improvements in Quality for Other Food Crops - Change in Net Imports	604
Table 244 Improvements in Quality for Other Food Crops - Changes in Income	604
Table 245 Improvements in Postharvest Technology for Fish - Change in Prices	605
Table 246 Improvements in Postharvest Technology for Fish - Change in Volumes	605
Table 247 Improvements in Postharvest Technology for Fish - Change in Net Imports	605
Table 248 Improvements in Postharvest Technology for Fish - Changes in Income.....	606
Table 249 Improvements in Quality for Fish - Change in Prices.....	606
Table 250 Improvements in Quality for Fish - Change in Volumes.....	606
Table 251 Improvements in Quality for Fish - Change in Net Imports	606
Table 252 Improvements in Quality for Fish - Changes in Income	607
Table 253 Improvements in Marketing Infrastructure - Change in Prices.....	608
Table 254 Improvements in Marketing Infrastructure - Change in Volumes.....	608
Table 255 Improvements in Marketing Infrastructure - Change in Net Imports	608
Table 256 Improvements in Marketing Infrastructure - Changes in Income	608
Table 257 Improvements in Export Marketing Infrastructure - Change in Prices	609
Table 258 Improvements in Export Marketing Infrastructure - Change in Volumes	609
Table 259 Improvements in Export Marketing Infrastructure - Change in Net Imports....	609
Table 260 Improvements in Export Marketing Infrastructure - Changes in Income.....	609
Table 261 Improvements in Agricultural Productivity for Rice and Vegetables - Change in Prices	611
Table 262 Improvements in Agricultural Productivity for Rice and Vegetables - Change in Volumes	611

Table 263 Improvements in Agricultural Productivity for Rice and Vegetables - Change in Net Imports	611
Table 264 Improvements in Agricultural Productivity for Rice and Vegetables - Changes in Income	611
Table 265 Improvements in Postharvest Technology for Rice and Vegetables - Change in Prices	612
Table 266 Improvements in Postharvest Technology for Rice and Vegetables - Change in Volumes	612
Table 267 Improvements in Postharvest Technology for Rice and Vegetables - Change in Net Imports	613
Table 268 Improvements in Postharvest Technology for Rice and Vegetables - Changes in Income	613
Table 269 Improvements in Quality for Rice and Vegetables - Change in Prices	614
Table 270 Improvements in Quality for Rice and Vegetables - Change in Volumes	614
Table 271 Improvements in Quality for Rice and Vegetables - Change in Net Imports ..	614
Table 272 Improvements in Quality for Rice and Vegetables - Changes in Income	615
Table 273 Estimated Value Added from Value Chain Interventions	617
Table 274 Effects of Different Program Interventions on Incomes	618
Table 275 Basic Indicators of the Agricultural Sector in Cambodia	712
Table 276 Share of Sectors in GDP	712
Table 277 Gross Domestic Product in Cambodia - 1994-2003	713
Table 278 Gross Domestic Product in Cambodia - 1994-2003 – Growth Rates	714
Table 279 Gross Domestic Product in Cambodia - 1994-2003 – Year on Year Growth Rates	715
Table 280 Share of Gross Domestic Product in Cambodia - 1994-2003	716
Table 281 Gross Value Added in Agriculture in Cambodia, 1994-2003	717
Table 282 Growth Rate in Gross Value Added in Agriculture in Cambodia, 1994-2003 ..	718
Table 283 Share of Gross Value Added in Agriculture in Cambodia, 1994-2003	719
Table 284 Total Cultivated Area Under Different Types of Crops	720
Table 285 Area and Production of Main Crops in Cambodia, 1995-2004	721
Table 286 Performance of Annual Crops Over Time 1991 to 2000	722
Table 287 Growth Rate of Main Crops in Cambodia, 1995-2004	723
Table 288 Characteristics of Rice Production Systems	724
Table 289 Food Balance for Rice Production	725
Table 290 Area and Production of Paddy and Maize in Cambodia by Province, 2003-2004	726
Table 291 Area and Production of Yellow Maize and Cassava in Cambodia by Province, 2003-2004	727
Table 292 Area and Production of Sweet Potato and Vegetables in Cambodia by Province, 2003-2004	728
Table 293 Estimates of Land Tenure/Use in Cambodia, 2004	729
Table 294 Relative Importance of Main Farming Systems, 2000	729
Table 295 Characteristics of Farm Households - 1999	730
Table 296 Characteristics of Landless and Farm Households - 1999	731
Table 297 Distribution of Sample Households by Province and Quintile	732
Table 298 Number and Percentage of Farm Households Owning Different Types of Land by Province and Quintile	733
Table 299 Average Size of Land Holding by Province and Quintile	734
Table 300 Number and Percentage of Farm Households by Type of Land Ownership, Province and Quintile	735
Table 301 Average Size of Usable Land Holding by Type of Land Ownership, Province and Quintile	736

Table 302 Average Number Parcels of Rice Land and Chamcar by Province and Quintile	737
Table 303 Average Land Area Under Crop and Left Fallow During Wet and Dry Season by Province and Quintile	738
Table 304 Households by Crop Production and Agro-Ecological Zone - CSES 2003/04	739
Table 305 Cropping Pattern by Micro-Zone	740
Table 306 Area and Production Biomass by Micro-Agro-Ecological Zone	741
Table 307 Crops, Area, Production and Yield by Micro-Agro-Ecological Zone	741
Table 308 Titled Land Parcels per Owner in Selected Provinces Determined by LMAP	743
Table 309 Agricultural Landholdings by Households	743

List of Figures

Figure 1 AusAID Country Strategy for Cambodia Objective Tree	60
Figure 2 Change in real Paddy Prices	75
Figure 3 Change in Revenues	75
Figure 4 Quantification of the Value Added along the Value Chain of Rice from Program Interventions	98
Figure 5 Quantification of the Value Added along the Value Chain of Maize from Program Interventions	99
Figure 6 Quantification of the Value Added along the Value Chain of Vegetables from Program Interventions	100
Figure 7 Quantification of the Value Added along the Value Chain of Soybeans, Cassava and Sweetpotato from Program Interventions.....	101
Figure 8 Quantification of the Value Added along the Value Chain of Fish from Program Interventions	102
Figure 9 Quantification of the Value Added along the Value Chain of Rice and Vegetables from Program Interventions	103
Figure 10 Problem Tree Analysis for Program Formulation	116
Figure 11 Impacts of the Core Problem.....	120
Figure 12 Causes of the Core Problem	123
Figure 13. Binding Constraints to Agricultural Growth	126
Figure 14 Clarifying the Constraints to be Addressed by the Program	147
Figure 15 Program Framework.....	155
Figure 16 Component 1 - Value Chain Development Component.....	156
Figure 17 Component 2 - Policy, Capacity, and Management.....	157
Figure 18 Program Institutional Structure	162
Figure 19 Matching Grant Scheme.....	199
Figure 20 Process of Proposal Submission, Feedback, and Technical Assistance	199
Figure 21 Change in real Paddy Prices.....	391
Figure 22 Change in Revenues	391
Figure 23 Rice Cropping Patterns	543
Figure 24 Production of Paddy and Rice, Food Requirements and Food Balance	544
Figure 25 Performance of Traditional vs. Modern Technology Adoption Farms in Cambodia - Wet Season Rice	545
Figure 26 Performance of Traditional vs. Modern Technology Adoption Farms in Cambodia – Cabbage.....	546
Figure 27 Number of Registered Commercial Mills in Cambodia 1994-2000.....	547
Figure 28 Number of Registered Custom Mills in Cambodia 1994-2000.....	548
Figure 29 Marketing Channels in Battambang, Takeo and Kampong Speu Provinces...	549
Figure 30 Trade Flows of Rice and Paddy in Cambodia.....	550
Figure 31 Trade Flows of Rice and Paddy in Cambodia (1998-1999)	551
Figure 32 Costs and Margins for Rice Marketing Chain 1998-99, Phaka Khgney Variety	552
Figure 33 Costs and Margins for Rice Marketing Chain 1998-99, Neang Menh Variety .	553
Figure 34 Rice Marketing Chain for Cambodia – 2004-05 Crop Year	554
Figure 35 Relative Trading Relationships between Actors in the Wet Season.....	555
Figure 36 Quantification of the Value Added along the Value Chain of Rice from Program Interventions	619
Figure 37 Quantification of the Value Added along the Value Chain of Maize from Program Interventions	620

Figure 38 Quantification of the Value Added along the Value Chain of Vegetables from Program Interventions	621
Figure 39 Quantification of the Value Added along the Value Chain of Soybeans, Cassava and Sweetpotato from Program Interventions.....	622
Figure 40 Quantification of the Value Added along the Value Chain of Fish from Program Interventions	623
Figure 41 Quantification of the Value Added along the Value Chain of Rice and Vegetables from Program Interventions	624
Figure 42 Growth Rates in GDP by Sector – 1994-2003	744
Figure 43 Growth Rates in Agricultural GDP by Sub-Sector – 1994-2003	745
Figure 44 Share of Cultivated Area by Crop Type – 1991-2004	746
Figure 45 Rice Cropping Patterns	747
Figure 46 Production of Paddy and Rice, Food Requirements and Food Balance	748

List of Boxes

Box 1 The National Strategic Development Plan (NSDP), 2006-2010: Key Commitments	50
Box 2. Niche Strategy in Rice Export: The case of Angkor Kasekam in Cambodia	73
Box 3 How Large Mills Cope with Changing Paddy Prices?	74
Box 4 Agricultural Cooperative in Battambang	80
Box 5 Farmer Organizations in Cambodia	83
Box 6. Storage Decisions Make a large Difference in Bottom Line	86
Box 7 Typology of Farm Households in Cambodia	104
Box 8 Success Story of Ken Yean and his wife Neary	105
Box 9 Improving Water Discharge Efficiency	113
Box 10 Improving Water Reservoirs	113
Box 11 Increasing Pumping Efficiency	114
Box 12 Measuring Moisture Content: Perception or Reality?	123
Box 13 Laboratory Tests for Quality of Processed Food	124
Box 14 How do Credit Components Perform?	135
Box 15 The IDE Approach to Poverty Reduction.	144
Box 16 Example of Proposal for a Smallholder Irrigation Scheme - 1	167
Box 17 Example of Proposal for a Smallholder Irrigation Scheme - 2	168
Box 18 Example of Proposals for Farmers Linking to Market - 1	169
Box 19 Example of Proposals for Farmers Linking to Market - 2	170
Box 20 Example of Proposals Under Farmer to Enterprise Contract Farming System- 1	171
Box 21 Example of Proposals Under Farmer to Enterprise Contract Farming - 2	172
Box 22 Unofficial Fees and Charges in the Cross-Border Trade with Thailand	384
Box 23 Unofficial Fees and Charges in the Cross-Border Trade with Vietnam	384
Box 24 How Large Mills Cope with Changing Paddy Prices?	391
Box 25 Profile of Angkor Kasekam	394
Box 26 Vegetable Farmer in Battambang	412
Box 27 Vegetable Farmer Group in Kampong Cham	412
Box 28 Vegetable Farmer in Prey Veng	413
Box 29 Organic Vegetable Farmer in Prey Veng	414
Box 30 Vegetable Farmer in Prey Veng	414
Box 31 Case Study of Fish Retailer	438

List of Maps

Map 1 Food Balance in Cambodia – 2000-2001	556
Map 2 Food Balance in Cambodia – 2001-2002	557
Map 3 Provincial Distribution of Crop Production 2003/04 – Paddy – Wet Season Harvested Area	558
Map 4 Provincial Distribution of Crop Production 2003/04 – Paddy – Wet Season Yield	559
Map 5 Provincial Distribution of Crop Production 2003/04 – Paddy – Wet Season Production	560
Map 6 Provincial Distribution of Crop Production 2003/04 – Paddy – Dry Season Harvested Area	561
Map 7 Provincial Distribution of Crop Production 2003/04 – Paddy – Dry Season Yield	562
Map 8 Provincial Distribution of Crop Production 2003/04 – Paddy – Dry Season Production	563
Map 9 Cambodia by Province	749
Map 10 Provinces and Regions of Cambodia	750
Map 11 Food Balance in Cambodia – 2000-2001	751
Map 12 Food Balance in Cambodia – 2001-2002	752
Map 13 Provincial Distribution of Crop Production 2003/04 – Paddy – Wet Season Harvested Area	753
Map 14 Provincial Distribution of Crop Production 2003/04 – Paddy – Wet Season Yield	754
Map 15 Provincial Distribution of Crop Production 2003/04 – Paddy – Wet Season Production	755
Map 16 Provincial Distribution of Crop Production 2003/04 – Paddy – Dry Season Harvested Area	756
Map 17 Provincial Distribution of Crop Production 2003/04 – Paddy – Dry Season Yield	757
Map 18 Provincial Distribution of Crop Production 2003/04 – Paddy – Dry Season Production	758
Map 19 Provincial Distribution of Crop Production 2003/04 – Maize – Wet Season Harvested Area	759
Map 20 Provincial Distribution of Crop Production 2003/04 – Maize – Wet Season Yield	760
Map 21 Provincial Distribution of Crop Production 2003/04 – Maize – Wet Season Production	761
Map 22 Provincial Distribution of Crop Production 2003/04 – Maize – Dry Season Harvested Area	762
Map 23 Provincial Distribution of Crop Production 2003/04 – Maize – Dry Season Yield	763
Map 24 Provincial Distribution of Crop Production 2003/04 – Maize – Dry Season Production	764
Map 25 Provincial Distribution of Crop Production 2003/04 – Yellow Maize – Wet Season Harvested Area	765
Map 26 Provincial Distribution of Crop Production 2003/04 – Yellow Maize – Wet Season Yield	766
Map 27 Provincial Distribution of Crop Production 2003/04 – Yellow Maize – Wet Season Production	767
Map 28 Provincial Distribution of Crop Production 2003/04 – Yellow Maize – Dry Season Harvested Area	768
Map 29 Provincial Distribution of Crop Production 2003/04 – Yellow Maize – Dry Season Yield	769

Map 30 Provincial Distribution of Crop Production 2003/04 – Yellow Maize – Dry Season Production.....	770
Map 31 Provincial Distribution of Crop Production 2003/04 – Cassava – Wet Season Harvested Area.....	771
Map 32 Provincial Distribution of Crop Production 2003/04 – Cassava – Wet Season Yield	772
Map 33 Provincial Distribution of Crop Production 2003/04 – Cassava – Wet Season Production.....	773
Map 34 Provincial Distribution of Crop Production 2003/04 – Cassava – Dry Season Harvested Area.....	774
Map 35 Provincial Distribution of Crop Production 2003/04 – Cassava – Dry Season Yield	775
Map 36 Provincial Distribution of Crop Production 2003/04 – Cassava – Dry Season Production.....	776
Map 37 Provincial Distribution of Crop Production 2003/04 – Sweet Potato – Wet Season Harvested Area.....	777
Map 38 Provincial Distribution of Crop Production 2003/04 – Sweet Potato – Wet Season Yield	778
Map 39 Provincial Distribution of Crop Production 2003/04 – Sweet Potato – Wet Season Production.....	779
Map 40 Provincial Distribution of Crop Production 2003/04 – Sweet Potato – Dry Season Harvested Area.....	780
Map 41 Provincial Distribution of Crop Production 2003/04 – Sweet Potato – Dry Season Yield	781
Map 42 Provincial Distribution of Crop Production 2003/04 – Sweet Potato – Dry Season Production.....	782
Map 43 Provincial Distribution of Crop Production 2003/04 – Vegetables – Wet Season Harvested Area.....	783
Map 44 Provincial Distribution of Crop Production 2003/04 – Vegetables – Wet Season Yield	784
Map 45 Provincial Distribution of Crop Production 2003/04 – Vegetables – Wet Season Production.....	785
Map 46 Provincial Distribution of Crop Production 2003/04 – Vegetables – Dry Season Harvested Area.....	786
Map 47 Provincial Distribution of Crop Production 2003/04 – Vegetables – Dry Season Yield	787
Map 48 Provincial Distribution of Crop Production 2003/04 – Vegetables – Dry Season Production.....	788

List of Abbreviations and Acronyms

ACAP	Australia Cambodia Agricultural Program 2007-2012
ACI	Agrifood Consulting International
ADA	Agricultural Development Action
ADB	Asian Development Bank
ADRA	Adventist Development and Relief Agency
AFD	Agent Francaise Pour Le Development
AQIP	Agriculture Quality Improvement Project
AusAID	Australian Agency for International Development
BAPEP	Battambang Agricultural Productivity Enhancement Project
CAAEP	Cambodia Australia Agricultural Extension Project
CAMSEM	Cambodia Multimarket Spatial Equilibrium Model
CARD	Council of Agriculture and Rural Development
CARDI	Cambodia Agricultural and Rural Development
CARDI-AP	Cambodia Agricultural Research Development Institute – Assistance Program
CC	Commune Council
CCSF	Cambodian Community Saving Federation
CDRI	Cambodia Development Resource Institute
CIDA	Canadian International Development
CRS	Catholic Relief Service
CSES	Cambodia Socioeconomic Survey
DAALI	Department of Agronomy & Agricultural Land Improvement
DAALI	Department of Agronomy and Agricultural
DAE	Department of Agriculture Extension
DOP	Department of Planning
DWRMAC	Depart. of Water Resources Management and Conservation
EIC	Economic Institute of Cambodia
ETOP	Environmental Threats and Opportunities Profile
FAO	Food and Agriculture Organization
FAS	Foreign Agricultural Service
FFS	Farmer Field School
GDP	Gross Domestic Product
GRET	Groupe de recherche et d'échanges technologiques
GTZ	German Technical Cooperation
HAACP	Hazard Analysis and Control Points
HDI	Human Development Index
IDE	International Development Enterprise
INGO	International Non Governmental Organization
JICA	Japanese International Cooperation Agency
LFA	Logical Framework Approach
LWF	Lutheran World Federation
MAFF	Ministry of Agriculture, Forestry, and Fisheries
MDG	Millennium Development Goals
MFI	Micro Finance Institutions
MOWRAM	Ministry of Water Resources And Meteorology
NGO	Non Governmental Organization
NIS	National Institute of Statistics
NSDP	National Strategic Development Plan
PCN	Program Concept Note
PDA	Provincial Department of Agriculture
PDOWRAM	Provincial Department of Water Resources and Meteorology
PDRD	Provincial Department of Rural Development
PDWA	Provincial Department of Women Affairs
PRDC	Provincial Rural Development Committee
RED	Rural Economic Development
RGC	Royal Government of Cambodia
RMA	Rice Miller Association
RPRP	Rural Poverty Reduction Project
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TA	Technical Assistance

T&V	Training and Visit
TF	Task Force
TOR	Terms Of Reference
TWGAW	Technical Working Group for Agriculture and Water
USDA	United States Department of Agriculture
VCA	Value Chain Approach
VDC	Village Development Committee
WUG	Water User Group
\$	US Dollar
ha	hectare
m	Meter
R	Riels

1 Executive Summary

1. Rice-based farming systems are the backbone of Cambodia's agriculture. They provide livelihood for the majority of rural households. In spite of Cambodia having achieved rice self sufficient and even an exportable surplus, the rice-based farming systems are characterized by low income. The typical farmer growing paddy gets an income per ha ranging between \$100 and \$ 200 per year. With little diversification into other crops and agricultural activities and with an average landholding size of 1 ha, poverty is pervasive.

2. Over the past 15 years Cambodia has made considerable achievements: peace, self-sufficiency in rice, infrastructure development, institutional building, access to WTO, the establishment of a market economy, sustained growth of the economy, and poverty reduction. Agricultural growth however has declined over the past few years and continues to be highly unstable. Agricultural productivity has increased but is still low (\$170/worker and \$517/ha). As a result, even though declined, poverty is still high at 35% of total households according to the 2006 Cambodia Poverty Assessment (World Bank 2006). Unless agricultural growth increases on a stable path, the goals of meeting the Millennium Development Goals of halving poverty by 2015 will not be reached.

3. The challenge ahead is to increase agricultural growth and generate more income opportunities in rural areas. Increasing the value added in rice-based farming system is crucial to this strategy of growth and poverty reduction.

4. Rice-based farming systems include not only rice, but other crops (eg vegetables, maize, soybeans), animal production (aquaculture and livestock), and potentially a wider range of horticultural products (fruits, spices, mushroom, flower, herbs, and medicinal plants). The key to unlock the values in rice-based farming system is to increase productivity and diversify into higher value activities, both at the farm level and particularly in the post-production stages of the value chain (processing, marketing, postharvest operations).

5. The objective of the Diagnostic Study is to analyze the value chains for rice-based farming systems in Cambodia and determine the potential values and the feasibility of different program activities. To this purpose, the Consultant's Team has undertaken various activities including consultations with stakeholders, fieldwork, and analytical work.

6. The starting point of the Study was to address through fieldwork a set of five questions related to the value locked in rice-based farming systems. The Study was based on the value chain approach and considered different stages and actors along the value chain.

Where is the value?

7. Value in the rice-based farming systems is generated by a variety of actors in a variety of activities. The study has analyzed some of the main agricultural production activities (rice, vegetables, aquaculture), and the main post-production activities (rice milling, food processing, and trade). The main findings show that:

1. Most farmers grow rice only once per year under rainfed conditions and without much intensification of production; the value added generated is low; with an average yield of 2 tons of paddy, rice gross margins per ha vary between \$100 and \$200.
2. However, there are several examples of increasing value at the farm level by pursuing a number of strategies including specialization in higher-quality rice (fragrant varieties, glutinous rice), double cropping of rice (provided that access to water is available), diversification into higher-value products (such as vegetables, fruits, soybeans, aquaculture, livestock), and integrating farming. Through these alternative strategies unit margins increase considerably and can reach the \$800 to \$2,000/ha.
3. Value in post-production activities is pursued by other actors along the value chain: traders, processors, and business enterprises. Even though gross margins for these actors is higher than for farmers (gross margins per small and medium agroenterprises varying between \$2,000 and \$100,000 per year), the general finding is that there are still too few stakeholders engaged in value added activities and even among those who do engage in these activities most are operating on a small scale and find it difficult to expand and diversifying further.

Who is generating the value?

8. The process of increasing value is closely related to differentiating the products, adding features to the product for which the consumer is willing to pay a higher price. Agroentrepreneurs (including farmers, processors, and traders) are the key actors in adding value. They are able and willing to make innovations, take risks, and engage in activities that meet market demand; by doing so, they achieve higher value, remain competitive, and generate employment opportunities both for farmers and off-farm rural households. The problem is that there are too few agroentrepreneurs. In a province such as Battambang, comprising a population of about one million, the local Chamber of Commerce includes only about 450 entrepreneurs (most small enterprises a large number of which are agroenterprises). While the overall situation of agroentrepreneurship in Cambodia points to a scarcity of actors, there are success stories, including agroentrepreneurs who have single-handedly created successful niche markets and organized a supply chain such as in the case of Angkor Kasekam rice mill.

How can value be increased?

9. The generation of value added implies the pursuing of different strategies aimed at increasing the price consumers are willing to pay, increasing the quantity consumers are willing to purchase, and reducing the costs of producing. Value generation is therefore not a single strategy. Different stakeholders pursue a combination of these strategies that involve the introduction of new technologies and new approaches to marketing, management, planning, and finance. Increasing value added is not only the result of introducing new seed varieties or introducing irrigation in a previously rainfed farming system. It involves establishing linkages with other stakeholders to achieve economies of scale in gaining access to markets, knowledge, and finance. The variety of strategies observed in the field implies that a blanket approach to be applied to all situations will not work. Any approach aimed at increasing value in rice-based farming systems of Cambodia will need to be flexible to adapt itself to the variety of market and agroecological conditions, and socioeconomic circumstances of the stakeholder.

What prevents value-added to be increased?

10. There are numerous constraints to increasing value added; moreover different constraints face different stakeholders. Some of these constraints are specific to the types of stakeholders and economic activities (production, trade, processing) and others are cross-cutting issues that affect a large number of stakeholders (for example illegal fees, land titles, deforestation). In the effort to identify the entry points for the formulation of a program to develop rice-based farming systems, it is useful to prioritize the vast range of constraints. Stakeholders have prioritized constraints in the following order: technology, marketing, water, and capital. Each of these constraints has various and complex dimensions.

How could the poor benefit from increasing value added?

11. Poverty has several characteristics and the poor in Cambodia are of many different types. The poorest farm households usually have little or no land assets, whereas other poor or lower income farm households have at least 0.5 ha of land and various other animal and physical assets. While it is almost impossible to design a program to increase farm productivity for farm households who do not have land, smallholder farmers with some minimum land asset could benefit directly from increasing of value added at the farm level. For the poorest and asset-less farm household, benefits from increasing value added in rice-based farming systems are in the form of higher wages and more stable employment opportunities. The fieldwork has also provided examples of increased income for previously poor farm households who have been able to either increase agricultural productivity or started small and medium agroenterprises.

Lessons

12. There are a number of lessons learned from the fieldwork and consultations with a broad range of stakeholders. These lessons relate to the implementation of programs, farmer organizations, and value addition. Related to the implementation of programs the main lessons suggest the need of flexibility and adaptation to local circumstances rather than applying models that might not be appropriate to the local conditions. Related to farmer organizations, there is an increasing confidence that slowly farm organizations are emerging in Cambodia, even though most of them still consist of small farmer groups, often not autonomously founded and with weak capacity to pursue common business interests. Related to value addition the main lessons emphasize the need of improving productivity, volumes, quality, establish market linkages, and agricultural diversification in terms of products and activities (for example on-farm processing).

The Program Concept Note (PCN)

13. The PCN has been prepared and submitted to AusAID separately. The following paragraphs summarize the concept note.

14. The Program⁴ concept is built firmly on the value chain approach in order to develop an **integrated** set of activities to achieve the Program purpose. The advantage of a unified approach over an alternative concept based on the collection of potentially unmanageable, discrete and un-integrated projects is underlined in the Scoping Studies and the

⁴ "Program" in this note refers to the Australia Cambodia Agricultural Program 2007-2012 (ACAP).

conclusions of the Sector Monitoring Group, and embodied in the TOR of the Diagnostic Study.

15. The Program will focus on a small number of value chains in rice-based farming systems and facilitate **upgrading** the technologies, the market linkages, and the infrastructure (irrigation and marketing) needed to increase value added at different stages of the value chain. Increasing value added along the value chain will lead to higher income and employment opportunities to smallholder households, workers, and agroenterprises, thus contributing to poverty reduction and food security.

16. Central to the Program approach is the idea that farmers, traders, and processors formulate investment proposals to meet market demand and increase income. The Program will facilitate this process in two mutually reinforcing ways. First, it will facilitate **investments** to upgrade the value chain by providing capacity building, advisory services, technical assistance, and capital on a competitive matching-grant basis. The matching-grant will be on a sliding scale – the poorer households will have to contribute less while the more affluent households and commercial entrepreneurs will have to contribute more. Second, the Program will promote **policy dialogue** with the Government and coordination with donors to raise awareness and find solutions to the key policy and institutional constraints to value chain development.

17. Underlying the formulation of the Program is the concept of **linkage**. Unless smallholder households and small enterprises are able to establish effective linkages among themselves and with service providers, they will face enormous difficulties in overcoming the constraints arising from low **economies of scale** and limited access to technology, markets, and capital. In the Program concept the increase in value added and the strengthening of value chain linkages are two closely interlinked dimensions of value chain upgrading.

18. The **geographical scope** of the Program includes two levels: national and local. At the national level the Program promotes policy dialogue and investments by enterprises involved in the value chain. At the local level, the Program will **initially work in two provinces** and focus on activities and investments involving farmers and firms in **two value chains** that promise a large impact on income, poverty reduction, and food security. The activities at the national level are expected to reinforce the value chain activities in the selected provinces. As the Program progresses, the expansion to additional provinces and value chains could be considered based on performance, resources, and lessons learned.

Program Rationale and Strategy

19. In order to increase income of smallholder households, agriculture will need to intensify and lower the cost of production, diversify towards higher value products, and ensure that farmers and enterprises are competitive and well integrated with rapidly growing urban and international markets. There are however numerous constraints that make difficult the process of intensification, diversification, and market integration of Cambodian agriculture, including: (i) technology, (ii) marketing, (iii) water; and (iv) capital.

20. There are two fundamental issues underlying the constraints. The first issue is that most of the farm households and small and medium enterprises (SMEs) have few assets and are largely unorganized; as a result they do not reach the economies of scale to access technology, markets, and capital required for rapid growth. The second issue is the presence of policy and institutional weaknesses related to illegal fees, poorly defined

property rights, inadequate research and extension, high cost of credit, undefined water resource management policy, and deforestation. These policy and institutional weaknesses result in a difficult business environment for the growth of agriculture and value added.

21. The Program addresses the first issue of economies of scale by promoting the development of value chains and the strengthening of value chain linkages among small scale farmers, SMEs/agribusinesses, markets, and service providers. The Program addresses the second issue of policy and institutional weakness by promoting reforms through policy dialogue.

22. The emergence of effective value chain linkage will not occur automatically but requires institutional mechanisms and interventions that are of public good nature and therefore justify public investment. The Program provides the resources and the technical assistance required to build the capacity of stakeholders and service providers and improve the management and operations of value chains. Building or strengthening capacity of stakeholders and service providers is not enough however. In order for this improved capacity to be incorporated into strategies, operations, and practices of farmers and entrepreneurs, investments are also necessary. The Program cofinances demand-driven investments using a matching-grant mechanism. The Program's criteria for judging if a demand-driven investment should be cofinanced include the following: the investment should be (i) technically feasible; (ii) economically viable; (iii) directed to improve value chain linkages; (iv) expected to improve competitiveness; and (v) contribute to poverty reduction.

23. While past and ongoing projects have focused on improvement of discrete aspects of the agricultural system (e.g. research, extension, seed, BDS, credit, irrigation), so far there has not been an **integrated program** focused on value chain development in agriculture that links smallholders to SMEs/agribusiness and service providers. The proposed Program provides the opportunity for this focus to be introduced in Cambodia agriculture through investments in the value chain and policy dialogue to improve the environment for value chain development. The expected benefit would be in terms of rice-based farming systems able to generate higher value resulting in increased income for smallholder farmers, workers, and enterprises.

Program Framework

24. The Program will contribute to the **development goal** of ensuring food security for all people, increase income and improve livelihood for rural poor farmers by improving agricultural productivity and diversification of agriculture in Cambodia. The **purpose** of the Program is to generate higher value added in rice-based farming systems resulting in higher income of farmers, workers, and entrepreneurs, particularly the poor among them. In order to achieve its purpose, the Program will be organized into interrelated **components** and **subcomponents**:

1. Value Chain Development Component (VCDC). This component will improve value added through the implementation of sub-projects based on demand-driven proposals related to upgrading of technologies, value chain linkages, and irrigation and marketing infrastructure. Its subcomponents include: (1.1) Technologies; (1.2) Marketing and Value Chain Linkages; (1.3) Water Management and Irrigation Infrastructure; and (1.4) Marketing Infrastructure.

2. Policy, Capacity, and Management (PCMC). This component will contribute to the improvement of the policy environment and stakeholders' capacity through policy dialogue, capacity building, and coordination in the implementation of the Program. Its subcomponents will be (2.1) Policy Dialogue and Coordination; (2.2) Capacity Building and Awareness; and (2.3) Program Management.

25. The selected subcomponents will enable a **fully integrated value chain** Program. Just as linkages and governance along the value chain are a vital aspect of the program intervention, linkages between the subcomponents are a vital aspect of program management. Having the individual interventions (Technologies; Marketing and Value Chain Linkages; Water Management and Irrigation Infrastructure; and Marketing Infrastructure) as separate components of the Program runs the **significant risk of duplication** of project management, separate lines of decision making and investment approval, and a lack of a coordinated approach to value chain development.

2 Introduction

26. AusAID is planning an **Agricultural Development Program** in Cambodia for the period 2007-2012 with the initially identified purpose of “*obtaining increased benefits (e.g. food security, reduced vulnerability, increased income) and better livelihood prospects for rural poor farmers from rice-farming systems, by direct implementation of activities in selected provinces and policy activities at the national level of Cambodia*”. The Program Design Strategy is split into (i) a diagnostic phase during which a Diagnostic Study will be carried out and (ii) a program design phase. This report refers to the diagnostic phase of the Program Design Strategy.

2.1 Overall AusAID Cambodia Agricultural Program (ACAP)

27. According to the TOR (see Appendix A), the overall AusAID Cambodia Agricultural Program for 2007-2012 (henceforth referred to as ACAP) has a three-parts structure as follows:

1. A rice-based farming systems value chain part focusing on a limited number of provinces
2. A NGO-based rural development part, possibly focusing on other provinces
3. A Policy Dialogue part, at the national level

2.2 Objective of the Diagnostic Study

28. According to the TOR, the primary objective of the Diagnostic Study is to analyze the value chains for rice-based farming systems in Cambodia and determine the potential values and the feasibility of different program activities.

2.3 Outline of Report

29. The report consists of 18 sections as follows.

30. Section 1 is the Executive Summary. Section 2 provides an introduction to the report, and presents the objectives of the Diagnostic Study. Section 3 provides background information related to the agricultural sector, rice farming systems, the policy context, past and ongoing projects, and AusAID country strategy. Section 4 discusses the field work findings. Section 5 reports the results of the value chain analysis. Section 6 discusses entrepreneurship in the context of rice-based farming systems. Section 7 identifies different strategies to unlock values in rice-based farming systems. Section 8 presents the constraints in the rice value chain identified by respondents and discusses the priority constraints. Section 9 deals with the issue of how the poor could benefit from value added. Section 10 discusses the lessons learned. Section 11 presents the problem analysis of the value chain for rice-based farming systems in Cambodia, while Section 12 discusses alternative strategic options to attack the identified core problem of increasing value added in rice-based farming systems. Section 13 presents the proposed approach of the Consultant’s Team to program formulation. Section 14 indicates the proposed components

of the program. Section 15 gives an economic analysis of the impact of proposed interventions. Section 16 discusses the institutional framework. Section 17 analyzes the expected impact of the proposed program on poverty. Section 18 gives recommendations for the Design Phase.

31. In addition to the main text, there are 16 Appendices as follows.

32. Appendix A contains the TOR of the Diagnostic Study. Appendix B contains a progress report on the work of the Consultant's Team. Appendix C lists the members of the Consultant's Team. Appendix D lists the person met. Appendix E provides the methodology for field work. Appendix F contains the summaries of case studies. Appendix G contains the summaries of focus group discussion. Appendix H contains the summaries of key informant's interviews. Appendix I is a review of the evidence on Farmer Field Schools Impact. Appendix J is the full value chain analysis report. Appendix K presents an analysis of competitiveness and constraints quantification. Appendix L provides a summary of the Strategy Workshop held on 10 March 2006. Appendix M provides a summary of the Final Workshop held on 24 March 2006. Appendix N contains a response of the Consultant's Team to the comments by MAFF to the Aide Memoire/Debriefing Note. Appendix O contains the draft TOR for the Design Phase Consultant's Team. Appendix P contains tables and figures referred to in Section 3.

3 Background to the Study

3.1 Features of Agricultural Sector in Cambodia

33. Cambodian farming systems are largely subsistence oriented and are dependent on rainfed conditions thereby excessively exposing producers to production uncertainties. Most agricultural activity is based on low input and rain fed production systems centered on paddy rice production. A lack of irrigation facilities restricts the majority of producers to a single, rain-fed rice crop per year. Other livelihood options for smallholders include rearing livestock (mostly poultry and pig production), fishing in rivers and wage employment on larger farms/plantations.

34. The main crops are paddy (wet season, dry season, receding and floating), corn, soybean, mungbean, cassava, sugarcane, peanut, sesame, sweet potatoes, Chinese cabbage, cauliflower, lettuce, water melon and tobacco. Plantation and industrial crops include rubber, cashew nut, pepper, palm sugar, palm oil and fruit trees (mango, pineapple, jackfruit, durian, rambutan and banana. Teak wood and acacia are two of the main commercial forest timber species and non-timber forest products include bamboo, grass, fodder, honey and mushrooms. Firewood is also collected).

35. The agricultural producers tend to be risk averse and are reluctant to undertake any value added activities, unless they see demonstrated direct benefits. Typically, traders from nearby towns with links to larger traders/processors/exporters collect marketable surplus from the households, often at prices well below market prices available in urban centers. Producers tend lack storage facilities and at the same time are in need of cash which leaves them with no other option but to sell at an offer price. Lack of proper market organization also implies that producers lack bargaining power.

36. Primary agricultural produce collected in the villages tends to be sold to local wholesale traders, processors and/or exporters. The volume of border trade is not known but is considered substantial with respect to informal export to China, Thailand and Vietnam. Marketing margins for middlemen are reportedly high for soybean, mungbean and cassava. Institutional inefficiencies limit establishment of efficient value-added agro-processing industries, which could potentially benefit producers and consumers alike.

37. Paddy rice and other major crop yields per hectare remain substantially low by South-East Asian standard and this holds for other commodities as well. Unless cropping intensity improves (primarily through irrigation provision and input application) it is not certain if paddy rice holds a comparative advantage over other crops in the respective agro-ecological zones. If markets develop in niche commodities (for example, including organic paddy rice), seasonal vegetables and pulses then other crops may replace rice in the local economy.

38. In addition to State forestry, major plantation crops are rubber, cashew nut and pepper. Rubber is also planted by smallholders and is sold to large rubber plantations in the area as well as traders linked with the Vietnamese market. Cashew is relatively new commodity which has been popular since land was provided to influential people under economic concessions for agricultural activities. In the past, returns from cashew nuts have varied widely but in recent years it is perceived to be a profitable economic activity. Raw cashew is exported to Vietnam through both formal and informal channels. However,

there is very little evidence to suggest that rapidly increasing cashew nut cultivation will be viable over time as land planted under cashew is committed for a longer duration compared to most fruit trees and seasonal crops.

39. The rapid pace of deforestation in Cambodia has outstripped reforestation efforts. A major part of deforested land has been leased to influential people having price speculation motives and/or for production of crops often not undertaken by traditional small holders (e.g. plantation rubber, cashew nuts, pepper etc). These allocations are not based on any economic or social justification. There is little evidence to suggest that these concessions have provided reasonable returns to the Government. Furthermore, the newly reforested areas are poorly maintained due to budgetary limitations (funds available for only three years) and this is likely to lead to poor harvest when trees mature.

40. Cambodia has initiated community forestry in recent years, primarily under the auspices of non-governmental organizations. The community forest lands are of both adequate cover as well as degraded land. The Government has issued a Sub-decree for community forestry and associated regulations are likely to be ready by late 2005 or early 2006. Some NGOs have undertaken valuation of non-timber forest products but no economic or financial analysis has been undertaken prior to allocating land for community forestry.

3.2 Characterization of Agro-ecological Zones and Dominant Farming Systems

41. Cambodia is richly endowed with land, as well as substantial natural resources, notably forests and fisheries, and a wide variety of natural habitats and ecosystems, including upland and lowland forests, freshwater wetlands, and diverse riverine areas. However, 70 percent of the population is concentrated on 30 percent of the land, along the lowland corridor from the Thai border in the Northwest to the Vietnamese border in the Southeast. Most land is used for rice cultivation and fishing in the flood plain and riverine areas, with population pressure increasingly threatening the Tonle Sap ecosystem (flooded forest and lake fisheries). In contrast, dense forest and low population density characterize the North/Northeast and Southwest of the country. Transition zones between lowland and uplands are experiencing increasing immigration and encroachment of farmers on forested areas. Strategies and policies for the management of natural resources would need to recognize these differences and provide responses tailored to regional and local situations – different population densities and different agro-ecosystems (World Bank 2005).

42. Cambodia is characterized by a diversity of farming systems which can be classified in seven major groups; four rice-based farming systems, two “chamcar” crops based farming systems, and a more limited industrial production system (GRET, IRAM et al. 2000). These systems differ in their potential for intensification, diversification and commercialization. However, low productivity terraced rain-fed rice farming systems are undertaken by around 70 percent of the rural population, representing 80 percent of the rice cropping area and 70 percent of paddy production; which explains the low performance observed at the aggregated level.

43. The four major types of rice farming system include (GRET, IRAM et al. 2000):

1. The one found in non-irrigated terrace zones, characterized by poorly productive and rainfall dependent seasonal rice cropping, frequently associated with sugar palm; this system is the most common among Cambodian farmer; see Table 294. Recent changes include the introduction of double cropping;
 2. Flood recession zones where water control allows intensive rice cropping; with good water and soil fertility control, evolution can be rapid towards either specialization in intensive rice farming – with land concentration and development of a salaried workforce -, or towards the diversification of production;
 3. Floating rice, in large flooded fields, where the extensive nature of farming practices allows good labor productivity but in which hydraulic risks are higher; these systems are regressing and evolving either into flood recession rice or into irrigated double cropping; and
 4. Upland rice-based systems, involving slash-and-burn land preparation, mainly located in less densely populated areas of North-Eastern provinces; these systems are less and less rice based, with increased population inflows and the development of cash crops by migrants.
44. “Chamcar” cropping refers to widely diversified farming systems in which rice cropping is most often found but where “dry” cropping is prevalent. They can be grouped in (GRET, IRAM et al. 2000):
1. River bank farming systems, dominated by diversified cropping systems following the annual flooding cycle, with a high development potential; land prices are high and land concentration induces the emergence of larger farms with mechanization and use of a smaller workforce; and
 2. Red and black soils upland farming systems, where rubber farming is concentrated and other cash crops are developing fast; the future of these systems depends on the restructuring of the rubber industry and to the development of annual crops, notably maize, soybeans, and other tree crops such as cashew nuts or bananas.
45. The last system is the modern, capital intensive one found mostly near cities, whether in riverbank zones (around Phnom Penh) or in combination of riverbanks and terraces (Battambang, Siem Reap); intensive market garden cropping, industrial chicken farming, orchards, etc. The evolution of this system will depend on the expansion of urban markets, labor costs, and development of alternative uses for capital in other economic sectors, as well as on the evolution of external markets for the main export commodities (oil palm, soybean, cashew nut, etc.) (GRET, IRAM et al. 2000).
46. In addition to the seven major types of farming systems, agrarian structure in Cambodia can be classified into agro-ecological zones and micro-zones. There are four agroecological or ecosystem zones in Cambodia; Northeast, Mekong, Coastal and the Tonle Sap; see Map 9 and Map 10. There are four microzones in Cambodia which are defined as:
1. Zone A. Fully irrigated zone in dry season;
 2. Zone B. Rainfed;

3. Zone C. Zone with supplemental irrigation in the wet season; and

4. Zone D. Chamcar.

47. Table 306 presents information on cropping patterns across agroecological zones and micro zones, while Table 307 shows the area, production and yield of selected crops by microzone⁵.

48. In addition to different farming system types, it is important to recognize the different economic zones prevalent in Cambodia, which may overlap with different farming systems. Helmers, Gibson and Wallgren (2003) outline six food economy zones in Cambodia based on the WFP classification:

1. Lowland rain fed areas. (45 districts, 2.9 million people) The majority of the population rely on a single non-irrigated wet season rice crop as a major food and income resource; small independent land holdings; income is supplemented by a variety of seasonal activities. Terrain is characterized as relatively flat and under extensive cultivation.
2. Riverine. (28 districts, 1.7 million people) The majority of people rely on cash crops, floating or dry season rice, and fishing for food security and income. Reside next to major rivers or in communes adjoining the Tonle Sap.
3. Urban/Market. (17 districts, estimated at 1.3 million people) Rely on cash income jobs and small business in urban government centers.
4. Scrub/contract labor. (24 districts, 1.2 million people reside in these areas) People rely mainly on degraded-forest resources and wage labor for income. Limited cultivation of rice, insufficient to meet annual needs. Landless households are commonly found in these areas. Vulnerable to reduction of forest resources through exploitation, and isolation from markets and major roads.
5. Forest. (37 districts, 450,000 people) Rely mainly on forest products for food and income. Vulnerable to access to forested areas. Very low densities, less than 8 people per square kilometer.
6. Mixed. Forest/rice (4 districts, 229,000 people), forest/riverine (3 districts, 122,000 people), forest/scrub (9 districts, 230,900 people), rice/scrub/forest (3 districts, 104,500 people), unclear/diversified (7 districts, 565,000 people).

49. The World Food Program evaluated the relative importance of different agro-ecosystems as shown above. A broad comparison of this classification with land use maps and poverty maps shows that the incidence of poverty is higher in lowland rain fed and scrub/degraded-forest areas, where the majority of the population is concentrated (Helmers, Gibson et al. 2003). However, the progress towards meeting the Cambodia

⁵ There is no commonly accepted agro-ecological zoning system in Cambodia, with different agencies and donors using different classifications. As an example, SCIRIP SCIRIP (2002). An Agroecosystems Analysis of the Steung Chinit Irrigation Project. Phnom Penh, Cambodia, Steung Chinit Irrigation and Rural Infrastructure Project (SCIRIP); Department of Agricultural Extension (DAE); Provincial Department of Agriculture Forestry and Fisheries (PDAFF); and Office of Agricultural Extension (OAE). identifies four agroecological zones in their irrigation project area in Kampong Thom; (i) lowland rainfed Riceland and market zone, (ii) lowland rainfed Riceland, (iii) alluvial flood plain zone, and the (iv) undulating upland mixed crop zone.

MDGs indicate a different situation, with a clear distinction between the Northern provinces, late on most MDGs, and the rest of the country where more progress is being made in reaching some or all the MDGs (World Bank 2005).

3.3 Performance of Agricultural Sector

3.3.1 Productivity

50. Cambodia is largely still an agrarian society, with agriculture representing the major share of GDP (31.1 percent in 2004 according to the latest figures of the National Institute of Statistics) and the majority of the population (84 percent) living in rural areas and depending mostly on agriculture for their livelihood; see **Table 275**. Productivity of agriculture is still quite low, both in terms of labor (about US\$170/worker) and in terms of land (US\$518/ha). Since the majority of the population depends on agriculture for their livelihood and most of this population is made of smallholders with less than 2 ha per household, the low productivity of agriculture implies that poverty is widespread in the country (28 percent of the population are poor) and concentrated in rural areas (34 percent of the rural population are poor)⁶.

51. The situation however, is changing. Production and productivity are increasing, the share of agriculture in GDP is decreasing while that of industry is increasing, infrastructure is improving, and since 1998, political stability for the first time in a long period of recent history seems to ensure the basic condition of peace⁷. Population growth is still high, at 2.5 percent annual growth and the composition of the population shows a large share of youth (42 percent below 14 years of age) suggesting the need of rapid growth in employment to absorb an even greater growth of labor force.

52. Over the period 1994-2003, agriculture was the major sector of the economy, averaging 41.2 percent of total GDP in Cambodia, while services averaged 34.5 percent and industry 19.3 percent; see Table 276. Over the short span of 10 years, however, considerable changes have occurred in the structure of the Cambodian economy. Agricultural share of GDP declined from 46.3 percent in 1994 to 34 percent in 2003. During the same period industry grew spectacularly from 13.9 percent to 26 percent, and services declined from 35.3 to 34.2 percent of GDP. The most dynamic sectors of the economy have been electricity, gas and water; textile, wearing apparel and footwear; and hotels and restaurants. While industry growth has been strong and increasing from the first sub-period (1994-97), through the second sub-period (1997-2000), and into the third period (2000-2003), in the case of agriculture, growth has been slow and declining from an average of 11.9 percent in 1994-97 to 2.6 percent in 2000-03; see Table 277, Table 278 and Figure 42. Over the overall period 1994 to 2003, average growth rate of agricultural GDP has been 6.7 percent, compared to 18.2 percent for industry and 9.7 percent for services; see Table 278. In the period since 1997, agriculture has the slowest growth rate in the economy; see Table 279 and Figure 42.

⁶ Overall poverty rates fell from 47 percent in 1993/94 down to 35 percent in 2004 based on a backwards projection from the 2004 sampling frame. However, when the 1993/94 sampling frame is used and only those overlapping areas in the 2004 CSES compared, the poverty rate fell from 39 percent down to 28 percent in 2004. These latter data are used as Conway Conway, T. (2006). *Poverty Assessment 2006 - Summary of Findings*. Cambodia: Halving poverty by 2015? - Launch Conference for the Cambodia Poverty Assessment 2006, Hotel InterContinental, Phnom Penh, World Bank Cambodia Country Office. then presents the breakdown of urban and rural poverty headcounts based on the 1993/94 sampling frame.

⁷ Despite the year-long hiatus in forming a new government in 2004, the social stability of the country was not upset.

53. Within agriculture, crops and fisheries are the most important sub-sectors with 46 and 29.5 percent of agricultural GDP, respectively, over the period 1994-2003; see Table 280. This is followed by livestock (14.1 percent of agricultural GDP) and forestry (10.3 percent). However, within agriculture there has been also some change, particularly as related to the role of forestry in GDP. Forestry contribution to GDP has declined from 16.1 percent in 1994 to 5.6 percent in 2003. At the same time, livestock, crops and fisheries have increased their contribution.

54. In terms of GDP growth performance (see Table 278), crops and livestock (with a growth of 9.3 and 8.6 percent, respectively, over the period 1994-2003) have fared better than fisheries and forestry (growth of 7.3 percent and -3.4 percent). The dramatic fall in growth rate of forestry GDP is related to the changes in logging policy.

55. Year to year growth of various sub-sectors is extremely variable; see Figure 43. In fact, when considering the coefficient of variation of various sub-sectors, growth in GDP of forestry is the most variable (coefficient of variation of -704) followed by crops (203), livestock (115), and fisheries (112).

56. Cambodia has enjoyed growth with poverty reduction. Over the period 1997 – 2003, GDP has grown by 6.4 percent on average (IMF 2004). Over the same period, poverty rates (using comparable samples) fell from 47 percent to 35 percent.⁸ However, apparent progress at the national level masks significant differences across within Cambodia as the following Table 1 shows. While urban areas continue to see significant falls in poverty levels, the rural areas lag behind. Consequently, this has resulted in increasing inequality, with the Gini coefficient estimated at 0.42 (up from 0.38 in 1993 and equal to the 1997 estimate) (Jackson 2005).

Table 1 Main Poverty Trends 1993/94 – 2004

	Poverty Headcount			Poverty Gap Index		
	1993/94	1997	2004	1993/94	1997	2004
Cambodia	39.00	43.32	27.97	9.21	11.94	9.02
Phnom Penh	11.39	11.77	4.60	3.06	2.31	1.23
Other Urban	36.62	32.40	20.54	9.66	8.72	6.55
Rural	43.12	51.37	33.66	9.99	13.57	10.17

Source: (Knowles 2005).

Estimates from the 1993/94 SESC, 1997 CSES and 2004 CSES are estimated using a consistent sampling frame.

57. Growth in agricultural GDP of around 6.7 percent per year between 1994 and 2003 has contributed greatly to food security and poverty reduction in rural areas and amongst farming households. This growth in agricultural output has been a result of economic reform within Cambodia, as well as an increased emphasis on exports of agricultural products; notably rubber, livestock, maize, soybeans and paddy.

58. Despite the impressive growth in export values and volumes over the past decade, agricultural exports from Cambodia still faces a number of hurdles for further development; including a predominance of exports of low value-added bulk commodities and a lack of commercial integration with the rest of the world economy.

⁸ Data from Knowles Knowles, J. (2005). A New Set of Poverty Estimates for Cambodia, From 1993/94 to 2004. Phnom Penh, World Bank., in which the sampling frame is revised to permit inter-temporal comparisons between the 1993/04, 1997 and 2004 surveys.

3.3.2 Land Use

59. Consistent data on land tenure and land use in Cambodia is difficult to obtain. Sophal et al (2001) provides a comprehensive review of land use patterns up to 2001, base on data from 1992/93, 1996/97 and 1999/00.

60. Table 295 and Table 296 provide a general characterization of the farm households surveyed in the 1999 SES in terms of income, income composition, demographic characteristics and farm features. Farm households are defined as the 2,764 rural households who cultivate some land. The households are divided in two groups classifying as poor (respectively non-poor) those households that are in the lower (respectively higher) 50 percent of the income distribution (Auffret 2003).

61. The average annual per capita income of the farm households surveyed in 1999 was about US\$210 with the poorest half having an annual per capita income of US\$130, while the per capita income of the top half is more than twice greater or about US\$290. However, poor farm households are slightly less dependent on cultivation income than non-poor households. Consequently, within the rural sector, households depend on off-farm activities for about one third of their income and they depend on activities which are not related to cultivation for about two thirds of their income (Auffret 2003).

62. Consistent with the findings on rural poverty throughout the world, poorer farm households tend to have larger families with more children than better-off farm households. Farm households have an average of 5.4 members while the presence of more children in poor households makes them larger than non-poor households.

63. Based on the 1999 SES, 23 percent of rural households are landless i.e. they do not possess any agricultural land. However, landless households are not necessarily poor as some of them derive income from sources other than agriculture. In fact, the average annual per capita income of landless households who live in rural areas is about US\$380 much above per capita income of rural households who have some land (US\$208). Landless households are also on average better educated. Overall, only 14 percent of the poor rural households are landless compared with 33 percent of the non-poor.

64. The average agricultural land operated per farm household in the 1999 SES was small, around 1.5 hectares. Average agriculture landholding for poor farm households is smaller at 1.3 hectares. This equitable distribution of land across households is the outcome of the 1989 land reform when land was distributed, by and large equitably, together with the fact that the number of rural land transactions has remained low since 1989. According to the SES, the Gini coefficient of inequality in agricultural land holding is 0.58 for all rural households and 0.46 for those households who cultivate some land which indicates a relatively equal distribution of land. The composition of landholding also varies across income group: while non-poor households own and manage almost all the land they operate, poor farm households depend to a larger extent on common land with unsettled ownership (Auffret 2003).

65. The proportion of households who own a buffalo – the main source of draft power -- is low (12.3 percent) and varies little across income group. Also, only 7.5 percent of farm households have received credit for agricultural production. Farm households' access to

public services is extremely limited. Only 2 percent of them have access to electricity (less than one per cent of the poor) and 15 percent have access to potable water (Auffret 2003).

66. The National Institute of Statistics is currently processing the results of the 2003-04 Household Socio-Economic Survey, which should provide some indication of land tenure across Cambodia; see MOP and NIS (2004; 2004; 2004; 2004). Preliminary results from the SES are detailed in Kanol (2004).

67. Estimates from Sophal et al (2001), IFSR (2004) and MAFF (2004) cited in World Bank (2005) indicate some 26 percent of land is under forests (not under concessions), 18 percent is classified as protected areas and forests, 17 percent is under forestry concessions, 15 percent is cultivated land, and 9 percent is classified as “scrub land, non-wooded land, etc.”; see Table 293.

68. Table 294 shows the relative importance of main farming systems in the year 2000 in terms of rice production. Most of the production in rice (71 percent) comes from terraced rice, with a further 14 percent from receding rice and 9 percent from riverbank rice production (GRET, IRAM et al. 2000).

69. ADB (2002) conducted an extensive survey of farmer investment (468 households), which included information on land use patterns. The relevant results from this survey are shown in Table 297 to Table 303⁹. The results show some interesting patterns.

70. In Table 298, Table 299 and Table 303 the agricultural activities across farm size in the ADB survey are shown. For farm size above 0.425ha, the agricultural activities are reasonably consistent; most households grow rice (>83 percent), between 25-50 percent have Chamcar land, and percent grow vegetables. For those households with under 0.425ha of land, only 38.8 percent grow rice and 20 percent have Chamcar land. Patterns of vegetable production for these small land holdings is the same for larger land holdings (8 percent of the smaller farms grow vegetables), but the larger the farm the more likely they are to undertake fruit production or have forestry land. The results indicate some possible trends, under the assumption that farm households engage in efficient agricultural production at their given farm size and economic circumstance¹⁰.

71. Smaller farms are more likely to diversify from just rice production (into income generating activities and risk minimization strategies) since rice is unlikely to provide enough income for sustainable livelihoods on such small land sizes. Vegetable production seems to be immune from economies of scale; primarily due to labor constraints in vegetable production (vegetable production is labor intensive, thereby limiting farm size). Orchard production appears to have some economies of scale, as does forestry activities. In terms of gender of the head of household, female headed households are more likely to be engaged in rice production and vegetables, while male headed households are more likely to be engaged in Chamcar and orchard production. Agro-ecologically, wet season production is undertaken by more households in Pursat (90 percent of land), Svay Rieng (83 percent of land) and Kampong Speu (71 percent of land) compared with the other

⁹ The survey stratified according to farm size, but did not present the weighted results. Therefore, there is no interpretation of data across different farm size, only within farm size strata.

¹⁰ See Sophal and Acharya Sophal, C. and S. Acharya (2002). Facing the Challenge of Rural Livelihoods: A Perspective from Nine Villages in Cambodia. Phnom Penh, Cambodia, Cambodia Development Resource Institute. for a description of the process of land acquisition and landlessness in the context of land use and agricultural productivity in nine selected villages in Cambodia and Sedara et al Sedara, K., C. Sophal, et al. (2002). Land, Rural Livelihoods and Food Security in Cambodia: A Perspective from Field Reconnaissance. Phnom Penh, Cambodia, Cambodia Development Resource Institute. for another six villages.

provinces in the ADB survey. Very little dry season production was undertaken in Pursat, Svay Rieng, Kampong Speu and Kampot (5.5, 1, 17 and 19 percent respectively); see Table 303.

72. Table 300 and Table 301 show the results of the land tenure situation amongst the ADB (2002) surveyed households. Overall, most households own their own land (95 percent), with 16 percent also renting additional land. Very few are renting out land (2.4 percent), while almost none of those surveyed were using usufruct land¹¹. This was relatively consistent across land size holdings, with only those households with less than 0.425ha having less owned land (just under 80 percent). There were some regional variations in land ownership structure, with fewer households in Pursat and Sihanouk Ville owning land compared with households in Kampong Speu, Kampot, Kampong Cham and Svay Rieng (85 and 83 percent respectively compared with over 98.6 percent for the others). Households in Kampong Cham were more likely to rent out land to other people (9 percent), while households in Kampong Speu and Kampot were less likely to rent in land (7 and 4 percent respectively).

73. Table 304 shows the number of households involved in different agricultural activities by agroecological zone from the 2003/04 SES (Kanol 2004). Over 68 percent of surveyed households (2.76 million) are involved in cereal production, while 12 percent are involved in fruits and nuts and 7 percent in vegetable production.

74. Fragmentation of farming land is an important issue in terms of land tenure as well as the economic efficiency and viability of farms. The available data is confusing and sometimes contradictory, reflecting the disparate sources and collection methods. The most comprehensive coverage of farming households is from the 1999 Socio-Economic Survey (NIS 1999), while the soon to be released 2003/04 SES (MOP and NIS 2003; MOP and NIS 2004; MOP and NIS 2004; MOP and NIS 2004; MOP and NIS 2004) will provide an updated picture of farming structure. In the meantime, several smallscale and intermediate surveys have been carried out by various agencies in an attempt to capture trends.

75. From the 1999 socio-economic survey, there were around 2.88 million parcels of agricultural land, giving an average of 1.37 parcels per household with an average size of 0.9 ha (Ballard and Savannarith 2004; Ballard and Sovannarith 2004). Gini coefficients range from 0.5 to 0.61 for agricultural land because of demographic pressure, large unsettled populations, weak credit markets and speculative land purchases (Ballard and Savannarith 2004).

76. In a smallscale survey carried out in 2002 by ADB (2002), an attempt was made to capture land fragmentation; see Table 302. On average, households have around 2.7 parcels of rice land and 1.75 parcels of Chamcar land. Excluding the smaller farms with less than 0.425ha, there are a decreasing number of rice land parcels per household as farm size increases. The smaller farms have on average 2.58 parcels of rice land, compared with 2 parcels for those farms between 0.425 and 1 ha, and 2.45 parcels for those farms between 1-1.54 ha. Table 308 shows similar information from LMAP land

¹¹ Usufruct: The right to use and enjoy the profits and advantages of something belonging to another as long as the property is not damaged or altered in any way.

titling¹². On average, property owners have 2.5 parcels of land, with individual parcels being around 0.258ha in size¹³.

77. While the paragraphs above give a detailed of land fragmentation over time, the different data sources indicate that land fragmentation has increased from around 1.37 parcels per household in 1999 to around 2.5 parcels in 2002. This indicates an increase in land fragmentation over time as households adjust to changing economic circumstances.

78. As Ballard and Savannarith (2004; 2004) point out, land distribution has never been equal in Cambodia since the distribution of land in 1989 which allocated land according to the number of working family members. As a result, larger households received more land and those with a smaller labor pool, particularly female-headed households, have subsequently been at a greater disadvantage; being particularly susceptible to emergencies and other household shocks.

3.3.3 Annual Crop Production

79. With 46 percent of total agricultural GDP, crops are the most important sub-sector of agriculture. The value added by the crops sub-sector is 2.92 times the value added of the livestock sub-sector; see Table 281. Over the period 1994-2003 the value added in the crops sub-sector has been growing at a rate of 9.3 percent compared with 8.6 percent growth of livestock and 7.3 percent in fisheries; see Table 281 and Table 282. In terms of value added, rice production comprises around 57 percent of the value added in the cropping sector; see Table 283. Vegetable production comprises 9.4 percent, while cassava and maize comprise 2.9 and 2.6 percent respectively. In the crop sub-sector, most agricultural land is cultivated to rice. In 2004, out of 2.8 million ha of cultivated land, 84 percent were devoted to rice, 9 percent to other food crops¹⁴, and 6 percent to industrial crops¹⁵; see Table 284. Even though rice is still the most important crop in terms of cultivated area and value added (with a value of \$312.7 million in 2003), its relative importance within the crop sub-sector has declined; see Figure 44. Table 284 shows that over 1991-2004, the growth in cultivated area for other food crops and industrial crops

¹² The LMAP titling program is non-random and is slowly being rolled out across Cambodia. As a consequence, the results are not representative of the overall situation.

¹³ Ballard and Savannarith Ballard, B. and S. Savannarith (2004). The Distribution of Land Titling Benefits in Cambodia: Agricultural Investments and Institutional Credit. Cambodia's Annual Economic Review. K. Chandararot, D. Liv, B. Ballard and S. Savannarith. Phnom Penh, Cambodia Development Research Institute. present some different data in Table 309 based on a sample of 907 households from the LMAP survey. Average number of parcels per household is around 4.3, with households with less land having a smaller number of parcels. Average area per parcel is around 0.375 ha, with households with more land having a larger parcel size. The results indicate that the process of land accumulation and fragmentation in Cambodia is at an early stage; the experience in other countries in S.E. Asia indicate that over successive generations the poorest families undergo increased land fragmentation (more parcels of land per household), while their total land holdings decline. Ballard and Savannarith suggest that the reason for this pattern lies with the 1989 land distribution when efforts were made to equally divide good quality land (defined in terms of productivity and location) according to the number of working age household members. Households with more working members received additional plots of land, some of which may have been of lesser quality, though larger in size Ballard, B. and S. Savannarith (2004). The Distribution of Land Titling Benefits in Cambodia: Agricultural Investments and Institutional Credit. Cambodia's Annual Economic Review. K. Chandararot, D. Liv, B. Ballard and S. Savannarith. Phnom Penh, Cambodia Development Research Institute..

¹⁴ Other food crops include maize, vegetables, mung bean, cassava, and sweet potato.

¹⁵ Industrial crops include soybean, sesame, groundnut, sugar cane, tobacco, and jute. Rubber is classified separately as a forestry crop.

averaged 6.5 and 9.8 percent respectively, compared with only 1.8 percent for rice; even though they are still small relative to area under rice.

80. Rice production comprises 84 percent of total cultivated land, and provides 65-75 percent of the population's energy needs. Average growth in rice production has been 5.9 percent for the period 1991-2000, but has been slowing down, with growth from 1996-2000 at 3.1 percent and 2000-2004 at 1.7 percent; see Table 35 and Table 36.

81. Cambodia as only recently moved from rice deficit to surplus; see Table 39 and Figure 24. While the actual volumes of surplus or deficit are under dispute¹⁶, it is generally agreed that Cambodia moved into rice surplus in the 1995-96 cropping year.

82. As Table 36 and Figure 24 show, production of rice has increased around 2.6 percent per year on a long term average basis, while over 2000-2004 production in rice grew only 1.7 percent. Over the same period of time the population is estimated to have grown by 1.9 percent per year¹⁷. Assuming that the amount of rice consumed per capita has not changed, this equates to a 1.9 percent increase in rice requirements. There are potential implications for food security with a 0.2 percent growth in rice production below domestic food requirements¹⁸.

83. The main types of paddy production systems are upland and lowland rainfed rice, deep water floating rice and dry season rice. These can be generally classified as being wet season versus dry season rice; see Table 288. Wet season rice is grown from May to December while dry season rice is grown from December to March; see Figure 45. Dry season rice is usually improved varieties of rice like IR66 and grown for cash income purposes. In contrast, wet season rice is usually traditional varieties cultivated for subsistence and food security purposes. Even though traditional wet season varieties have a lower yield, they fetch a higher price as the quality and taste is better than the dry season improved varieties.

84. Over the period 1992-2004, most of the increase in rice production has come through increases in dry season area production (6.73 percent per year), and yields of wet season rice (4.36 percent per year). The yields of wet season rice increased from 1.2 tonnes per hectare in 1992 to over 1.95 tonnes per hectare in 2003 and thus the increase in yield should be seen in the context of improvements from a very low base. Because access to better wet season variety seeds has been limited, this increase in yield has been due to better access to fertilizer and other inputs (rather than improved varieties of seed).

85. Rice production in Cambodia is mainly conducted under rainfed conditions. Irrigation area for rice was estimated at 473,000 ha in 1997-98 (about 23 percent of total rice area) of which 11 percent is supplemental wet season irrigation, 11 percent is partial dry season

¹⁶ Due to the different post harvest losses, milling recovery and per capita consumption ratios used by different studies.

¹⁷ Estimates of population growth vary significantly between sources. For example, MOP and NIS MOP and NIS (2004). National Accounts of Cambodia 1994-2003. Phnom Penh, Cambodia, Ministry of Planning and National Institute of Statistics. uses 1.9 percent, MAFF uses 2.2 percent, while ADB ADB (2002). Report on Marketing in the Agricultural Sector of Cambodia. Agriculture Sector Development Program (ADB - TA No. 3695 - CAM). Phnom Penh, Cambodia, Ministry of Agriculture, Forestry and Fisheries, Asian Development Bank. uses 2.5 percent. All that is known is that the 1998 population census reported 11.44 million people.

¹⁸ CIAP notes that slowing productivity gains plus ongoing population growth may see Cambodia slide back into food deficit by the end of 2010 Young, D., R. T. Raab, et al. (2000). "Economic Impact Assessment of the Cambodia-IRRI-Australia Project." *Cambodian Journal of Agriculture* 3: 48-52..

irrigation, and about 1 percent is fully irrigated. Double cropping area is also an insignificant quantity, representing about 1 percent of total cultivated area.

86. The total tonnage of wet season rice has increased from 1.87 million tonnes in 1992 to 3.84 million tonnes in 2003, compared with 0.35 million tonnes of dry season rice in 1992 to 0.87 million tonnes in 2003. This indicates that although dry season rice is becoming an important component of rice production in Cambodia (particularly for exports), wet season rice continues to be the mainstay of rice production in Cambodia.

87. Map 1 and Map 2 show the food balance for 2000-2001 and 2001-2002 on a provincial basis (ACI 2002). Of note is the significant provincial variation in food balance, with provinces in the Tonle Sap and Plains regions being in surplus (with the exception of Kandal and Kampong Cham) and provinces in the Coastal and Plateau/Mountainous regions are generally in deficit (ACI 2002). Table 38 and Map 3 to Map 8 show the area of land and production of wet and dry season rice in 2003-2004. With the exception of Takeo, Kandal, Prey Veng and Kampong Cham, very little dry season rice is cultivated in Cambodia; see Map 6 (ACI 2002). Current levels of yield and cropping intensities in rice production are low compared with similar ecosystems in neighboring countries. In part this is due to mixed seed varieties, poor soil fertility, and low levels of farm inputs such as pesticides, fertilizer and timely water applications (ADB 2002).

88. The cultivated area of other food crops is around 8 percent of the total cultivated area; see Table 284. Other food crops include maize, cassava, sweet potato, mungbean, and vegetables. Table 285 to Table 36 show the trends in area and production of crops in Cambodia between 1995 and 2004.

89. Maize production grew strongly at 28 percent on average during 1995-2004, but has been slowing down from 32 percent over 1995-2000 to just under 23 percent over 2000-2004. Yield is the main factor driving growth, with increases in cultivated area only averaging 7.3 percent over 1995-2004 compared with yield, which grew at an average of 16.7 percent over the same period. Nationally, yields are averaging 3.9 t/ha in the wet season and only 1.8 t/ha in the dry season. This varies significantly between a high of 5.5 t/ha for wet season maize in Battambang to a low of 0.6 t/ha for dry season maize in Otdor Meanchey.

90. Yellow maize production grew by 45.5 percent over 1995-2000, with similar trends to white maize production. The strong growth of yellow maize is related to its increasing use as animal feed, which is associated with the rapid growth of the poultry industry. Nationally, yields are averaging 4.4 t/ha in the wet season and 2.2 t/ha in the dry season. This varies significantly between a high of 5.5 t/ha for wet season yellow maize in Battambang to a low of 0.7 t/ha for dry season yellow maize in Otdor Meanchey.

91. On a provincial basis, Table 38 and Table 291 show the distribution in production of white maize and yellow maize. Most of the maize production is carried out in the wet season in Battambang, with lesser areas grown in Banteay Meanchey, Kandal, Kampong Cham and Pailin.

92. Cassava production growth has been strong at 39 percent over the period 1995-2004, helped by the increasing demand for the starch industry. Increases in production in 1998-99 and 2002-03 have greatly influenced the long term trends in the industry. Even though yield growth has been strong, averaging 23 percent, average yields are still low at

13-16 t/ha for wet and dry season production^{19,20}. On a provincial basis, Table 291 shows the distribution in production of cassava. Most of the cassava production is carried out in Kampong Cham, with lesser amounts in Kampong Speu, Kampong Thom and Battambang.

93. Sweet potato production has been declining, partly because more valuable crops like rice and maize have increased cultivated area and partly because, differently from cassava, there has not been growing demand for industrial uses. Over the period 1995-2004 average growth in production was around -0.4 percent. However, in recent years there has been resurgence in production, with growth averaging 6.2 percent over the period 2000-2004. Average yields are around 4.3 t/ha for wet season production and 3.6 t/ha for dry season production. On a provincial basis, Table 292 shows the distribution in production of sweet potato. Most of the sweet potato production in the wet season is carried out in Kampot, Kampong Chhnang and Kampong Cham, while in the dry season it is in Kandal and Kampong Cham.

94. Vegetable production is more difficult to interpret. Over the period 1995-2004 there have been only 3 years where growth in production has been positive; 1995/96, 1999/00 and 2003/04 (29.4 percent, 7.7 percent and 28.2 percent respectively), see Table 36. Over the longer term, average growth in production has been 0.5 percent, with the period 1995-2000 being 1.6 percent and 2000-2004 being -0.9 percent. It is possible that actual production is grossly underestimated because of home garden cultivation that goes unrecorded. However, competition by imported vegetables from Vietnam might contribute to market instability and therefore fewer incentives for farmers to engage in risky vegetable production. Most of the increases in production have been due to yield, which grew an average of 3.1 percent over the period 1995-2004 compared with -2.2 percent growth in area under cultivation. Table 292 shows the provincial distribution of vegetable production in the wet and dry season. National yield averages are around 3.8-3.9 t/ha over the year, although it does not make much sense to compare productivity across different crops in the vegetable grouping.

95. There are differences in the distribution of wet and dry season production of vegetables, depending on access to water from Tonle Sap. In the wet season the major production areas of vegetables (greater than 1000 ha) are Kampong Cham (3,785 ha), Kandal (2,094 ha), Kampot (2,091 ha), Kampong Thom (1,414 ha), Kampong Speu (1,231 ha), Takeo (1,192 ha), and Battambang (1,059 ha). In the dry season the major production areas are Kampong Chhnang (2,822 ha), Kandal (2,636 ha), Kampong Cham (2,224 ha), Seam Reap (1,151 ha), Kampong Thom (1,120 ha), and Battambang (1,005).

3.4 Policy Context

96. The Royal Government has indicated in its Rectangular Strategy that its agriculture policy is “to improve agricultural productivity and diversification, thereby enabling the

¹⁹ Since cassava is an 8-12 month long crop it does not make much sense to discuss wet season and dry season production. Official statistics distinguishing between the two seasons basically captures time lags in harvesting.

²⁰ Average yields of newer germplasm from CIAT and Thailand breeding programs can reach 30 t/ha, although individual farmers have been known to produce up to 50 t/ha ACI (2004). Integrating Germplasm, Natural Resource, and Institutional Innovations to Enhance Impact: The Case of Cassava-Based Cropping Systems Research in Asia. Ha Noi, Viet Nam, A Report Prepared for CIAT-PRGA by Agrifood Consulting International: 506..

agriculture sector to serve as the dynamic driving force for economic growth and poverty reduction.” Government has also highlighted the role of land and committed a policy of “strengthening an equitable and efficient system of land management, distribution and utilization, including land registration and distribution, land tenure security, eradication of illegal settlements and land grabbing, and the control of land ownership concentration for speculative purposes.” This strategy is intended to be supported by implementation of new policy instruments established under the 2001 Land Law, including Social Land Concessions (distribution of state private lands to the poor), Economic Land Concessions (long-term contracts for plantation-type developments on large areas); State Land Management (mapping, land use and allocation procedures) and implementation of the Unused Land Tax.

97. While the overall objective of Government’s strategy is clear, the means to achieve this through agricultural growth is not clear and still disputed within Government. The Rectangular Strategy highlights inclusive growth, and given Cambodia’s relatively rich natural resource endowment and the concentration of poverty (90 percent of poor) in rural areas, agricultural and rural development is the key mechanism to achieve this. However, neither the Rectangular Strategy nor other key strategic documents – SEDP II (Ministry of Planning 2001) or NPRS – clearly identify the role of smallholder agriculture in achieving growth, including export production. In the private communications with the Consultant, several senior officials view plantation style development as the key to export led, rural growth, while smallholder agriculture is viewed as a kind of “dead end” activity for maintaining a currently unemployable rural populace.

98. The Cambodian National Strategic Development Plan 2006-10 (NSDP) has the overall aim of poverty reduction, and to implement the RGC ‘Rectangular Strategy’ for agriculture; see Box 1. The NSDP further stipulates the primary need of developing a national strategy for Agriculture and Water Resources within 2006. AusAID proposes to provide support for the process of developing this national strategy and a sector program framework for coordinated government/donor action to implement the strategy during 2006, and to seek to harmonize this program design with the broader sector program process to the extent feasible.

99. The NSDP recognizes the need to address rural development and makes improving the lives and livelihoods of the rural poor a top priority. Agricultural productivity improvement is the core strategy to meet this need.

100. The engines of growth that have driven improvements since the early 1990s (garment, tourism, and construction) need to be complemented with other sources of growth that are more rural, more broad-based, and more pro-poor. To accelerate poverty reduction will require:

1. Secure property rights to private land, particularly for smallholders
2. Emphasis on small holder agriculture for both growth and poverty reduction
3. Equitable access to common property resources as a critical source of income and security for the rural poor (water and forestry)
4. Increased investment in productivity-enhancing infrastructure
5. Improved human development and human capital, achieved through the pro-poor delivery of basic services in education and health

101. The MAFF has formulated an Agricultural Sector Strategic Development Plan 2006-2010 outlining nine goal areas, and the constraints and actions to be taken in each of these areas. These goals notably include:

1. Ensure food security for all people, increase income and improve livelihood for rural poor farmers by improving agricultural productivity and diversification of agriculture.
2. Enable food-insecure households to increase food availability and access from their own agriculture, livestock production and common property resources.
3. Improve market opportunities and market access for agricultural products to ensure sustainable economic growth, and market access and employment for rural farmers, and improve agricultural safety standards.
4. To ensure adequate and efficient institutional management and legislative standards and work performance by improving and strengthen institutional and legislative frameworks.
5. Ensure the access to land resources for the rural poor farmers by improving land tenure security and land market, and reduce land disputes

Box 1 The National Strategic Development Plan (NSDP), 2006-2010: Key Commitments**1. Good governance**

Anti-corruption measures; legal and judicial reforms; administrative reform; decentralization and deconcentration; and military reform.

2. Environment for the implementation of the Rectangular Strategy

Ensure peace, political stability and social order through elections; strengthen development partnerships; sustain a favorable macroeconomic and financial environment; further promote economic integration into the region and the world; address poverty, ensuring that all strategies focus on poverty reduction.

3. Enhancement of Agriculture Sector

Formulate and implement a comprehensive Agriculture and Water Resources Strategy; improve agricultural productivity and diversification; reform land administration and management, fisheries and forestry reform; invest in environmental conservation and rural infrastructure development.

4. Continued rehabilitation and construction of physical infrastructure

Restore and construct transport infrastructure; improve management of water resources and irrigation; develop energy and power grids; manage future oil and gas resources and revenues; develop information and communication technology

5. Private sector growth and employment

Carry out the RGC's Twelve Point Plan and the recommendations in the Investment Climate Survey; promote SMEs, trade and tourism, rural credit; create jobs and ensure improved working conditions; establish social safety nets for the disadvantaged.

6. Capacity building and human resource development

Enhance the quality of education; improve health outcomes through the Health Action Plan; foster gender equity; implement population policy to decrease fertility and promote birth spacing.

Source: NSDP

3.5 Past and Ongoing Projects and Programs

102. Table 2 presents an assessment of selected Cambodian NGOs and donor projects involved in agricultural production and agribusiness supply chain development. As can be observed, most interventions are focused near the farmer at the production level, with some recent efforts being implemented to improve the supply of agricultural inputs such as seeds, fertilizers, and pesticides. As noted in the NZAID-funded Market Scoping-Feasibility Study (Hundley, McNaughton et al. 2004), many production oriented donor-funded projects have recently realized that they overlooked and did not appreciate the value of marketing and market development until after agricultural production was already providing marketable surpluses, leaving beneficiary farmers with no way to sell improved varieties and quantities of produce, rice, and livestock. In some cases, the projects themselves have purchased the surplus, but this can only be seen as a short-term solution.

103. Recently, projects have tried linking farmers directly to markets, such as rice farmers in the CBRDB in Kampot province, but most have not been successful. The following descriptions, presented in alphabetical order, highlight selected organizations leading agricultural production and supply chain development projects²¹.

²¹ Most of these descriptions are taken from Hundley Hundley, C. J. (2005). Cambodia Agribusiness Development Facility: Strategic Framework. Phnom Penh, Cambodia, Emerging Markets Consulting for NZAID. and relevant project websites.

104. A more complete list of agricultural development projects is available in the MAFF publication *The List of Agricultural Development Projects, May 2005*.

3.5.1 Adventist Development and Relief Agency (ADRA)

105. ADRA is an international development and relief agency active in various provinces of Cambodia including Siem Reap. Activities focus on food security, health, micro enterprise development, community and civil society development, and government capacity building aimed at improving the quality of life of the poor.

106. ADRA's Sustainable Agriculture and Family Empowerment (SAFE) project in Siem Reap, funded by AusAID, is an integrated project with components covering basic adult literacy, home gardening, animal husbandry, small enterprise development (SED), micro-credit and farmer associations. A separate German government funded water and sanitation project has improved access to hygienic water and provided for better waste management.

107. Another project funded by the Canadian government (CIDA) and implemented by ADRA, will seek to improve farmers' capacity to provide for the needs of the local fresh produce market and promote value-added food processing such as fish sauce, soy sauce, soy drinks, pickled beans and provide basic marketing training. Capacity building of existing Farmer Associations located close to Siem Reap town will be the focus to establish links with the markets and coordinate farmer activities.

3.5.2 AGRISUD Siem Reap and Banteay Meanchey

108. AGRISUD is a peri-urban agriculture development programme funded by the French Agency for Development (AFD) in Cambodia. The AGRISUD programme in Banteay Meanchey is the only fully functioning, donor-funded agricultural production or enterprise development project currently operating in the province. All other donor-funded programmes are primarily concerned with social development issues.

109. The Siem Reap programme ended January 2004. Important results of the Siem Reap efforts included the promotion of 12 small-scale processing enterprises and the training of many advanced farmers, the names of which are included in this strategic framework. Most of the 12 processing enterprises still operate, but struggle because they lack continuing business development service support.

110. About 40 percent of the advanced farmers trained by AGRISUD have discontinued farming because they determined it to be more profitable to sell their land, which has risen in value due to Siem Reap's tourism growth. In Siem Reap, AGRISUD had about 30 staff working in the urban and peri-urban Siem Reap area with beneficiaries being 1,581 families in 104 villages, 23 communes, 5 districts. Significant activities of the project were to train farmers to use new farming technologies, strengthen and support the planting of improved varieties of vegetables and fruits, introduce mushroom production, expand pig and chicken production, and support production of animal feeds production and processed foods.

111. AGRISUD's programme in Banteay Meanchey promotes similar technical interventions with more than 20 well-trained staff. AGRISUD has a detailed poverty reduction measurement, monitoring and evaluation system by which to measure impacts of the project. The programme has worked with 450 farm families and has promoted about 60 to 75 advanced farmers. AGRISUD's advanced farmers, largely, are multi-product farmers who also invest in agriculture input supply businesses, collecting and trading activities, and are aggressive at providing local markets with fresh produce.

3.5.3 Agricultural Productivity Improvement Project (APIP)

112. The Cambodia-Agriculture Productivity Improvement Project was a US\$35.1 million project funded by the World Bank and ran from 1997 to 2005.

113. The objective of the project was to carry out a coordinated program through MAFF to bring about sustainable improvements in agricultural productivity and rural incomes. This would be achieved through a selective program of activities covering the main agricultural subsectors of rice and other crop production, livestock and fisheries, comprising essential knowledge acquisition, technology testing and adaptation, field development activities, essential rehabilitation investments, and a major effort in retraining and human resource management in MAFF.

114. The project comprised components addressing priority development needs of five of the Ministry's operations departments, three components at the Ministry level - establishing a training and personnel management capability, strengthening the planning and statistics functions, and strengthening of selected provincial departments of agriculture - and establishment of a project management unit (PMU) within the Ministry to manage the project. Project components included:

1. Agronomy, Seeds & Plant Protection
2. Integrated Pest Management (IPM)
3. Animal Health & Production
4. Agricultural Hydraulics
5. Fisheries
6. Smallholder Rubber Research
7. MAFF Strengthening

3.5.4 Agricultural Quality Improvement Project (AQIP)

115. Funded by AusAID, the total cost of the program is AU\$17 million and runs from 2000 – mid 2006. AQIP contributes to improved food security and greater cash incomes for farm families by increasing the quantity and quality of rice production, reducing waste through improved rice milling, and building more robust farming systems with improved, small-scale village-based fruit and vegetable marketing. The main programme of AQIP is to promote the formation of four Cambodian seed companies. The investment is heavy in infrastructure and technical training. The seed companies are 51 percent owned by the private sector – farmers – and 49 percent owned by the Cambodian government.

116. AQIP provides for its own agriculture extension services and its own market information services. The project was late in realizing the value of market information, choosing instead to concentrate on the technical issues of developing four seed

companies. It is only within the past year that considerable attention has been placed on building marketing capabilities, hiring market development staff, and designing a market-based distribution network. Therefore, one of the most important lessons for the AQIP seed company project has been to consider market requirements first and then link market demands to farmer groups in the initial phases of the project.

117. A complementary project within the AQIP programme has been the fruit and vegetable market development project. This project was active in the same four provinces as the AQIP seed company project. AQIP's Vegetable and Fruit Market Development Project has taken a broad-spectrum approach by focusing on the entire supply chain, but most specifically, produce traders and collectors. Recent activities have included business development assistance for input suppliers and technical assistance related to post-harvest handling technologies. These specialized activities followed almost two years of organizing farmer groups and identifying the seven best and brightest collectors and traders in four provinces, training them to be full service wholesalers, performing market studies, and developing business strategies.

118. The AQIP market-oriented interventions involve collector-traders in hopes of promoting a pull strategy, to encourage rural and peri-urban farmers to grow a wider variety of crops where there is existing demand in the market. The full service wholesalers are members of the community, work closely with farmer associations to communicate market requirements, and encourage farmers to supply improved quantities of agricultural products, for which they have developed a market.

3.5.5 Agricultural Sector Development Project

119. ADB's sector strategy is to help achieve the Government's development objectives through enhanced agricultural productivity in line with the SEDPII of the Government. ADB's strategy also aims to promote private sector participation in agriculture, and increase awareness and knowledge among the rural poor, women, and vulnerable groups to participate in agricultural development and to gain better access to productive opportunities. The US\$25 million Agriculture Sector Development Program (ASDP) aims to promote market oriented agricultural growth in Cambodia in line with ADB's operational strategy.

120. Within the overall program framework of the Agriculture Sector Development Program, the program loan will facilitate policy and institutional reforms to ensure a favorable environment for market-based agricultural growth. The loan will:

1. Provide better access to productive land, water, improved seeds, and other quality agricultural inputs;
2. Improve efficiency of rubber production, and ensure no direct state intervention in the agricultural input and output markets; and
3. Facilitate agricultural commercialization by rationalizing agricultural institutions and improving access to effective research and extension services at the local level.

121. At completion, ASDP will have substantially contributed to the enhancement of policy and institutional environment favorable for the market-oriented agriculture development, and to the provision of improved access to productive opportunities for poor farmers in southern Cambodia.

3.5.6 Cambodia-Australia Agricultural Extension Project (CAAEP)

122. The Cambodia Australia Agricultural Extension Project (CAAEP), Phase II is a AU\$19 million project running from 2001-2007. The aim of CAAEP II is to increase household cash incomes by further developing a sustainable, district-oriented, agricultural extension system to educate Cambodian farmers and introduce new farming practices.

123. CAAEP is designed as a capacity building project within the Department of Agricultural Extension. This second phase shifts focus to the provinces and district based extension services. Thirteen provinces, 86 districts and some 500 staff are involved. Six of the provinces are served by two IFAD projects for which CAAEP provides the TA. All provinces are recipients of the innovative programs of CAAEP which include an all-staff Annual Staff Appraisal by RRA, a program of Extension-in-Governance which employs Agro-ecosystem Analysis to enable commune development planning on a commune basis; Routine Monthly Monitoring of all activities of the Ministry from district level, province aggregated and nationally aggregated using a database program, and a program of Effectiveness Monitoring revisiting the baseline annually and conducting surveys of diffusion of innovation. Cascade training from the central department's expert sections starts with training of trainers and proceeds with programs of personal development in the provinces. Provincial training programs for district staff are practical and competency-based.

124. Under the terms of its design and among other things, CAAEP was required to design & implement certain kinds of systems. These were:

1. Operationalising agro-ecosystems analysis at provincial level in 13 provinces. Adoption of AEA is now MAFF policy as a result of CAAEP, allowing greater participation of stakeholders.
2. Establishing a training-of-trainers program in extension methods at national level and a provincial training program concentrating on technology, in 13 provinces.
3. Implementing a system of staff appraisal for MAFF for nation-wide application.
4. Provide an impact monitoring system and a routine activity monitoring system for the whole of the Cambodia serving project and ministry requirements for all projects in the sector.
5. Cooperate with the RGC policy and system for local government reform called SEILA which provides a local planning process for all sector institutions.

3.5.7 Cambodia Agriculture Research and Development Institute – Assistance Project (CARDI-AP)

125. An important outcome of Australia's support for agricultural research through CIAP has been the development of Cambodia's own national agricultural research institute, CARDI. The four-year CARDI Assistance Project, focusing on achieving the financial and management sustainability of CARDI, commenced in August 2002 and will run until mid-2006. The total cost of the project is AU\$6 million and the purpose of the project is to assist CARDI achieve sustainable management of its personnel, financial and physical resources and to deliver its mandate according to national priorities for food security, poverty reduction and National Resource Management.

3.5.8 CEDAC

126. Centre d'étude et de Développement Agricole Cambodgienne (CEDAC) is a rice farmer association development project. CEDAC is a Cambodian NGO, working now with about 6,000 farmers in 300 villages in 14 Cambodian provinces, but with plans to concentrate efforts in seven provinces - Takeo, Prey Veng, Kampong Speu, Kandal, Kampong Cham, Siem Reap, and Kampot. CEDAC is planning to begin operations in Siem Reap in the next project cycle. Main goals are livelihood security and quality of life for small farmers and consumers, while maintaining quality of natural resource base and social cohesion. Thematic focus is education and innovation in ecological agriculture, farmer organization, environment and health, trade in organic products, wood energy, land issues, and savings and credit for smallholders

127. CEDAC uses a technical entry point (in food security - rice, vegetables, livestock) to develop group dynamics among farmers. A key technology is the Madagascar "system for rice intensification" in which smallholders are regularly able to get at least 3-5 tonnes per hectare of rain fed rice, as compared to the national average of less than 1.5 T/ha, without using purchased or chemical inputs. Key farmers identified early in the technical extension phase are encouraged to meet with other villagers in this "pre-association" level activity. Whether farmers can get the expected outcome with the given inputs and advice is a matter of empirical verification.

128. Meetings of villagers are assisted in the process of developing bylaws and forming Farmers' Associations. Association members learn management techniques including planning, group negotiation and conflict resolution and finance. Most of the 40 existing CEDAC supported farmer associations have savings and credit programs operating. CEDAC plans to have assisted the formation of over 400 farmer associations by 2007.

3.5.9 CEDAC Organic Certification and Farm Group Forming Project

129. CEDAC is developing capabilities in organic vegetables, with an aim to certify groups of farmers and, eventually, to spin-off the certification group into a separate utility. These small farmers' groups are encouraged to form together as a business, with a long-term view for profits to support payments to CEDAC staff's work.

130. CEDAC is unique in its approach and has been very active in linking farmers to markets through its farmer association building as well as linkages to commercial markets for organically grown rice. CEDAC has learned that farmer groups, with adequate farm extension services provided, are capable of growing higher-quality products and adopting new agriculture techniques quickly. The organization has also learned that linking farmers to markets is a complex task that requires intermediaries, product certification, and close discussions with international firms.

3.5.10 DANIDA-DFID NREM Programme and Pro-Poor Rural Business Component

131. The forthcoming (2006-2010) DANIDA Natural Resource and Environment Management program includes a component on "pro-poor rural business development." This component does not seek to work directly with the poorest and is flexible about how it demonstrates the link to employment and income for the poor. Nevertheless, the component seeks to support a number of mostly existing initiatives in areas such as:

investment climate and local market information dissemination; innovative access to finance, potentially including an “equity” component, as well as SME-relevant funds for on-lending and business plan assessment training for MFI staff; business advisory provided through existing rural producer and other civil society groups, in support of local business development, and; assistance with the development of credit unions, associations of business cooperatives and an “Advanced Rural Producers’ Network.”

3.5.11 Economic and Social Development of the Northern Provinces (ECOSORN)

132. ECOSORN is an European Commission-funded initiative scheduled to begin activities in 2006-2010. The project will be implemented in Siem Reap, Battambang, and Banteay Meanchey provinces and cover 40 out of the 96 communes in those provinces. The project is a US\$25 million grant and covers farming systems interventions in agriculture, livestock and fisheries.

133. Components of the project include: small-scale irrigation; land mine clearance; linking farmers to markets, especially through the improvement of tertiary roads; developing integrated farm models using a farming system approach to promote model farmers, diversify cropping, and encourage year-round agricultural production. One goal is to have three or four models based on three or four agricultural zones.

134. The project will support professional development of existing provincial institutions related to agriculture and support the commune administrations, but will not create independent institutions. A fundamental principal is to use any existing institutional structures, and avoid creating new ones

135. The approach will be to assist in the development of the private sector by contracting out project components to private sector firms and other interested parties. There will be one sub-component focused on improving farmer, intermediary, and other supply chain associations. There is no specific focus on solving business environment issues for small enterprises.

136. A separate EU-funded project will provide additional funding of about US\$10 million to help develop the private sector agro-industry. This additional project, which is currently in design phase, will be nationwide and not specifically focused on the northwest provinces.

3.5.12 Food and Agriculture Organization (FAO) Integrated Pest Management (IPM)

137. FAO is a specialized agency within the United Nations family responsible for agriculture, forestry, fishery and rural development. FAO's priority activities are designed to encourage sustainable agriculture and rural development, with a long-term strategy of ensuring food security by providing technical assistance, technical cooperation, and support for policy and development.

138. Several ongoing and pipeline FAO projects focus on sustainable vegetable and fruit crop production and protection (IPM), farmer extension and education, policy and strategy formulation for enhancing agro-industrial development, and village level food processing for empowering the vulnerable rural poor. A key program is the Special Program for Food

Security, which is now active in Cambodia and focused on capacity building among farmer associations, including diversification and enterprise development.

139. IPM is the MAFF-national program of integrated pest management, supported by funding from FAO, the World Bank, DANIDA, and other donors. It is implemented as a commune-based development activity. The program is designed to promote and broaden farmer institutional training based on key issues facing Cambodia's farm systems.

140. The program supports farmer-to-farmer IPM training in three different ways: organized training courses, funding and backstopping activities, and partnerships with other NGOs or donors. The IPM program mobilizes the support through community-based IPM activities with the objective of reducing dependence on agricultural chemicals, developing the technical capacity of farmers, and educating farmers about agriculture technologies.

141. IPM offers a holistic crop management system that integrates a variety of methods to manage and protect crops. It provides extension services in agricultural technologies and pest management that enable farmers to achieve production sustainability and socio-economic effectiveness. Srer Khmer is an off-take of IPM and takes Farmer Field School trainees and develops Farmer Life Training activities.

142. IPM and Srer Khmer combine agricultural production with social development. They have encouraged several farmer associations in selected provinces. Otherwise, most of the activities of the FAO, IPM, and Srer Khmer are technical assistance based.

3.5.13 HURREDO

143. HURREDO is a Cambodian NGO with offices located in Siem Reap. With financial and technical support from the Canadian International Development Agency (CIDA), New Zealand, International Labor Organization (ILO) and The Asia Foundation, the organization has established a vegetable production farm located on MAFF land on the outskirts of Siem Reap. The objectives of HURREDO's demonstration farm are to:

1. Employ handicapped workers to produce high-quality vegetables specifically for the tourist-upscale hotels and restaurants;
2. Promote agricultural extension services to about 150 farmers in the Siem Reap area;
3. Test vegetable seed varieties and develop a seed production facility in Siem Reap.

144. The organization has cultivated about five hectares of typical Siem Reap soil. Planting to date has been very limited due to funding shortfalls and lack of technical expertise.

145. HURREDO's farm is equipped with modern technologies for crop cultivation, such as sun screens, a power tractor, sprinkler and drip irrigation systems, steel-framed green houses, so that only the organization can make the farm self-sufficient and profitable. HURREDO could become a significant high-quality vegetable supplier and wholesaler to Siem Reap's tourist-upscale market. In 2003, HURREDO conducted an extensive survey of the hotel and restaurant sector in Siem Reap to identify market requirements, prior to producing crops to meet those requirements. Although HURREDO has had technical difficulties supplying a consistent level of produce, it has well proven that Cambodian

farmers are capable, given adequate market information and technical assistance, to supply high-quality vegetables to Siem Reap's tourism sector.

146. HURREDO has extensive relationships with advanced farmers, wholesalers, and other supply chain participants. They also have technical relationships with poor rural and peri-urban farmers who have already proven they can supply produce that meets market requirements.

3.5.14 International Development Enterprises (IDE)

147. IDE is a non-profit organization that originated with the development of small-scale irrigation and on the mass dissemination of simple, appropriate and sustainable technologies in Cambodia. IDE seeks to strengthen input markets, improve on-farm productivity, and facilitate market linkages. Smallholder market development activities have been initiated in several provinces through the promotion of vegetable and mushroom production.

148. Recently, IDE has conducted surveys of the vegetable and fruit markets in Kampong Thom and Siem Reap, estimating the market size, describing supply chain components, and identifying development constraints. It is now looking forward to seeing opportunities for commercialization and large-scale dissemination of the technology for processing in Cambodia.

3.5.15 Mekong Private Sector Development Facility (MPDF)

149. MPDF is a multi-donor initiative led by the International Finance Corporation (IFC), the private sector arm of the World Bank. The initiative supports private sector development in Cambodia, Lao PDR and Vietnam. MPDF's three main activities are:

1. Assisting local privately owned enterprises to improve operations and seek financing;
2. Strengthening local institutions to provide business support services, and;
3. Promoting research and policy dialogue to improve the SME business environment.

150. Although MPDF is transitioning away from the financial aspects of business development, the organization does occasionally fund market development studies, promotes specialized research, and encourages policy dialogue and reform.

3.5.16 Srer Khmer

151. Srer Khmer is an independent, non-profit organization dedicated to the development of farmers' agriculture. The organization promotes, facilitates, and provides training to farmers through action research, farmer life schools, farmer networks, farmer clubs, and advocacy and human rights training. In principle, Srer Khmer promotes the exchange of information between farmers, farmers' networks, and farmer experiments in agricultural and processing technology. Srer Khmer has implemented the model of building the farmers' networks by first establishing farmer clubs rather than more formal farmer associations.

152. One of their primary programs is to develop pesticide free and organic farming of vegetables for the tourist-upscale and Cambodian domestic markets. The agency recently established two organic vegetable shops, one located in Siem Reap and one in Phnom Penh. The facilities are under-developed for the potential of the market, with limited storage, refrigeration, or marketing expertise

153. Srer Khmer provides a price guarantee to the farmers for chemical free produce and then sells this produce in its retail shops, usually at a loss to the agency, in an effort to encourage farmers to produce and as a primer for market development. The experiment is relatively new, but initial findings are that businesses and customers in Siem Reap are not willing to pay above market prices for organic produce.

154. Srer Khmer, in the past has focused on the activities mentioned above, but may be transitioning to more market-oriented programs. The organization has created several farmer clubs in Siem Reap and while Srer Khmer promotes the production and sale of organic produce and has been successful at developing supplies, but has had difficulties in marketing them.

3.6 AusAID Country Strategy

155. AusAID's Country Strategy for Cambodia is encapsulated in (AusAID 2003), which sets out the goals for the 2003-2006 Development Cooperation Program.

156. The goal for the Cambodia Australia Development Cooperation Program is: ***to advance Australia's national interest through contributing to poverty reduction and sustainable development in Cambodia.***

157. The three strategic development objectives for the program are:

1. To increase the productivity and incomes of the rural poor;
2. To reduce the vulnerability of the poor; and
3. To strengthen the rule of law.

158. The three objectives are inter-related and mutually reinforcing; all are of equal priority. Reducing vulnerability is important to sustained increases in productivity and income, just as increased productivity reduces vulnerability.

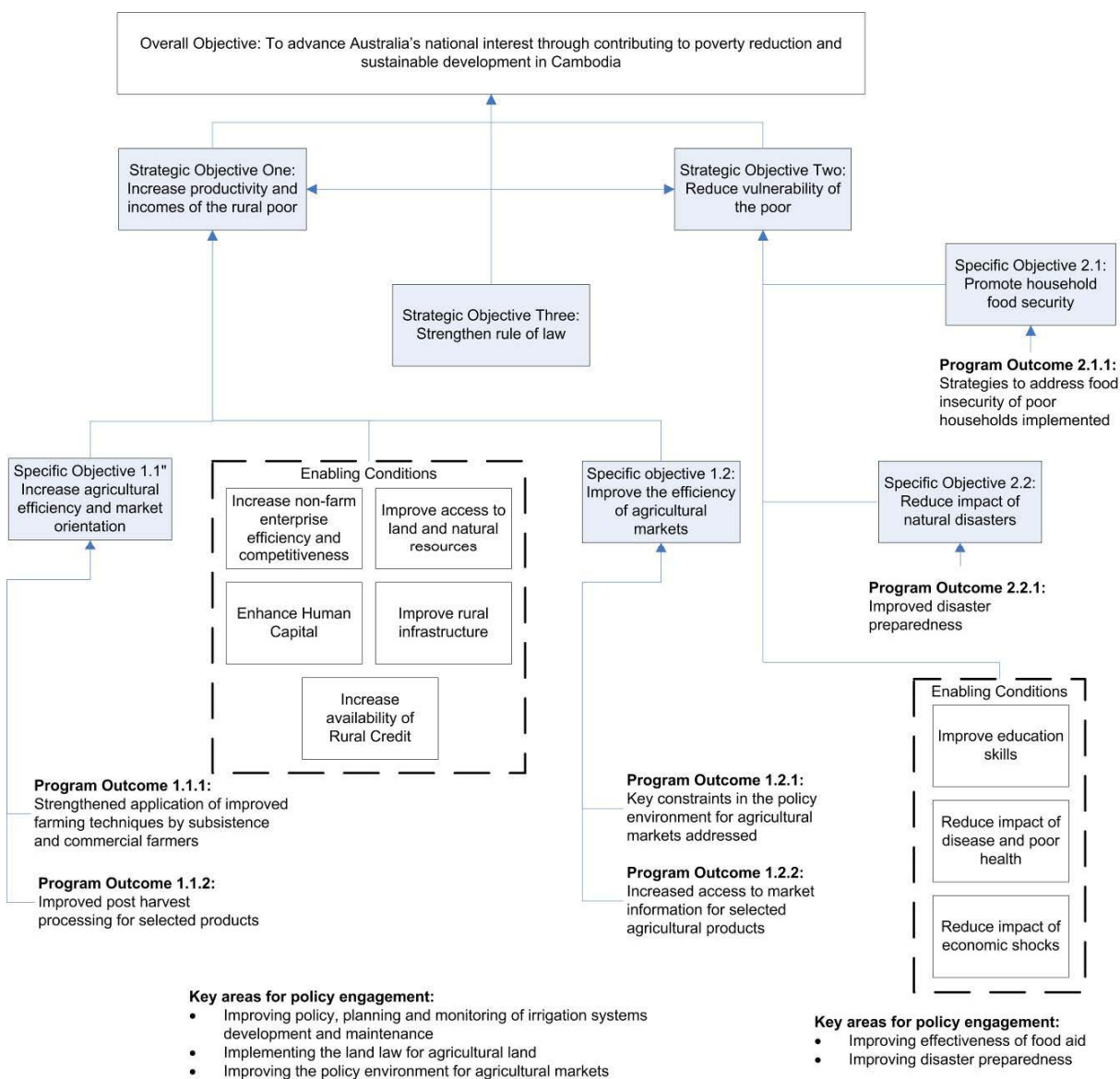
159. AusAID intends to contribute towards these objectives through complementary policy efforts and program activities. The priorities under each strategic development objective have been identified taking account of the poverty analysis, the activities of other donors, and Australia's capacity to make a difference.

160. The objective tree sets out the specific objectives in support of the three strategic objectives for the program; see Figure 1.

161. This strategic approach represents a significant sharpening of focus compared to previous Cambodia country strategies. By targeting resources to a smaller number of areas where Australia can add value, Australia is seeking to increase their effectiveness and impact.

162. Agriculture, private sector development, disaster preparedness and governance are areas where Australia has the potential to play a leading donor role and support the development of more effective, coordinated government-donor approaches.

163. The two strategic development objectives of relevance to the design of AusAID's new agricultural program from 2007-2012 are now discussed in detail.



Source: (AusAID 2003)

Figure 1 AusAID Country Strategy for Cambodia Objective Tree

3.6.1 Increase Productivity and Incomes of the Rural Poor

164. Australia has a proven track record in the agriculture sector and can make a difference to the productivity and incomes of the rural poor. Australia has valuable expertise to offer, and there are relatively few other donors. Australia may be able to take

a lead donor role to address the lack of a coordinated government-donor framework for agricultural investment which reduces the effectiveness of donors.

165. Agriculture in Cambodia remains relatively inefficient; hence there is considerable potential for rapid growth in productivity and incomes from effective, well-coordinated investments. Growth in the agricultural sector will bring considerable benefits to the large proportion of the poor who are dependent on it, improving food security and incomes, and reducing the rate of rural-urban migration.

166. Private sector growth can also be expected to be a driver for governance reform, given the importance of a transparent rules-based environment for investment.

167. Australia's contribution to increasing the productivity and incomes of the rural poor will build on our successes in the agriculture sector over the last 15 years. Australia will continue to assist Cambodia's shift from a narrow focus on rice for food security towards a broader emphasis on development of rice and other products for trade.

168. The program will support greater agricultural productivity, diversification, and value-adding. In particular, assistance will promote availability of effective extension and research services and good quality agricultural inputs, making appropriate use of government institutions and the private sector.

169. To enhance impact, Australia will develop effective models for agricultural assistance that can be replicated by other donors. For example, with the CAAEP-II project Australia is already playing a leading role in efforts to develop standard approaches to supporting extension services.

170. Close coordination with key donors will be an important element of the strategy. Integrated approaches will be explored, including assistance to address all of the barriers to growth of particular agricultural industries at each stage of the production and marketing process. NGO-led integrated rural development approaches will target specific poor districts. AusAID's approaches will need to take account of the important role of women in agriculture and seek to ensure that programs are sensitive to gender issues.

171. Land access issues will be taken into account in program development, and progressed through policy dialogue and monitoring/coordination of other donor efforts to promote effective implementation of the land law. Improving the efficient, equitable and sustainable use of water resources will be another important objective. Water policy considerations will be integrated into agricultural research and extension work and progressed on a regional basis through Australia's support for the Mekong River Commission. Australia will also promote improved irrigation policies through strengthened government-donor coordination.

172. Consideration will be given to how Australia can address other constraints to growth and investment in the agriculture sector, including in areas such as barriers to trade and foreign investment. Such issues will also be taken up in our policy dialogue with the Royal Government of Cambodia.

173. The new Governance Facility will be used as a mechanism to provide flexible technical assistance in these areas. Support related to accession to the WTO will also be provided through regional programs. Options for supporting Cambodia's decentralized

rural development program (Seila) will be considered, where there are expected to be direct benefits for rural productivity.

3.6.2 Reduce Vulnerability of the Poor

174. Complementing activities in support of productivity, the aid program seeks to reduce vulnerability of the poor to household food insecurity, natural disasters and land mines. Australia can make a difference in these three areas.

175. Although Cambodia has produced rice surpluses overall in recent years, food deficits are a problem at household level. As a result of Australian involvement in agriculture and the significant food aid contributions, Australia is well-placed to assist in promoting household food security. Floods, droughts and milder climatic volatility impact on agricultural productivity and can have a devastating impact on the poor who mostly only produce enough food for subsistence in a good year. Australia will help to strengthen disaster preparedness including through better coordination of government and donor efforts.

Table 2 Donor Initiatives in Agricultural Development and Agribusiness Support

Supply Chain Element	Research	Credit	Input Supplies	Production	Processing and Post Harvest Handling	Marketing	Collection and Distribution	Retail
ADRA		Develop Associations	Develop Associations	Training Farmers	Develop Associations	Develop Associations		
ADVRC					Proposed			
AGRISUD			Private Suppliers	Training Farmers		Develop Associations		
AQIP	Produce Prices		Collector Traders	Training Farmers	Collector Traders	Collector Traders	Collector Traders	
CEDAC	Organic Cert.		Working Groups	Training Farmers				
CIDA	Proposed AMO Project					Proposed AMO Project		
HURREDO	Seed Varieties		Seeds	Training Farmers		Direct to Hotels		Pesticide Free
IDE	Technology		Water Pumps		Technology			
IPM/FAO				Training Farmers	Training Farmers			Pesticide Free
MAFF				Training Farmers				
MOC	Price Info			Training Farmers				
NZAID					Regional SPS Project			
Srer Khmer			Advanced Farmers	Training Farmers				Organic Sales
Comments	Limited Price Information Available	Micro Finance Only, No SME or Longer-Term	New Initiatives Being Tested to Encourage Local Sales	Training Not Generally Linked with Market Assessments	Limited Focus and Little Observed Impact or Change	Some Social Marketing Experiments Begun	AQIP and AGRISUD Are Experimenting	Unwillingness of Consumers to Pay More for Organics

Source: (Hundley 2005)

4 Field Work Findings

4.1 Approach to Field Work

176. Given the overall duration of the study (8 weeks to produce the Draft Final Report), the Study Team was not expected to conduct a comprehensive field work covering all the rice-based farming systems in Cambodia or conduct representative surveys to assess the complexity of rice-based farming systems in Cambodia. Fortunately, there are already several studies that provide a good basis for the work of the Study Team. Rather than replicating these past studies, the field work has tried to address five sets of issues that have not received adequate analysis in the past and yet are crucial to the overall purpose of the Study (unlocking the potential and improving income and livelihood of the poor).

177. The five sets of issues could be expressed as follows:

1. **Where is the value?** The question refers to different stakeholders along the rice-based farming systems value chain. In order to address this question, it is necessary to consider farmers, traders, and processors in the value chains related to rice-based systems. Rather than considering only physical dimensions of productivity (eg yield) it is necessary looking at revenues, costs, and income generated by different activities in production, processing, and marketing.
2. **Who is generating value?** In spite of overall low productivity and low value added in rice-based farming systems, the hypothesis is that there are stakeholders already capable of generating value above the current low levels. These stakeholders are the agroentrepreneurs who are able to make innovations, meet market demand, and by doing so able to get higher value.
3. **How is value generated?** One key objective of the field work is to identify ways to unlock value along different stages of the value chain for rice-based farming systems. Through case studies, key informant interviews, focus group discussions, and value chain questionnaires, the Consultants' Team was able to identify several ways to unlock value that are of relevance to the rice-based farming systems of Cambodia.
4. **What prevents the value to be increased?** Even though most of the constraints along the rice-based farming systems are relatively well known, it is not immediately clear how to prioritize them and how to focus on a few constraints that a program can address successfully.
5. **How could the poor benefit from increasing value?** If value could be unlocked along the value chain, the question remains as to what extent and in what way could the poor benefit from interventions that facilitate the generation of increased value added in the value chain.

178. In order to address these questions, the Consultant's Team has conducted field work in 4 provinces (Kampong Speu, Svay Rieng, Battambang, and Kampong Thom) and utilized four main tools, namely (i) key informant interviews, (ii) case studies, (iii) focus group discussions, and (iv) value chain questionnaires. The choice of the provinces and the description of the fieldwork tools are reported in Appendix E.

179. Several appendices contain the detailed summaries of the field work, including Appendix F (case studies), Appendix G (focus group discussions), Appendix H (key informant interviews). Appendix J contains the value chain analysis.

180. The next sections summarize the findings related to the five sets of questions: (where is the value?), (who is generating the value?), (how is value generated?), (what prevents value to be increased?), and (how could the poor benefit from increased value?).

5 Where is the Value? Value Chain Analysis

5.1 Introduction

181. This section provides indicative measures of value added for different stakeholders along the value chain in rice-based farming systems, namely farmers, traders, millers, and processors. The full analysis of value chain is contained in Appendix J.

5.2 Value Added – Farmers

182. Table 3 illustrates a sample of revenues, costs, gross income, and margins (gross income as a percentage of revenue) for different types of farming systems and commodities assessed by the Consultant's Team.

Table 3 Revenues, Costs, Gross Income, and Margins for different crops and farming systems.

		Battambang	Kg. Speu	Kg. Speu Dry Season but not Intensified	Svay Rieng	Kg. Thom	Svay Rieng
	Unit	Typical Wet Season	Aromatic Wet Season		Dry Season Intensified	Vegetable Cabbage	Vegetable Convolvulus
Revenue	000 Riels/ha	885	1,360	1,290	2,600	7,550	12,000
Cost							
Material	000 Riels/ha	290	610	755	1,280	1,900	388
Labors	000 Riels/ha	288	380	380	325	640	2,375
Total cost		577	990	1,135	1,605	2,540	2,763
Gross Income	000 Riels/ha	308	370	155	995	5,010	9,237
	\$/ha	\$77	\$93	\$39	\$249	\$1,253	\$2,310
Margin %		34.8	27.2	12.0	38.3	66.4	77.0

Note: Exchange rate applied: 1US\$ = Riels 4,000

Source: Diagnostic Study Fieldwork

183. The conclusions from analyzing the margins for farmers are:

1. Paddy cultivation is generally adding low value. With average landholding size of around 1 ha, most smallholder farmers (comprising the vast majority of farmers) produce just enough for self-consumption and a slight marketable surplus. In a typical wet season the gross income is about \$77/ha. Without much land available and without an additional crop during the dry season, the overall gross margin is low. The land constraint cannot really be removed given the current agrarian structure. Double cropping is either not possible or very risky without access to irrigated water.
2. The dry season paddy cultivation conducted under conditions of rainfed agriculture is very risky, as already mentioned. Moreover, the dry season cultivation requires higher material costs (for fertilizers, pesticides, herbicides, and pumping water) than the wet season. As a result, even if some improvements in yield could be obtained through the use of dry season varieties, the overall outcome in terms of value added can be even lower than during the wet season (in the example of Table 3 it is \$39/ha, about half the level in the wet season).
3. Improvement in margins could be obtained by either cultivating aromatic varieties or by intensifying agriculture through the use of irrigation, high yielding varieties, and sound plant nutrient and pest management. The increase in gross income resulting

from aromatic varieties is about 20 percent (from \$77/ha to \$93/ha) and for intensified agriculture can be of more than 200 percent (from \$77/ha to \$249/ha). The increase in margin for aromatic varieties is mainly the outcome of higher prices for the product (Riel 700/kg instead of Riel 500/kg) and the increase in margin for intensified rice is mainly the outcome of increase in yield (5 tonnes/ha instead of 2 tonnes/ha).

4. Diversifying into high value products, such as vegetables, can result in dramatic increases in value. The two examples shown in the table above indicate that vegetable production can lead to gross income 16 to 30 times higher than in the case of paddy produced during the wet season. Shifting to vegetables and other higher value products is of course partly an issue of technology and partly an issue of market access. The total size of the vegetable market in Cambodia is much smaller than the size of the rice market. However, one should not forget that there is still a large demand for vegetables that is currently met by imports from Viet Nam (estimated at 80 percent of total demand).

5.3 Value Added – Traders

184. Table 4 illustrates revenues, costs, gross income, and margins (gross income as a percentage of revenue) for different types of paddy traders.

Table 4 Revenues, Costs, Gross Income, and Margins for Paddy Traders

	Unit	Kg. Speu	Svay Rieng	Kg. Speu
		Medium 1	Medium 2	Large
Volume	Tonnes	1,430	2,200	5,525
Revenue	000 Riels	940,200	1,286,000	4,068,500
Total Expenses	000 Riels	934,140	1,193,700	3,955,336
Gross Income	000 Riels	6,060	92,300	113,164
	US\$	\$1,515	\$23,075	\$28,291
Margin	%	0.6	7.2	2.8

Note: Exchange rate applied: 1US\$ = Riels 4,000

Source: Diagnostic Study Fieldwork

185. The conclusions from analyzing the margins for paddy traders are:

1. Gross income from trading activities is much larger than in the case of production activities by farmers.
2. Margins are relatively low, suggesting that contrary to commonly held belief there are not monopolies. Traders themselves often complain about too much competition. A study conducted in Battambang²² has supposedly indicated local monopolies in which farmers become captives of traders. This situation however might be the outcome of interlocking products and credit markets: the trader provides credit to farmers in need and by doing so exercises influence on the price of the product. In most cases observed by the Consultant's Team there is no credit involved in selling of paddy from farmers to traders and markets appear rather competitive.

²² Referred to by Julien Calas during the Final Workshop.

3. There are considerable differences among the performance of difference traders. Comparing just two traders of similar size (referred to in the table above as medium 1 and medium 2), the difference in gross income is striking. The main difference is related to storage decisions by different traders. In the case of the first trader, she decided to store paddy and was penalized by a sudden drop of prices when she finally put the produce on the market. In the case of the second trader, he was quite skillful in exploiting high price hikes during the postproduction period. There were no noticeable differences in varieties of paddy sold by the two traders. This suggests that trading is a highly risky and specialized occupation. Good knowledge of seasonal prices and the capacity of taking quick decisions in response to market conditions are critical skills for success.
4. Almost all of the traders self-finance their investment both for working capital requirements and investment capital. The reason is obvious. Given the high cost of capital and the relatively low margins in paddy trade, there is hardly any chance of making a profit in trading after paying the interest on borrowed capital.

5.3.1 Value Added – Millers

186. Table 5 illustrates revenues, costs, gross income, and margins (gross income as a percentage of revenue) for different types of millers.

Table 5 Revenues, Costs, Gross Income, and Margins for Millers

	Unit	Kg. Speu	Kg. Thom	Battambang
		Small	Medium	Large
Volume	Tonnes	200	3,000	5,100
Revenue				
Rice	000 /Riels	99,600	1,390,800	2,010,000
Others	000 /Riels	20,400	342,000	1,129,752
Total Revenue	000 /Riels	120,000	1,732,800	3,139,752
Total Expenses	000 /Riels	113,565	1,521,940	2,773,027
Gross Income	000 /Riels	6,435	210,860	366,725
	US\$	\$1,609	\$52,715	\$91,681
Margin %		5.4	12.2	11.7

Note: Exchange rate applied: 1US\$ = Riels 4,000

Source: Diagnostic Study Fieldwork

187. The conclusions from analyzing the margins for millers are:

1. Gross income from milling activities is much larger than in the case of production activities by farmers.
2. Small mills have relatively low margins. When compared these margins to larger mills, however, one should take into account the actual costs of structures and capital and the depreciation factors which are much higher in the case of larger mills.
3. As in the case of traders, storage decisions might cause tremendous changes in gross income. The medium mill in Kampong Thom has a volume of sales which is 15 times the volume of sales of the small mill in Kampong Speu, yet the gross income is 33 times higher. Part of this difference is explained by better quality provided by the medium mill when compared to the small mill. However, a large part of the difference is due to storage decisions.

4. In the case of large mills, the gross margin is deceptively high (almost 12 percent). In fact the mill is operating at only 10 percent of capacity (see Box 3 explaining the story behind it). When depreciation of fixed assets is taken into consideration, the net margins might be much smaller and possibly negative.
5. Small and medium mills market only to the domestic market. The quality of rice they are able to provide is of insufficient quality and consistency for exports. On the other hand, the larger mill has the capacity of providing quality rice, but it is not doing so, mainly because of bottlenecks at the supply side or at the marketing side.

5.3.2 Value Added – Processors

188. Table 6 illustrates revenues, costs, gross income, and margins (gross income as a percentage of revenue) for selected food processors.

Table 6 Revenues, Costs, Gross Income, and Margins for processors

		Battambang	Kg Speu	Battambang	Kg. Thom
	Unit	Sauces (Chili,Soy,Fish)	Soybeans (popussandeak)	Noodles	Soy bean Fermented
Revenue	000 Riels	600,000	43,200	1,175,300	16,200
Cost	000 Riels	562,500	36,000	903,375	13,770
Gross Income	000 Riels	37,500	7,200	271,925	2,430
	US \$	\$9,375	\$1,800	\$67,981	\$608
Margin	%	6.3	16.7	23.1	15.0

Note: Exchange rate applied: 1US\$ = Riels 4,000

Source: Diagnostic Study Fieldwork

189. The conclusions from analyzing the margins for farmers are:

1. Gross income from processing activities is generally larger than in the case of production activities by farmers.
2. All of the food processors encountered by the Consultant's Team are small scale.
3. They fund activities with their own funds.
4. They are able to obtain moderate gross income by meeting consumer demand for processed foods and are able to compete with imported products.

6 Who is Generating Value? The Agroentrepreneurs of Rice-based Systems

6.1 Entrepreneurship

190. Entrepreneurship refers to the assumption of risk and responsibilities in designing and implementing a business strategy or starting a business. For the purpose of the Diagnostic Study an entrepreneur could be a farmer, a rice miller, a trader, a leader of a cooperative, or a business person who has engaged in innovative activities related to value-adding agricultural and agribusiness activities (including processing, trading, and distribution) for rice-based farming systems. These innovative activities usually involve taking risks, making investments, and mobilizing resources to ensure that higher income is generated through successfully meeting market requirements.

191. A key feature of an entrepreneur is his or her capacity to identify a market opportunity, organize human resources and systems, and manage processes to achieve higher returns to investment. To do so, the entrepreneurs will need to establish horizontal and vertical linkages across the value chain. Horizontal linkages refer to other stakeholders at the same level of the value chain. For example, if the respondent is a farmer, horizontal linkages refer to other farmers (in the same community or in other parts of the country). Vertical linkages refer to other stakeholders in the value chain at different stages of the value chains (for example, for a farmer these other stakeholders could be input suppliers, collectors, wholesalers, millers, credit suppliers, extensionists, agroenterprises, etc).

6.2 Seizing Market Opportunities - The Vegetable Trader

192. Mr Keun Ron is a vegetable trader in Kampong Thom (see Case Study 17). He started the business of vegetable trading about 3 years ago and before then he was a smallholder farmer and fish collector. In 2003 he saw an opportunity in vegetable trading to supply the increasing market demand in Siem Riep, induced by the tourism industry. He made an initial investment in a truck and started to make deliveries to Siem Riep. Currently, he is specialized only in vegetable trading and completes about 120 deliveries per year. For each delivery he requires a working capital of about R 5 million, of which R 4 million he finances with his own funds and obtain R 1 million as credit from the collector agent. He and his three workers spend about 3 days to procure the vegetables from farmers and send a truck to the market in Siem Riep. For some vegetables (ie cucumber) he has contract relations with a buyer. The contract establishes terms of delivery and prices. To honor the terms of the contract he sometimes has to accept lower prices. With a margin of about 20 percent on his invested capital, he is able to obtain an income of about \$30,000 per year. He is facing an increasing competition to supply vegetables to Siem Riep and does not yet have a clear strategy of how to stay ahead of the competition. As many other small business persons, he finances most of the capital with his own funds, pays illegal fees, gets market information through mobile phone contacts with collectors, farmers, and buyers. He is also aware of losses he incurs due to lack of refrigerated truck and also due to poor quality of handling and producing vegetables.

6.3 Willingness to Take Risk - The Paddy Trader/Rice Miller

193. Ms Hout Eng is a successful trader and rice miller (Case Study 11). She started in 1980 with only \$200 capital and she currently has sales of about \$3 million per year including paddy, rice, cashew nuts, pigs, sesame and mungbeans. In spite of low education (reached only 4th grade), she has a very good sense of business. She was a trader for a long period and has been shifting from one business opportunity to another, always willing to take high risk. During last year, she lost about \$30,000 on cashew trade. At the same time she is quite responsive to new market opportunities, whether they are related to paddy trade to Viet Nam, rice milling for Cambodia market, pork for government contracts, or cash crops such as cashew, sesame, and mungbean.

194. She has access to credit. ACLEDA bank has given her a loan of \$70,000 at 1.5 percent per month, but she is thinking to refinance the loan at a lower interest rate of 1 percent per month that she could get outside of the formal banking system. She seems to have an extensive network of suppliers including both collectors and farmers. At the same time she is quite vigilant about new market opportunities. Her family strongly supports her in her business decisions.

195. Ms Eng started her career as a rice farmer, she shifted to trading, then added milling, and now in face of increasing competition in the paddy and rice milling industry, she is thinking again to engage in a new business venture. She plans to invest in farming and get access to an economic concession of about 2,100 ha where she is thinking to develop irrigation system and contract farming.

6.4 Making Innovations - The Integrated Farmer

196. Mr Long Saroeun is a 55 year old farmer from Svay Rieng (Case Study 9). His small farm of 1.7 ha is located in an area without access to irrigation and with very low productivity of rice (less than 2 tonnes/ha). Until 3 years ago, he and his family (including 9 children) could hardly make ends meet and provide for basic necessities. In 2003 he was selected by an international NGO (CRS) to be involved in an integrated farming system demonstration using the land surrounding his house (0.8 ha). The demonstration involved making several innovations in farming, changing practices and learning several new techniques. Since then, with technical support of CRS, he has started various agricultural activities including vegetable production, tree nursery, pig raising, and aquaculture. In addition to agricultural activities, his wife has a small retail store located in the farm and he and his children provide repair services to the villagers (flat tires repairing). His farm is a good model of integrated farming; recently he was one of the exhibitors in the provincial Agricultural Fair where he exhibited a model of his farm. His current income for various agricultural and non-agricultural activities is about \$800 per year. That is still relatively low but represents a considerable increase from the barely \$200 per year he could make with only rainfed rice production. In spite of a large family and not been young anymore, Mr Saroeun and his family have been able to make considerable innovations and add value to the meager assets they started with. He and his family have clear plans of what needs to be done in the next 5 years, including investment in a small tractor and thresher that could be used to rent to other villagers. He also would like to send his son to college to study agriculture, but he currently would have difficulty in financing the studies.

6.5 *Continuously Learning New Technologies - The Intensive Farmer*

197. Mr Dieu Heuy is a farmer in Svay Rieng (Case Study 5) in one commune that is fully irrigated, as a result of a PRASAC project started in 1997. Before 1997 he was a soldier in the army and his wife was in the village trying to make ends meet through some early wet season paddy cultivation and raising of cows. Once irrigation was available in the village, his land of 3 ha could be cultivated with two crops per year and an average yield of 4 tonnes/ha. He broadcast rice using seeds from Viet Nam, has 2 pumps and rents tractor services to prepare land. Threshing is also mechanically done. As he started to have higher income from rice cultivation he invested in digging ponds on his land and has currently three ponds that produce about 1000 kg fish per year which he sells in the commune and occasionally in the provincial market; the total level from this activity is about \$1,000 per year. He attributes the increased income and success of his business to intensive use of new agricultural techniques that he has learned through various training courses with the Provincial Department of Agriculture and also through frequent visits to Viet Nam. At the same time, he believes that rice alone cannot be a business to provide sufficient income to his family, given the relatively small size of the farm. For this reason he has started both aquaculture and animal raising (cows and pigs). He is constantly learning new techniques in both crop and animal husbandry.

6.6 *The Importance of a Distribution Network - The Sauces Processor*

198. Ms San Kimheun is a 35 years old food processor from Battambang (Case Study 18). She and her husband started the business of producing fish, chilli, and soy sauce about 4 years ago. Previously her husband was a worker in a processing plant in Phnom Penh and she was a small trader in the local market. She convinced her husband to start the business. Since the beginning her target market was farmers from neighboring districts. In order to compete with cheaper and higher quality products from abroad, she and her husband thought of developing a distribution network which has been continuously increasing; they aim at covering all the districts in Battambang province very soon. Every day, her husband makes delivery to the various customers. The delivery services provided to farmers, often in distant villages provide a competitive advantage for her products. Her yearly income is about \$10,000.

6.7 *Learning New Technologies to Improve Quality - The Rice Noodles Processor*

199. Mr Seng Map is a rice noodle processor in Battambang province. Over the past 10 years he has consistently increased his production capacity and sales; his distribution network covers now the provinces of Battambang and Pailing. His main competitors are rice noodles from Thailand and Viet Nam. His factory is producing about 2,300 kg of noodles per day. He employs 35 people and uses about 2,000 kg of rice per day, implying a procurement of about 700 tonnes per year. His main problem is in learning new technologies to improve quality of the product and become more competitive with imported products. However, currently he does not know where he could learn the new technology. His estimated yearly income is about \$70,000.

6.8 Establishing Effective Value Chains - Angkor Kasekam

200. The example of Angkor Kasekam (see Box 2) is rightly cited as a model of an entrepreneur in Cambodia who single-handedly has created a value chain for a niche rice market and in the process has been able to generate a supply chain involving more than 80,000 farmers, as of 2005. His main product is a fragrant, long-grain, high quality rice variety (Neang Malis) which he exports to overseas markets at a premium over the competing Jasmine rice from Thailand. In order to do so, the mill has created a well organized supply chain with a network of farmers and suppliers in several provinces of Cambodia. He provides seeds and technical assistance and ensures purchase of paddy at prices well above the average (R 700 rather than R 500). The mills has advanced technology (Satake rice mill), is extremely well organized, and its product is well packaged and directly put on containers at the mill for shipment at the port of Sihanoukville.

Box 2. Niche Strategy in Rice Export: The case of Angkor Kasekam in Cambodia

Background

Angkor Kasekam is one of the largest commercial mills in Cambodia, with a mill capacity of 30 tonnes per hour. Established in 2000, but not operational until 2001, Angkor Kasekam is unique in terms of their integrated supply chain on the production side. Angkor Kasekam specializes in the production of organic Neang Malis rice from Battambang province and engages in contractual agreements with farmers to produce this pure variety.

Contracting Arrangements

Farmers who contract with Angkor Kasekam must first apply to be a member of a commune-level farm association, which requires approval by the association head, village chief, commune chief, and village representatives who are members of the association. Once approval has been granted, the farmers are subject to strict contractual obligations. For instance, farmers are provided free seed, with the provision that for every 50 kg of seed distributed, they are to return 100 kg to the company. In exchange for these conditions, farmers are guaranteed a premium price for their paddy, although a schedule of deductions is published that deducts from the paddy price products with high levels of moisture content, immature grains, and foreign matter. The company also maintains a private extension service which works with farm associations in 65 communes to promote proper farming techniques and monitor supply.

Linkages with Suppliers and Buyers

For the year 2001, the company reports that 27,000 households were affiliated with the company on 17,000 ha. For 2002, these numbers nearly doubled to 50,000 households on almost 30,000 ha. Estimated production in 2002 was 50,000 tonnes. The majority (95 percent) of Angkor Kasekam's production is destined for export markets, including Hong Kong and several markets in the EU.

Value Added

The price paid for Angkor Kasekam's rice fetches a high premium on international markets, with fob Sihanoukville prices reported at \$460 per tonne (\$100 per tonne more than the best Thai Jasmine varieties). Angkor Kasekam has been a victim of its success, as one of the constraints cited were working capital bottlenecks needed to purchase paddy from greatly expanded production.

Institutional Structure

One of the interesting facets about Angkor Kasekam is their ability to develop and enforce contractual arrangements in a country where high transactions costs and an underdeveloped legal and institutional framework impede the enforcement and application of many basic laws. Reliance on existing communal structures appears to prove critical to these relationships, though further research is needed to understand these dynamics. In addition, through the use of their own company-specific extension service, they have found means to ensure quality along the supply chain.

Such supply-chain management techniques draw parallels to those used by multinational and agribusiness companies in Latin America in the 1990s, which integrated their supply chains in response to a lack of public grades and standards necessary to export their production. While these extension services are limited in the sense that they only apply to a narrowly-defined, organic variety, the production lessons are still valuable for

farmers given the lack of comprehensive public extension services in Cambodia.

Challenges

The challenge for Angkor Kasekam and other companies with similar business models is the need for the development of an appropriate enabling environment, in terms of institutions and infrastructure, to facilitate and manage these relationships. More importantly, while these models may facilitate private sector trade, particularly for exports, they do not necessarily have a major impact on the poor who either do not have land or have little in the way of marketed surplus to sell, highlighting the important role needed for government, multilateral institutions, and private institutions to better integrate the poor into the market.

Source: Adapted from (ACI 2002)

6.9 *It is not only about Capital and Transportation Cost - The Large Miller*

201. As indicated in section 8 a variety of entrepreneurs (farmers, traders, and processors) experience several constraints. Often cited as key constraints are the lack of capital, the competition from neighboring countries, and high transportation costs including illegal fees. All of these constraints are certainly relevant. However, as the examples above show, several entrepreneurs in Cambodia have been able to overcome several of these constraints and embark on a higher path of growth and value added. Even though a Program and appropriate government policies and effective institutions might contribute to enhance the opportunities for entrepreneurs to prosper, one should not forget that there are also other factors explaining the lack of success, including the unwillingness to adapt or lack of capacity.

202. The case discussed in Box 3 shows an entrepreneur who has a large mill, with adequate processing capacity to export quality rice, has sufficient capital, yet the current capacity utilization of the mill is only 10 percent (which when taking into account depreciation of capital would imply negative margins). Even though the increase in paddy price during the last 4 years (originated by growing demand from Viet Nam) is often considered the main factor behind the present difficulties of the rice milling industry, a closer analysis of the mill performance show in fact an inability to establish a supply chain (ie backward linkages with farmers and suppliers) as well as the inadequate effort to meet buyers requirements.

Box 3 How Large Mills Cope with Changing Paddy Prices?

During the period 2002 to 2005, paddy prices have increased substantially, mostly as the result of imports of paddy from Viet Nam and Thailand. This increase in paddy prices has been often indicated as the major reason for the stagnant growth of the milling industry in Cambodia. The analysis of a large mill visited by the Consultant's Team during the field work however suggests that other reasons may play a role in explaining the low performance of the milling industry. The mill visited by the Team is one of the largest mills in Cambodia: it has a capacity of about 40,000 tonnes per year of milled rice, is endowed with modern equipment able to produce milled rice of good quality acceptable in international markets, and has excellent facilities located along one of the main national roads. Moreover, the owner of the mill has access to considerable finance from his own funds. The conditions of the mill would seem excellent to embark on exports of rice. This, however, has not occurred. During the last year, the mill was operating at 10 percent capacity, producing and selling only about 4,000 tonnes.

During the period 2002 to 2005, prices of paddy have indeed increased considerably, even when one takes into account inflation. The paddy prices over the period have increased by 25 percent in real terms; see Figure 2. Over the same period, the decrease in revenues of the mills has been dramatic, dropping by 75 percent from US\$5.2 million in 2002 to US\$1.3 million in 2005; see Figure 3.

Paddy Price in Rs/Kg (CPI adjusted)

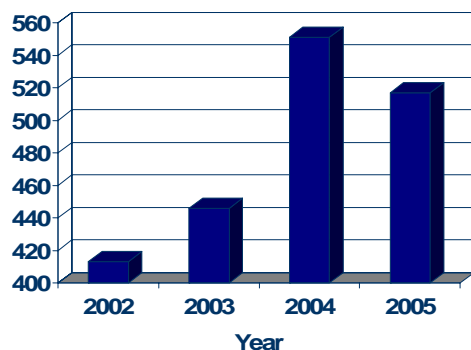


Figure 2 Change in real Paddy Prices

Revenues US\$ Million

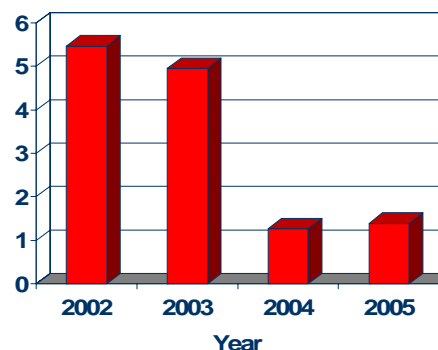


Figure 3 Change in Revenues

On the surface, it would then seem that there is a close relationship between paddy prices and revenues of the mill. In fact, the situation is rather different. An analysis of revenues of the mill, made available by the owner, showed that the high revenue in 2002-03 were due to the existence of a major contract with the Government. That contract value was about \$4million. In 2004 the mill lost the contract and therefore could only sell to the domestic market (about \$1million). There is a strong hypothesis that the mill was established in the expectation that the large government contracts could last, which in fact did not happen. Faced with a declined contract, the mill so far has not been able to reach foreign buyers. Yet, if the mill has to survive, it will have to develop backward linkages with farmers and forward with foreign buyers.

Source: Diagnostic Study Fieldwork

6.10 Summary

203. The discussion of various cases of entrepreneurship in rice-based farming systems can be summarized as follows.

204. **Factors of Success.** First, there are several factors explaining the success of entrepreneurs that need to be taken into account and promoted by a Program that intends to increase value added. These factors include:

1. Seizing Market Opportunities
2. Willingness to Take Risks
3. Making Innovations
4. Continuously Learning New Technologies
5. The Importance of Establishing a Distribution Network
6. Learning New Technologies to Improve Quality
7. Establishing Effective Backward Linkages (farmers and suppliers)
8. Establishing Effective Forward Linkages (domestic and foreign customers)

205. **Enabling Environment.** Second, there is sometimes confusion as related to what an “enabling environment” for private sector development is. It is often assumed that the private sector will respond to market signals and the main issue to promote the private sector consists in creating an enabling environment for private investment to flourish. The enabling environment consists of appropriate policies, adequate infrastructure, and a legal system that protects property rights and minimizes corruption. While all these aspects are certainly necessary to promote private sector, other aspects are neglected. Facilitating private sector investment and growth might involve:

1. To disseminate market intelligence so that more opportunities are known and seized by prospective entrepreneurs;
2. To provide tools and information to evaluate and minimize risk;
3. To disseminate innovations;
4. To provide mechanisms to access technologies that are suitable to the varying conditions of the market and the socio-economic and agroecological environment;
5. To provide training and capacity strengthening based on the demand of the entrepreneurs, keeping in mind that no single technology is appropriate in all circumstances;
6. To promote methods to measure and improve quality; and, perhaps most important,
7. To facilitate the formation of value chains, particularly backward linkages with farmers and suppliers.

206. **Neglect of Agroentrepreneurs.** Third, in the formulation of agricultural programs, the role of agroentrepreneurs is often neglected. There is almost an exclusive focus on farmers and agricultural productivity as the main and only content of the programs. While giving a central attention to farmers and agricultural productivity is certainly an important aspect of agricultural programs, it is often forgotten that without a parallel emphasis on agroentrepreneurs (whether they are farmers, processors, or traders) very limited value added will occur. The example of Angkor Kasekam shows that one company could affect and improve the livelihood of 80,000 farmers. The issue is how to facilitate the emergence of other Angkor Kasekams in Cambodia. At the same time, the discussion of various entrepreneurs above suggests that not only large enterprises are to be promoted, but also small and medium enterprises have a key role to play to link farmers to the market and create higher value added. The rice noodle company in Battambang in section 6.7 employs 35 workers and procures paddy equivalent to the surplus of at least 700 smallholder farmers. In addition, through induced services (repair of machinery, distribution outlets, transporters, financial services, local restaurants and food outlets, etc) it might induce several hundred jobs in the rural economy. Lacking these entrepreneurs, the income of farmers and rural households would be considerably lower.

7 How is Value Generated? Unlocking Value in the Rice-based Systems

7.1 Definition of Value Added

207. Value added is a measure of output which is potentially comparable across countries and economic structures. Value added by an organization or industry can be defined as follows:

$$\text{Value Added} = \text{Revenue} - \text{Non-labor costs of inputs}$$

where

$$\text{Revenue} = \text{Price} \times \text{Quantity}$$

and

$$\text{Costs} = \text{Costs of Capital (Structures, equipment, land)} + \text{Costs of (materials, energy, and purchased services)}$$

7.2 Ways to Increase Value Added in Rice-based Farming Systems

208. The term value-added can be interpreted in many ways. In agricultural policy, it predominantly describes the steps that alter or add to a product or service. It is an innovation that enhances or improves (in the opinion of the consumer) an existing product, or introduces new products or new product uses. This allows the farmer to create new markets, or differentiate a product from others and thus gain an advantage over competitors. In so doing, the farmer can ask a higher premium (price) or gain increased market share or access.

209. Vertical expansion of a farm operation through direct selling or a move to on-farm processing shortens the distance between farmer and consumer, and is often cited as a means to add value to the farm operation. Agricultural value-added can also involve new vertical and horizontal relationships that help increase profit margins, such as collective membership and investment in farm cooperatives. In addition, food quality chains can be protected or enhanced, and thus add value through partnerships along the food continuum from the farmer to the processor, distributor and retailer.

210. Adding value does not necessarily involve altering a product; it can be the adoption of new production or handling methods that increase a farmer's capacity and reliability in meeting market demand. Value-added can be almost anything that enhances the

dimensions of a business. The key is that the value-adding activity must increase or stabilize profit margins, and the output must appeal to the consumer.

7.2.1 Implications of the Definition of Value Added

211. The immediate implications of the definition of value added given in the previous section are that to increase value added, a combination of the following strategies is needed:

1. Increase the price paid by the consumer for the product sold;
2. Increase the quantity purchased by the consumer; and
3. Reduce the costs involved in selling to the consumer.

212. These strategies could be applied at any stage along the value chain, from producers to consumers. The following sections illustrate different strategies. In many cases the strategies are already been adopted by farmers and agroentrepreneurs in rice-based farming systems of Cambodia.

213. A key issue will then be of how to formulate a program that builds on the theoretical framework introduced here and the often isolated experiences of success already prevailing in the economy.

7.3 Increasing Value Added at the Farm Level

7.3.1 Increase the price

214. This can be achieved in different ways:

1. **Diversifying production** from main staples to higher-value commodities such as aromatic varieties of paddy, high-demand horticultural products, aquaculture and livestock products.
 - a. Examples:
 - i. Producing glutinous rice (eg Damnep Khucoo in Kampong Speu, see Table 68; and Agricultural Cooperative in Battambang, see Box 4)
 - ii. Producing fragrant rice (eg Neang Malis see Box 2; or Somali rice see Table 71)
 - iii. Producing vegetables
 - iv. Aquaculture
2. **Producing higher quality** products, where quality is a set of characteristics perceived by the buyer such as uniformity of the product, appearance, taste, freshness, organic method of production
 - a. Examples:
 - i. Probably the best example is the Neang Malis produced by Angkor Kasekam, which has consistency of variety, fragrance, perfect milling, good packaging, and quality control system.

3. **On-farm processing** (primary processing). This involves cleaning, grading, packaging on the farm or at village/commune level. The products could be marketed to the trader or the consumer at a higher price.
 - a. Examples:
 - i. Fish processing at the farm level (see Case Study 16)
 - ii. Very little on-farm processing occurs even though the potential for pickled vegetables, banana chip primary processing, mango primary processing, etc, could be explored.
4. **Branding.** By creating a reputation for consistency in quality and supply of certain products (eg Neang Malis for rice varieties, oranges from Battambang, durian from Kampot) the consumer is willing to pay higher prices.
 - a. Examples:
 - i. Neang Malis is the main example
 - ii. Sanpidor rice is also now marketed in major supermarkets in Phnom Penh
 - iii. In spite of some of the highest quality of fish in the world that is available in Cambodia, very little fish branding and fish processing occurs. Fish paste, dry fish, and fish sauces are mostly artisanal activities of small enterprise activities, often unable to compete with imported products.
5. **Improving the service.** Rather than waiting for the collector to come to the farm or village level, local transportation of the products to the closest collection center (eg mill, wholesale market, and retail market) will cut some of the transportation and intermediation costs that allow farmer to fetch higher prices.
 - a. Examples:
 - i. Rarely farmers market products. At most they take paddy to the mill. They heavily rely on a network of collectors and assemblers.
6. **Group marketing.** Rather than selling individually, farmers through marketing groups (associations, cooperatives) can assemble products in larger quantities and exercise more bargaining power vis à vis traders. This however will require more coordination among farmers in order to avoid free-riding problems and organizational structures that ensure governance of the group (to avoid for example management of the group to work at the detriment of the group or collude with the buyer).
 - a. Examples:
 - i. Cooperative marketing of glutinous rice (see Box 4)
 - ii. Vegetable marketing in AQIP project
7. **Contracts.** By establishing long-term contracts with a processor or other marketing agents in the value chain (eg retailer such as supermarket in Phnom Penh, specialty stores, restaurants), farmers can ensure a stable buyer who can provide higher prices. This however will require coordination among farmers and between farmers and the buyer. Specific product requirements have to be complied with through improved agricultural practices and postharvest good practices (handling, packaging, transporting).

- a. Examples:
 - i. Seed contracts within AQIP
 - ii. Contracts to produce Neang Malis (Box 2)
8. **Storage.** By exploiting seasonal price changes, farmers could store their products and ensure higher prices than those prevailing after harvest. This however will require at least four conditions: (i) availability of storage, (ii) financial capacity of storing, (iii) technical capacity for storing, and (iv) good understanding of market price variations. In the case of perishable products (eg vegetables, fruit, fish), storage is more complex and capital intensive than for the case of non-perishable products (eg paddy). In the case of perishable products, storage may require cool or cold storage. An alternative to storage is processing or preservation of products (eg fish paste, pickled vegetables).
- a. Examples:
 - i. Very little on-farm storage is currently done by farmers
 - ii. Preservation of food is limited to fish past and dry fish
9. **Drying.** High moisture content in paddy, grains (eg maize, soybeans), and roots (eg cassava, potato) reduces the price premium paid by traders and processors. For example in farmer-mill contracts to supply Neang Malis, an aromatic variety of paddy, to a major rice mill (Angkor Kasekam), a price premium or discount is given to farmers based on objective measurement of moisture content.
- a. Examples:
 - i. Drying is mostly traditional, laying the produce on the ground and sun-drying
 - ii. Farmers in intensive farming systems, such as those in Chup Pring commune in Svay Rieng are planning to buy dryers to sell dry-season rice (which comes at harvest at the beginning of the rainy season)
 - iii. Farmers in Battambang producing maize (a dry season crop) are also planning to buy dryers.

Box 4 Agricultural Cooperative in Battambang

The cooperative located in Balat Meanchey village, Norea Commune, Sangke District, or Battambang province, was first established as an association in 1994 comprising 92 families and 12 ha. The cooperative was formally recognized on the 3rd of September 2004 containing 82 families from different villages and covering 80 ha. Community meetings are held every one to two months to make decisions in relation to the management of the Cooperative. Decisions are passed by majority vote with both men and women participate in the voting process. Mr Kol Savoeun has been the elected Chief since 1996. Before this time he was the Vice Chief of the Cooperative. Elections are held every 5 years and the next election is due in 2007. The cooperative includes poor farmers (5-6 families) who have trouble contributing to the organization.

Farming Issues. 50 percent of growers use their own seed for rice production while 50 percent purchase pure seed for planting. Collective purchasing by the cooperative occurs in the areas of diesel, pure seed and fertilizer. Some members also pay the cooperative for supplying labor for seedbed preparation, transplanting and harvesting.

Diesel is a large component of the costs for the cooperative. Mr Kol Savoeun explained they consume on average 220L of Diesel per ha per season. In total they require almost 100 Drums (220L) per year. The breakdown is 80 drums for 80ha of dry season rice and 20 drums for 80ha of wet season rice. Total expenditure for diesel in a season is greater than R20 million or \$5000

Regarding credit, most money lenders require a high degree of security. In this instance the Chief of the cooperative will use his own personal land as security against the borrowings of the cooperative. The value of the village chief's parcel of land is \$5000. When used for security by the money lenders this land is valued down to \$3000 and a charge of 3 percent interest per month applies for a loan of around R 700,000 to 800,000. This rate increase to 5 percent per month for

smaller amounts of R 200,000 to 300,000. Millers will also lend money (up to \$1000) at 3 percent per month. There has been no pressure from the millers in the past to sell rice back to them (at a potentially lower price) to cover their debts. The cooperative has always been free to sell to whomever they please regardless of where the debt is held. In 2000 the cooperative was able to source from CARITAS an interest free loan for three years of \$1800 for the purchase of a pump. There is still outstanding \$600 to pay on this loan at the present time. In the past the cooperative has been able to borrow money for the procurement of diesel and cropping inputs for dry season rice. However, the village chief believes, due to the increases in private expenditure of members on items such as motorbikes, improved houses etc less money is available for the purchasing of inputs.

In some cases the money available to purchase diesel for the entire season for the cooperative is insufficient. It is the responsibility of the Cooperative Chief to source diesel from wherever he can and he is paid back by the cooperative in rice at the end of the season. If the Chief is owed money by members of the cooperative the rice millers must first pay moneys directly to the chief. The cooperative has control of the relationship between the millers and the farmers. The cooperative says how much the millers can procure directly from farmers and how much has to be supplied to the cooperative. The cooperative takes priority.

In many instances the millers attempt to deal directly with the farmers. To prevent this the Village Chief will offer to purchase rice above the price the millers are willing to offer. For example the price millers offer the individual farmer is R 450/kg. The Village Chief will offer farmers R 600/kg. The millers then purchase the rice from a common collection point off the Village Chief for R 600/kg. For his facilitation services the Chief collects a commission of R 10/kg.

Labor Issues. The cooperative does have problems sourcing labor and as a result the cost of labor is high. Labor is sourced locally from near by the village and there is a feeling the local labor force is diminishing, moving to the urban centers in Battambang and Thailand. The farmers have tried to reduce the labor costs by taking longer in the field with less people. Experience has taught them this leads to less timely farming operations and yield losses due to weather are inevitable, especially when growing dry season rice. The collecting and transplanting 40 branches of seedlings costs R 7,000. In one day an experienced person can transplant two to three 40 branch seedling units. There are difficulties with the transportation of rice from the field to the collection point in the village but once in the village there are no issues for the millers to transport rice. They pick up at their own expense from a central location within the cooperative.

Yields and Prices. The average yield for dry season rice is 4t/ha. The cooperative has concentrated on producing glutinous rice for cash flow purposes (100 percent sold). They grow wet season rice, also yielding 4t/ha for private consumption (70 percent) and the remaining 30 percent is sold to millers. Dry season glutinous rice is sold at R 700/kg while wet season rice is sold on average at R 580/kg. The difficulty experienced in growing dry season glutinous rice is it requires 2 days of drying at the end of the dry season due to its increased grain size. This is often risky as the wet season is commencing. Quality planting seed is often difficult to source. There are some individual farmers in the cooperative who attempt to purify their glutinous rice variety and the other farmers try to source from these farmers first. There are four millers available to offer prices to the cooperative for their glutinous rice.

Major Constraints. The first constraint at present for the cooperative is the high price of diesel. The second constraint is the lack of access to credit at reasonable rates. In the past 5 years the Cooperative Chief has had to put his own private land up for security 4 times. The third most important constraint is the condition of the irrigation system. The poor condition (siltation) of the secondary canals limits the ability to grow the maximum area of dry season rice. This is limiting the growth of the cooperative as new people wish to enter but extra irrigated land is unable to be supplied. At present they are unable to collect money for the maintenance of the system as money is being held over in preparation for cultivation of wet season rice and for the establishment of small business enterprises.

What does the future hold? Over the next 5 years the cooperative wishes to promote the growing of dry season rice along with promoting the establishment of diverse business interests within the organization. In 2005 the Provincial Department of Agriculture issued a Certificate certifying the status of the cooperative. Twenty five of these certificates have been issued by the PDA. The function of this certificate is to facilitate borrowings from financial institutions and to have officially recognized any small businesses opportunities the cooperative wish to embark on. These future enterprises may involve milling and trading their own rice and selling livestock, fish and vegetables (see translation of certificate).

In 2005 the cooperative made the decision to stop increasing the farming area and concentrate on saving money to reduce their reliance on external credit. To date they have saved R 6 million and have received Government support totaling R 5 million. The cooperative was to meet for their annual general meeting two days after this interview to establish a new internal credit facility for its members with the R 11million available. The cooperative chief has some reservations regarding this venture. In 1994 a similar internal lending institution was established. In this instance it was initiated under no legal framework. At the time the lending period expired the cooperative was owed R 2 million by its members which was never repaid.

The Success Factors. Without hesitation it was stated the reason for the current success of the cooperative was the promotion of dry season glutinous rice growing. The management structure used for the production of dry season rice was also seen as a contributing factor to the success of the organization. The cooperative is divided into seven groups (one for each day of the week) consisting of 11 to 12 people. Each group is then charged with the responsibility by the cooperative for managing all the funds and inputs for the crop on its given day. It is the role of the vice village chief to coordinate the operations between each group from day to day. This system has been established since 1996 and was originated by the cooperative itself.

Source: Diagnostic Study Fieldwork

7.3.2 Increase the quantity

215. This can be achieved in different ways:

1. **Irrigation.** Lack of irrigation is perhaps the single most important way to increase production. Lack of irrigation makes impossible, or difficult, or very risky to engage in double or triple cropping. As a result, production levels are much lower than market demand.
 - a. Examples:
 - i. Medium irrigation system in Svay Rieng making possible 2 rice crops per year
 - ii. Small irrigation systems in Battambang making possible 2 rice crops per year
 - iii. Small irrigation systems in Battambang making possible vegetable and fruit production (oranges, pineapples, guava)
2. **Higher yields.** Higher yields can be achieved through improved production practices such as the efficient and effective use of irrigation, improved seeds, effective use of plant nutrients (chemicals and organic matter), effective use of plant protection methods (pesticides, herbicides, IPM), improved soil fertility and land preparation methods.
 - a. Examples:
 - i. Rice yield of 4-5 tonnes/ha observed in Svay Rieng (Table 69), Battambang (see Box 4), Kampong Speu (Table 68)
3. **Reduction of postharvest losses.** On-farm losses starting at harvest can be considerable both for grains and for perishable products. Postharvest losses of up to 5 percent for grains and up to 25 percent for perishable imply a waste of resources and inputs to production. Simple improvements in harvesting and threshing (through mechanized systems provided these are cost-effective) can increase the total volumes available for marketing. Reduction in storage losses (both for self-consumption and marketing purposes) translate in higher quantities for sales or self-consumption. Postharvest losses increase with moisture content (see above under point 9) which induces a more suitable environment for pests. Drying and storage technologies can remedy this problem.
 - a. Examples:
 - i. Extensive use of threshing machines in intensive farming system of Svay Rieng
 - ii. Generally speaking little awareness and knowledge of postharvest losses by farmers.
4. **Coordination in Production.** Management of resources which have externalities or are common (such as water and soil) can increase overall production through a more efficient use of limited resources and through the avoidance of negative externalities (overuse of water upstream reduces water availability downstream in an irrigation system). Pest management conducted only by a few selected farmers in a village can be ineffective if other farmers do not adhere to the same principles. Over-production in one season may lead to a collapse of prices that result in under-production in the next season and decline in overall production.

a. Examples:

- i. Coordination of production in agricultural cooperative (Box 4)

5. Establishing Larger Organizations. The creation of effective larger organizations (farmer groups, associations, cooperatives) allows gaining several positive externalities that result in higher production. By pooling resources together, the organization is able to make larger investments than the individuals and thus realize economies of scale in activities such as marketing of products, procurement of inputs, and use of water. Good agricultural practices can also more readily be adopted by members of an organization than by isolated farmers.

a. Examples:

- i. In spite of a large number of farmer organizations in Cambodia, most are small and created by NGOs or other external agencies rather than being autonomously created entities.
- ii. Agricultural cooperatives have a clear institutional framework until the Cooperative Law. Their number is still limited though (Box 5).

Box 5 Farmer Organizations in Cambodia

A recent study on Farmer Organizations in Cambodia has surveyed different types of farmer organizations in the country. The definition of farmer organization used in the study is as follows:
Farmer organizations are collective entities of farmers who come together with common goals for economic benefit and resource management related to agricultural activities. The survey results are reported in the following table.

Type of Farmer Organizations	Number	%
Farmer Group (krom) Farmer organization with following characteristics: grass-root level; informal or recognized by village chief or commune council; small size with 5 to 30 members. Usually the objective of the farmer group is mutual assistance between members. Example: rice banks, traditional associations, farmer clubs (IPM), self-help groups (PADEK), farmer associations (CEDAC), motor pumps (Agrisud), women groups.	10,487	80
Farmer Association (samakum) Farmer organization with following characteristics: have by-laws, objective, and structure, recognized by local authorities or registered under Ministry of Interior, size more than 30 members. The main objective is mutual assistance between members, secondary objective can be economical. Farmer associations often gather several farmer groups from the same area. Examples: community based organizations (CBO) of CIDSE and Ockenden, village animal health workers associations (VSF-CICDA), village farmer associations (CEDAC)	662	5
Farmer Community (sahakum) Farmer organization with objective to manage and use in common natural resources: water, forest, fish. The number of members depends on the size of the target area. Examples: water use communities, forestry communities, fishery communities.	1,769	14
Farmer Business Community (sahahum kace atchivakam) Farmer organization with following characteristics: have by-laws, objective, and structure, recognized by local authorities or under PDA (following Royal Decree on agricultural cooperatives). The main objective is the economic benefit. Farming business communities usually have more than 30 members. Examples: Agricultural Cooperatives (MAFF), cooperatives (BFD), Chicken Raiser Association (Siem Reap, Agricam), Trade Centers (CIDSE)	93	1
Federation (sahapouan) Kind of network which gathers several farmer groups, farmer associations, farmer communities or farmer cooperatives that come together to achieve common objectives. This network can be at commune, district, provincial, or national level.	6	0
	13,017	100

Source: Julie Couturier, Savun Sam Ol, Ham Phalla, Overview of the Situation of Farmer Organizations in Cambodia, DRAFT prepared for the Office of Farmer Organization, Department of Agricultural Extension, MAFF, February 2006

7.3.3 Reduce the cost.

216. This can be achieved in different ways:

1. **Efficient Use of Water.** Field work has confirmed that there are many simple and effective ways to improve water use efficiency through gaining pumping efficiency, discharge of water, and greater water availability for the same level of effort in earthworks. This requires the training of irrigation extension officers, effective demonstrations and extension to farmers, and the formation of water use groups who manage the system of irrigation effectively and sustainably.
 - a. Examples:
 - i. Pumping Efficiency (see Box 11)
 - ii. Discharge of Water (see Box 9)
 - iii. Improving Reservoir Capacity (see Box 10)
2. **Integrated plant nutrient and pest management.** Farmer Field Schools (FFS) have shown a promising approach to improve farmer's crop and pest management and there is some supporting evidence to the claim that they have contributed to increase yields and reduce use of pesticides. At the same time, the impact studies both in Cambodia and in other countries indicate some room for caution in trying to expand and replicate this approach on a large scale; see more discussion in section 12.2.5 and Appendix I. Field work has confirmed the need for caution (see Key Informant Interview 9, Key Informant Interview 29). Similarly, even though IPM is a useful practice when applied to appropriate agroecological and socioeconomic conditions, it may also have undesirable effects. A farmer group discussion in Kampong Speu, for example, highlighted the fact that when using IPM, the quality of vegetable products is not good and they could not be sold in the market, as a consequence farmers use these vegetables as fodder for pigs or for making compost (see Focus Group Discussion 2).
 - a. Examples:
 - i. FFS in National Program for Food Security and Poverty Reduction
 - ii. Lutheran Word Federation
3. **Mechanization and Repair Services.** Mechanized land preparation (through the use of tractors or power tillers) and use of threshers are becoming increasingly adopted by farmers to reduce costs of production. The emergence of business service providers (rental of mechanized equipment) is also increasing. Still lacking is the emergence of a vibrant repair workshops and shops network at the commune level; often implying that maintenance is poor and also representing a loss of value added to neighboring countries. Farmers in Svay Rieng, for example, go to Viet Nam for repairing services. The next steps in mechanization will most likely involve drying, harvesting, seeding, and spraying.
 - a. Examples:
 - i. Use of mechanized services in Svay Rieng for land preparation and threshing
4. **Soil fertility management.** Loss of soil fertility due to loss of organic matter, erosion, and salinization is increasing the cost of production. Farmers respond by increasing the amount of chemical fertilizer, but this might not always be the best

response. Leaching of nutrients through soils (leading to eutrophication of ponds), and soil erosion can create additional costs to the community.

a. Examples

- i. Soil fertility management by CEDAC in Kampong Thom (see Key Informant Interview 38)

5. **Group procurement of inputs.** Farmers often complain about the high costs of inputs and their poor quality. Group procurement could address these problems. Larger quantities would generally imply price discount and also a better control of the quality of the purchased inputs.

a. Examples

- i. The Consultant's Team could not find examples during the field work. When inputs were procured collectively through an NGO, often it was at subsidized prices rather than through the market.

6. **Group access to credit and investment funds.** Groups create economies of scale not only in marketing and procurement of inputs, but also in access to credit and investment funds. One of the reasons of the high interest rates paid by farmers is the fact that the delivery and monitoring of small loans to individual farmers (even for ACLEDA Bank, the size of loans to smallholders vary between US\$100 and US\$400; much less for MFI) is costly. If a loan to a group of say 25 farmers could be collateralized (through group ownership of some assets other than land), then group lending of US\$5,000 could be obtained (US\$200 per farmer) which would imply a lower cost of delivery and monitoring for the financial institution. This of course would also require good governance and organizational capacity within the group.

a. Example:

- i. Agricultural Cooperative in Battambang (Box 4)

7.4 Increasing Value Added at the Trader/Miller/Processor Level

7.4.1 Increase the price.

217. This can be achieved in different ways:

1. **Quality.** Quality improvement in milling is essential to gain access to export markets. Quality improvement is partly the result of milling technology (capacity of producing different grades of broken, polishing), and partly the result of procuring consistent quantities of specific varieties of paddy with characteristics desirable to the consumers (domestic and foreign).

a. Examples:

- i. Contracts by Angkor Kasekam (Box 2)

2. **Quality assurance Systems.** Procedures for controlling quality at different stage of the production process (from production, transportation, arrival to the mill, drying, grading, milling, packaging, storing, handling, labeling, chemical analysis, etc.) are

well known (Codex Alimentarius²³ offers standards to guide the process; HACCP methods are already well developed for the food industry). Yet those procedures are largely unknown to rice millers and food processors in Cambodia or, even when they are known, they are rarely followed.

a. Examples:

- i. Quality problems in food processing (Case Study 18, Case Study 15)
- ii. Quality problems in rice milling (Case Study 3)

3. **Storage.** By exploiting seasonal price variations traders and millers can benefit in excess of storage costs (mostly expressed in terms of cost of capital) or lose profusely. This requires a considerable understanding of domestic and international markets. Information services about international markets are often available through the internet either from government sources (for example USDA at <http://www.ers.usda.gov> or FAS at <http://www.fas.usda.gov>) or through specialized market services (eg. The Rice Trader by Tom Slayton), one of the most knowledgeable services in the global rice trade industry). Storage technologies help to reduce the storage losses (due to moisture, insects) and improve product quality (therefore prices).

a. Examples:

- i. Traders income and storage decisions (see Box 6)

Box 6. Storage Decisions Make a large Difference in Bottom Line

There are considerable differences among the performance of different traders. Comparing just two traders of similar size in the following table, the difference in gross income is striking. The main difference is related to storage decisions by different traders. In the case of the first trader (in Kampong Speu), she decided to store paddy and was penalized by a sudden drop of prices when she finally put the produce on the market. In the case of the second trader (in Svay Rieng), he was quite skillful in exploiting high price hikes during the postproduction period. There were no noticeable differences in varieties of paddy sold by the two traders. This suggests that trading is a highly risky and specialized occupation. Good knowledge of seasonal prices and the capacity of taking quick decisions in response to market conditions are key to success.

Table 7 Revenues, Costs, Gross Income, and Margins for Paddy Traders			
	Unit	Kampong Speu	Svay Rieng
Volume	Tonnes	1,430	2,200
Revenue	000 Riels	940,200	1,286,000
Total Expenses	000 Riels	934,140	1,193,700
Gross Income	000 Riels	6,060	92,300
	US\$	\$1,515	\$23,075
Margin	%	0.6	7.2
Note: Exchange rate applied: 1US\$ = Riels 4,000			

Source: Diagnostic Study Fieldwork

4. **Timely delivery.** Establishing a reputation for timely delivery creates a sense of confidence in the buyer from whom a higher price might be expected.

a. Examples

- i. Delivery by food processor to farmers in Battambang (see Case Study 18)
- ii. Delivery by paddy trader (see Case Study 4) for larger deliveries.

²³ Already adopted by CamControl, the national agency for inspection and quality control.

5. **Branding.** Branding is a complex marketing strategy aiming at establishing a reputation for the product, product recognition through the market, increasing market share, and willingness of the consumer to pay a higher price relatively to similar non-branded products. A simpler approach is a label of origin, such as in the case of Jasmine rice (from Thailand) or Basmati rice (from Punjab in India/Pakistan). Neang Malis has achieved a reputation for high quality rice in Cambodia. However, there are not similar strategies currently pursued by other actors in the rice value chains. Even worse, there are not brands or labels of origins for other products in the rice-based farming system.

7.4.2 Increase the quantity.

218. This can be achieved in different ways:

1. **Access to credit.** High interest rates and difficulty of accessing credit, particularly for SME limit the capacity of expanding procurement of raw material. The rice milling industry has recently lobbied to get more credit. Apparently, according to respondents in Battambang, they have been successful in getting \$2million at favorable terms. Apart from lobbying, another more sustainable way to increase access to credit is to conduct transparent and sound business management. One easily forgotten issue, particularly by SME, is the fact that banks expect to review the books and business plans of a company before disbursing credit. When those books and business plans either do not exist or they do not give a confidence to the loan officer, the chance of being denied credit or to be considered a high-risk customer increases. This lack of sound business management is partly reflected in credit constraints and high interest rates. Capacity building of SME to improve their business management and planning is therefore indirectly useful also to improve access to credit.
2. **Investment in capacity.** Higher capacity of the mill or processing unit is obviously a condition for increasing quantity and to gain economies of scale in processing, marketing, and access to credit. The decision of investing in higher capacity depends on two factors: (i) availability of capital; and (ii) market demand. The second factor is often neglected. Businesspersons assume that the first factor, lack of capital, is the main constraining factor. In fact, even when there is availability of capital, without market demand that could justify a return on the investment in capacity, there is little scope for the investment. If market demand provides sufficient confidence that the business could be expanded and be profitable, then the capital constraint is a serious one. A good business plan could facilitate the search for either equity or loans.
3. **Establishing reputation for consistency of product.** A reputation for consistency not only improves the price, but also affects the quantity demanded by the market. The reputation effects quickly multiply and increase the demand for the product.
4. **Promotion.** Promotion campaigns increase the demand for the product. Often in Cambodia there is the assumption that foreign products are better. This is not necessarily the case. Promotion through fairs, exhibition, media, and events organized by trade associations and Chambers of Commerce could be viable methods to increase demand for the product.

5. **Establishing contracts with farmers and suppliers.** Agroprocessing is an activity intensive in procurement of raw material. Unless the supply chain back to farmers is well organized, it is difficult to ensure a constant flow of quality-consistent raw material to the processing plant. As a result, under-capacity utilization of processing plants occurs (see Box 3). A more organized supply chain requires well developed linkages and governance procedures to ensure the regular flow of raw material of desired characteristics.

7.4.3 Reduce the cost.

219. This can be achieved in different ways:

1. **Postharvest Technologies.** For rice mills, this involves activities such as increasing milling efficiency including the recovery of head ratio, measuring moisture to reduce the percentage of brokens during milling, using handling machinery to reduce the cost of labor. In food processing in general, different methods of storage and preservation of perishable products could reduce the losses before and after processing.
2. **Illegal Fees.** The problem of illegal fees, albeit well known to the public and policy makers, could be partly alleviated through group pressure and collective action by trade associations. This might induce political action at the local or national level to reduce the problem.
3. **Handling.** Training on how to improve handling would have two important effects. First it would reduce several losses incurred in the movements of delicate products (like fruits, vegetables, and flowers). Second, it would ensure less contamination, thus improving the quality of the product.
4. **Procurement through contracts.** Procurement of raw materials through contracts will ensure a more stable supply. Moreover, it would allow better cost planning and stabilize price fluctuations, thus allowing better cash flow management.
5. **Associations.** The use of association as a pressure group to reduce costs of doing business has already been highlighted in the context of illegal fees. Similarly, associations can improve the flow of information about the industry, reducing the costs for the individuals to access similar information. Activities by the associations such as lobbying for reducing the costs of capital, organizing promotions and fairs, pressing public agencies to provide services to the industry, and conducting training workshops would also help reducing costs to individual firms.
6. **By-products.** Utilization of by-products could help increase revenues and create economies of scope. In rice milling, for example, bran could be sold to both the feed industry or to the food industry. Husks could be used for fuel, but also in the wood panel and insulating material industry.

8 What Prevents Value to be Increased? Constraints Analysis.

220. The field work has indicated several constraints faced by stakeholders along the value chain in rice-based farming systems. A list of those constraints is reported in the following paragraphs. The section will conclude with a prioritization of constraints.

8.1 *Farmers' Constraints*

221. Through individual and group interviews, farmers have indicated the following constraints:

1. Production Constraints
 - a. Irrigation and water use efficiency
 - b. Access and quality of inputs (seeds, breeds, fertilizers, pesticides)
 - c. Plant nutrients and protection management
 - d. Animal nutrition and disease
2. Marketing Constraints
 - a. Access to markets
 - b. Market opportunities information
3. Postharvest Technology Constraints
 - a. Threshing, drying and storage
 - b. Primary processing
4. Capacity Constraints
 - a. Business Planning
 - b. Establishing linkages among themselves and with the market
5. System-wide Constraints
 - a. Credit
 - b. Infrastructure (rural roads, electrification)
 - c. Deforestation
 - d. Land titles

8.2 *Traders' Constraints*

222. Through individual interviews, traders have indicated the following constraints:

1. Transportation Cost
 - a. Poor infrastructure
 - b. Illegal Fees
2. Capital
 - a. High interest rates for working capital
3. Postharvest technologies

- a. Storage, Drying, Packaging, Handling
- 4. Quality
 - a. Low quality of marketed products
- 5. Lack of organized channels
 - a. Market places
 - b. Collection and Distribution centers, Packhouses
 - c. Contracts

8.3 Millers and Food Processors' Constraints

223. Through individual and group interviews millers and food processors have indicated the following constraints:

- 1. High Costs
 - a. Credit
 - b. Energy
 - c. Transportation
- 2. Supply Chain
 - a. Procurement of raw material of consistent quality
 - b. Competition from neighboring countries
- 3. Technology and Know-how
 - a. Outdated technology
 - b. Labor skills
- 4. Competition
 - a. Foreign inflow of products
 - b. Competition in paddy procurement by neighboring countries
- 5. Quality
 - a. Low quality of the product they are able to produce
 - b. Lack of appropriate technologies and methods to improve quality
 - c. Lack of institutional mechanisms to improve quality
 - d. Ineffectiveness of quality control by government agencies
- 6. Public and Private Services
 - a. Ineffectiveness of Public Services
 - b. Ineffectiveness of Associations and Chambers

8.4 Service Providers' Constraints

224. Through individual interviews with public and private/NGO, service providers have indicated the following constraints:

- Public service providers
 - a. Budgetary constraints
 - b. Capacity of staff (technical, management, planning, monitoring)

- c. Multiple objectives and limited instruments
 - d. Technology dissemination
 - e. Lack of Irrigation for farmers
 - f. Coordination among agencies and programs
 - g. Marketing by farmers
- NGO service providers
 - a. Weak communication and coordination with public agencies
 - b. Multiple objectives and limited instruments
 - c. Sustainability of activities
 - d. Lack of Irrigation for farmers
 - e. Technology know how by farmers
 - f. Market linkages of farmers

8.5 Prioritizing the Constraints

225. During the field work activities including focus group discussions, case studies, key informants interviews, and value chain questionnaires, respondents were asked to (i) reflect in details about all the key constraints affecting the development of rice-based farming systems in Cambodia; and (ii) indicate the priorities among all the key constraints identified. The summaries of this prioritization exercise are reported in the following tables.

226. Table 8 reports the percentage of responses of stakeholders (including farmers, processors, traders, line agencies representatives, and staff of NGO, MFI, and Projects). Four types of constraints were indicated as priorities, namely water, marketing, technology, and capital (see paragraph 227 for explanation of these types). For each category of respondents, the priorities are slightly different. As indicated in Table 9 farmers prioritize constraints in the following order: technology, water, marketing, and capital; processors (including millers) prioritize the constraints in the following order: technology, marketing, and capital; departments prioritize the constraints in the following order: water, technology, marketing, and capital; and NGO/MFI/Projects prioritize the constraints in the following order: water, technology, and capital. Overall, the respondents prioritize the constraints as follows: (i) technology, (ii) marketing; (iii) water; and (iv) capital.

Table 8 Percentage of Responses related to Main Constraints

Constraint Type	Farmers	Processors	Traders	Departments	NGO/MFI/Projects	All Respondents
Water Management and Irrigation	28.8	0.0	0.0	18.2	30.4	16.0
Marketing and Quality	15.2	29.2	23.3	9.1	8.7	18.0
Technology	34.8	31.3	10.0	18.2	21.7	26.0
Capital	4.5	12.5	30.0	3.0	0.0	9.5
Other constraints	16.7	27.1	36.7	51.5	39.1	30.5
Total Responses	100.0	100.0	100.0	100.0	100.0	100.0

Source: Diagnostic Study Fieldwork

Table 9 Priority Constraints for different Stakeholders

Stakeholder	Priority Constraint			
	1	2	3	4
Farmers	Technology	Water Management and Irrigation	Marketing and Quality	Capital
Processors	Technology	Marketing and Quality	Capital	
Traders	Capital	Marketing and Quality	Technology	
Departments	Water Management and Irrigation	Technology	Marketing and Quality	Capital
NGO/MFI/	Water Management and Irrigation	Technology	Marketing and Quality	
All Respondents	Technology	Marketing and Quality	Water Management and Irrigation	Capital

Source: Diagnostic Study Fieldwork

227. The four types of constraints (technology, marketing, water, and capital) are general groupings which contain considerable more details. The following paragraphs clarify the details of each of these constraint types.

228. **Technology.** This constraint refers to several aspects including:

1. Know-how about use of available technology
2. Management of plant nutrients, pests and diseases, and soils
3. Postharvest technology (threshing, drying, storing, handling)
4. Processing technology (on-farm processing, off-farm processing)

229. **Marketing and Quality.** This constraint refers to several aspects including:

1. Access to new markets for processors and millers (including exports)
2. Market information and intelligence
3. Organization of markets
4. Linkages between farmers and processors
5. Linkages between farmers, traders, and consumers
6. Marketing Groups
7. Contracts
8. Horizontal and vertical integration
9. Absence of grades and standards
10. Lack of knowledge about quality insurance systems
11. Ineffective current quality control system
12. Competition (both domestic and foreign)
13. Unstable prices

230. **Water Management and Irrigation.** This constraint refers to several aspects including:

1. Lack of water during the dry season and the difficulty and risk of conducting cultivations without assured access to water
1. Water management during the wet season, where both drainage and water control might not be available
2. Efficiency in water use, including pumping efficiency, alternative methods of irrigation (surface, groundwater, drip, sprinkle)
3. Water conservation and design of poulder, reservoir
4. Irrigation schemes

5. Water Use Groups formation and management capacity
6. Maintenance of irrigation systems and water use fees

231. **Capital.** This constraint refers to several aspects including:

1. High interest rates for credit
2. Low saving mobilization
3. Lack of access to investment and working capital
4. Cumbersome procedures to access credit

232. In addition to the four major types, it is worthwhile to note “**coordination**” as another important constraint that has been highlighted by public agencies, NGOs, and projects. This constraint highlights the difficulty of sharing information among organizations and agencies involved in program planning and implementation. This is the case both at the central level and the local level. The process of decentralization and devolution of decisions to local governments (Provincial Rural Development Committee - PRDC, Commune Council - CC, Village Development Committee - VDC) have to a certain extent addressed this issue, but more remains to be done. It is generally perceived that coordination is higher at the local level than at the central level.

233. While the indication of constraints is not particularly surprising, the prioritization is. Perhaps the most surprising finding is that most of the respondents (with the exclusion of traders) do not indicate “capital” as the priority one constraint. For farmers and processors, other constraints are more “binding” particularly those related to technology and marketing. In the case of service providers (public, private, and NGOs), the prioritization also does not seem to indicate capital as the main constraint: instead water, technology, and marketing are considered higher priorities.

234. Farmers, processors, and service providers clearly indicate that the main emphasis of a program to develop value in the rice-based farming systems should be on two general aspects:

1. **Improving productivity** both at the farm level and at the post-production level through access and adoption of improved technologies and better use of natural resources such as water and soil
2. **Improving access to markets** through better linkages along the value chain, better organization of the supply chain, and improvement in quality systems

235. As it will be seen in the section on problem analysis (see section 11), these two aspects are critical to increase value added in the value chain.

8.6 Quantification of Value Added along the Value Chain

236. The simulations in Appendix K provide estimates of the effects of various interventions along the value chain for agricultural commodities in the model. These interventions fell into the following categories:

1. **Improvements in Agricultural Productivity:** This is the introduction of technologies (seeds, irrigation, fertilizer, etc.) which lead to a 20 percent increase in yields.

2. **Changes in Technology:** These include improvements in milling technology for rice which leads to the milling recovery ratios to increase, as well as a reduction in post harvest losses along the value chain.
3. **Improvements in Quality:** This simulates changes in practices which result in higher quality commodities being sold in the market. This is simulated though an increase in consumer prices for the same (unchanged) commodity which should hopefully flow through to increased farm gate prices.
4. **Improvements in Infrastructure:** These include reductions in the marketing margins between the farm gate and urban areas, as well as a reduction in the marketing margins between the farm and border areas. These simulate an improvement in road infrastructure, a reduction in transportation costs (more efficient transportation, less unofficial costs), as well as an improvement in the marketing functions which lower transaction costs.

237. It is of interest to quantify the effects of these various interventions in order to estimate the likely benefits accruing at each stage of the value chain. These are summarized in graphical format in Figure 4 to Figure 9

238. Table 10 and Table 11 present estimates of the income effects of each of the interventions on poor and non-poor households²⁴ in both urban and rural areas. Of importance to note that even though the underlying income elasticities of each household group are different, the net effect on agricultural income from each of the simulations is the same across different groups. The main differences occur in the impact on non-agricultural incomes, and hence total household incomes.

239. In Table 11 the percentage change in income from the base income is presented for each of the simulations, while in Table 10 the value (in US\$) of each intervention along the value chain for each commodity is presented.

240. For several commodities such as maize, vegetables and Other Food Crops (soybean, cassava and sweet potato) the model treats these crops as non-exportable, meaning that domestic demand and supply conditions have to be in equilibrium and so if supply increases then prices must fall to compensate. As a consequence, simulations which involve an increase in production (whether through yield increases or reductions in losses) will invariably result in reduced prices and therefore reduced incomes.

241. This highlights the important role of exports in the Cambodian economy as the domestic economy is too small to absorb surplus production. In all cases except vegetables Cambodia is a net exporter and hence domestic demand is satisfied before the surplus is exported.

242. As Table 11 shows, in most cases the net effect on income is minor. Interventions in increasing agricultural productivity only increase agricultural income by at most 1.85 percent, while improvements in post harvest technology improve incomes by 2.5 percent in the case of rice improvements, but for other commodities there are income changes of less than 0.15 percent; see Figure 4 to Figure 8.

²⁴ Non-Poor are the top two income deciles and the Poor are the bottom 8 deciles.

243. The most significant benefits to the agricultural economy come from improvements in export marketing. Agricultural income increases by almost 9 percent from reductions in transaction costs and barriers to exporting.

244. The improvements in export marketing, combined with the above implications on non-exportable commodities, highlight the crucial role in providing an enabling environment for the export of surplus production.

245. Interestingly, the improvements in quality of agricultural products do not have a major positive effect on agricultural incomes, and indeed in several cases actually reduce incomes. The main reason for this is that the improvements in quality are proxied by increases in consumer prices. Naturally if price elasticities do not change then any increase in price will be met with reductions in demand. These point to an obvious conclusion; consumers have to be willing to pay for higher quality products and in the case of Cambodia there does not seem to be any evidence of widespread demand for such higher quality (and more expensive) products. As such, an export oriented approach to quality improvements should be undertaken.

246. As indicated above, Table 10 shows the value added for each of the value chain interventions. While the change in income might be only a few percent, the large size of the Cambodian economy demonstrates the overall effect on farm family incomes.

247. Most of the value added comes from improvements in export marketing, which affect all commodities equally. Some US\$88.5million in value added comes from just improvements in domestic and export marketing infrastructure.

248. Overall, improvements in the rice value chain accrue just over US\$142 million in value added, while maize accrues just under US\$79 million, vegetables US\$91.6 million other food crops (soybeans, cassava and sweetpotato) US\$92.7 million and fish US\$65.7 million.

249. If just two value chains were chosen for support, these would have to be rice and vegetables. The Other Food Crops value chain has a higher value added compared with vegetables, but the disparate nature of the grouping (soybeans, cassava and sweetpotato) would make it difficult to formulate a consistent intervention strategy. Combined, the value added for the rice and vegetable value chain is around US\$110 million²⁵; the reduction compared with the individual value chains is due to cross-elasticity effects. Figure 9 graphically shows the income accruing along the combined rice and vegetable value chain for each of the interventions.

²⁵ A rough calculation shows that under a US\$30 million AusAID program the Benefit-Cost ratio would be 3.67.

Table 10 Estimated Value Added from Value Chain Interventions

Value Chain	Value Chain Intervention				Total
	Agricultural Productivity	Technology	Quality	Marketing Infrastructure	
Rice	35.04	42.30	-23.47	88.49	142.35
Maize	-6.40	-1.51	-1.69	88.49	78.89
Vegetables	-2.26	-0.55	5.87	88.49	91.56
Other Food Crops	-0.67	-0.16	5.02	88.49	92.67
Fish	n.a.	0.00	-22.75	88.49	65.74
Rice and Vegetables Combined	17.39	24.85	-20.64	88.49	110.09

Million US\$

Note: Agricultural Productivity Interventions are increases in yields, while technology interventions are reductions in postharvest losses and increases in rice milling recovery ratios. Quality improvements are modeled as increased consumer price in the presence of a higher quality product. Marketing infrastructure improvements are reductions in marketing margins and transaction costs for farm-urban trade as well as farm-export trade.

Note: Negative value added for maize, vegetables and other food crops is because of restrictions on exports in the model. All production increases results in falling prices and consequently incomes.

Note: The scenario with Rice and Vegetables combined has lower value added because of cross-substitution effects within the model.

Note: The Marketing infrastructure intervention has the same value added due to its none-exclusivity in impact; i.e. the intervention is across all sectors.

Source: CAMSEM Simulations

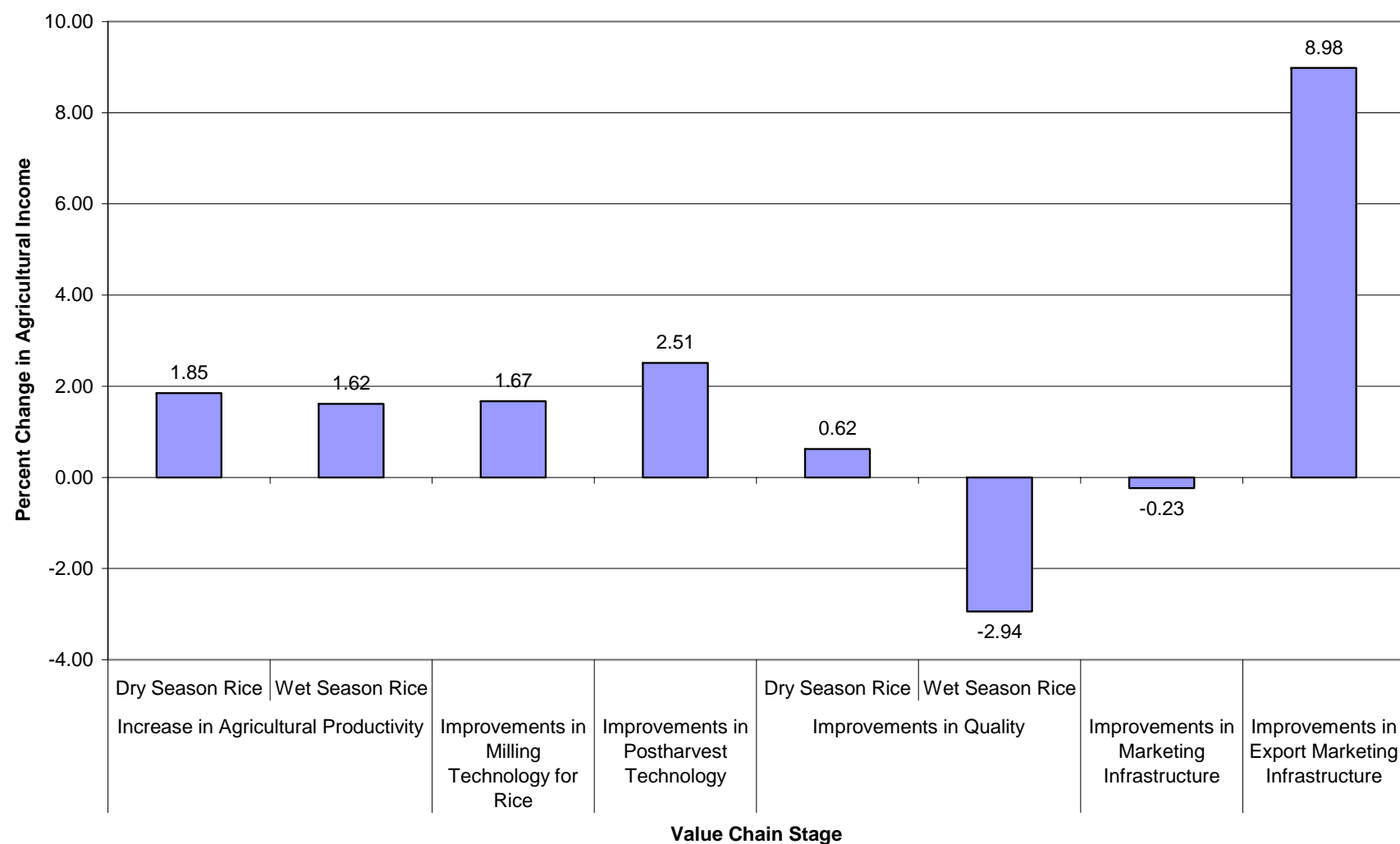
Table 11 Effects of Different Program Interventions on Incomes

Program Intervention	Commodity	Total Income from Agriculture and Non Agriculture					Agricultural Income		
		Urban		Rural		Total	Rural		Total
		Non-Poor	Poor	Non-Poor	Poor		Non-Poor	Poor	
Increase in Agricultural Productivity	Dry Season Rice	0.41	0.41	1.62	0.95	0.89	1.85	1.85	1.85
	Wet Season Rice	-4.91	-4.91	0.56	-2.45	-2.73	1.62	1.62	1.62
	Maize	-1.56	-1.56	-0.78	-1.21	-1.25	-0.63	-0.63	-0.63
	Vegetables	-1.30	-1.30	-0.40	-0.89	-0.94	-0.22	-0.22	-0.22
	Other Food Crops	-0.62	-0.62	-0.16	-0.41	-0.43	-0.07	-0.07	-0.07
	Rice and Vegetables	-7.49	-7.49	0.22	-4.02	-4.41	1.72	1.72	1.72
Improvements in Milling Technology for Rice		0.37	0.37	1.46	0.86	0.81	1.67	1.67	1.67
Improvements in Postharvest Technology	Rice	0.56	0.56	2.19	1.30	1.21	2.51	2.51	2.51
	Maize	-0.32	-0.32	-0.18	-0.25	-0.26	-0.15	-0.15	-0.15
	Vegetables	-0.26	-0.26	-0.09	-0.18	-0.19	-0.05	-0.05	-0.05
	Other Food Crops	-0.12	-0.12	-0.03	-0.08	-0.09	-0.02	-0.02	-0.02
	Fish	0.00086	0.00086	0.00000	0.00047	0.00052	-0.00015	-0.00015	-0.00017
	Rice and Vegetables	0.29	0.29	2.10	1.11	1.01	2.46	2.46	2.46
Improvements in Quality	Dry Season Rice	-0.11	-0.11	0.50	0.17	0.14	0.62	0.62	0.62
	Wet Season Rice	-9.14	-9.14	-3.95	-6.81	-7.07	-2.94	-2.94	-2.94
	Maize	-0.26	-0.26	-0.18	-0.23	-0.23	-0.17	-0.17	-0.17
	Vegetables	-0.07	-0.07	0.48	0.18	0.15	0.58	0.58	0.58
	Other Food Crops	0.04	0.04	0.42	0.21	0.19	0.50	0.50	0.50
	Fish	-7.20	-7.20	-3.05	-5.33	-5.54	-2.25	-2.25	-2.25
	Rice and Vegetables	-9.41	-9.41	-3.24	-6.64	-6.95	-2.04	-2.04	-2.04
Improvements in Marketing Infrastructure		-4.09	-4.09	-0.86	-2.64	-2.80	-0.23	-0.23	-0.23
Improvements in Export Marketing Infrastructure		7.67	7.67	8.77	8.17	8.11	8.98	8.98	8.98

Percent Change from Base Income Scenario

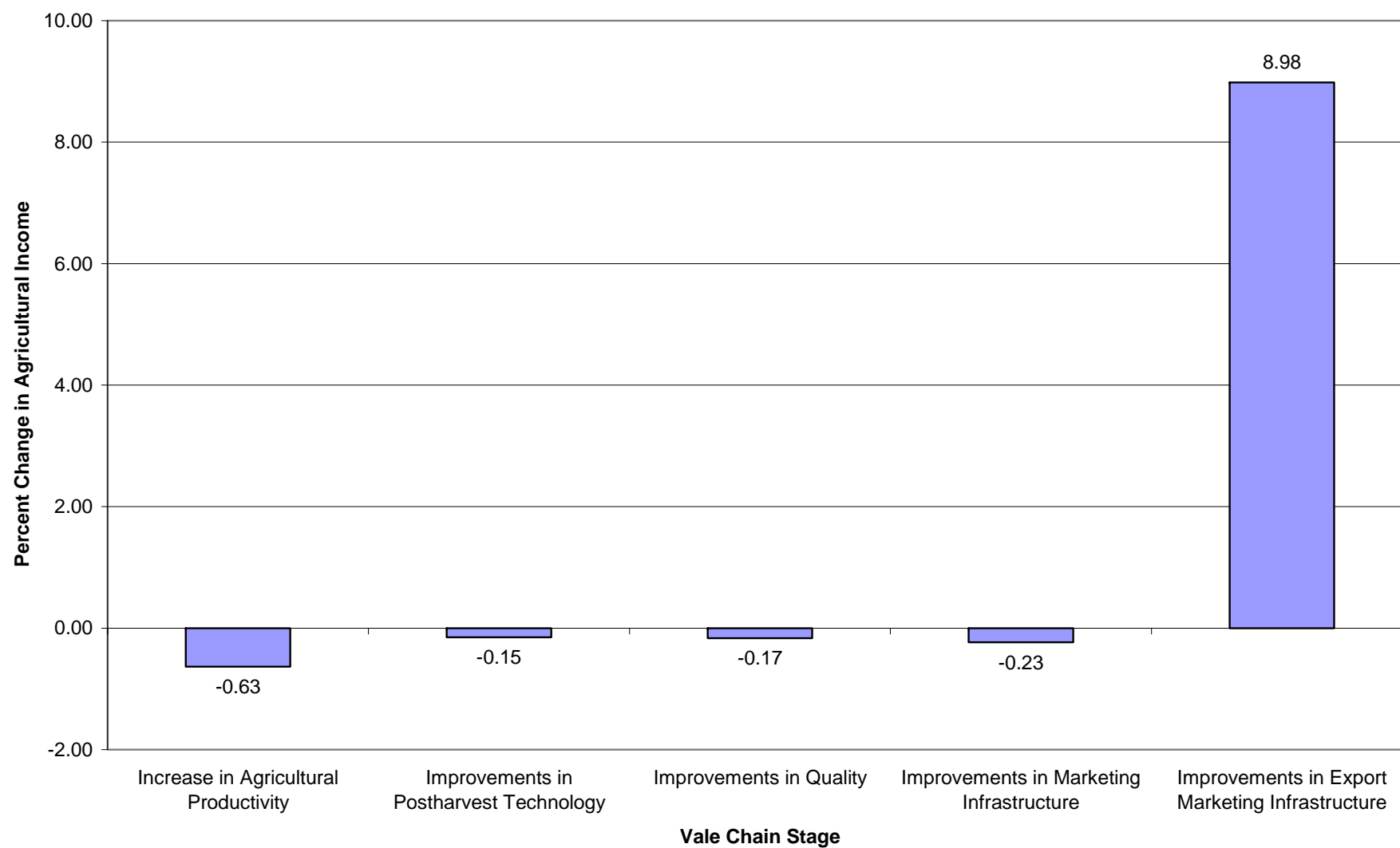
Other Food: Soybean, Cassava and Sweetpotato

Note: Negative income effects are due mainly to two feature; (i) price elasticities and (ii) exportability of the crop. As production increases, prices fall and this is exacerbated by the lack of export outlets.



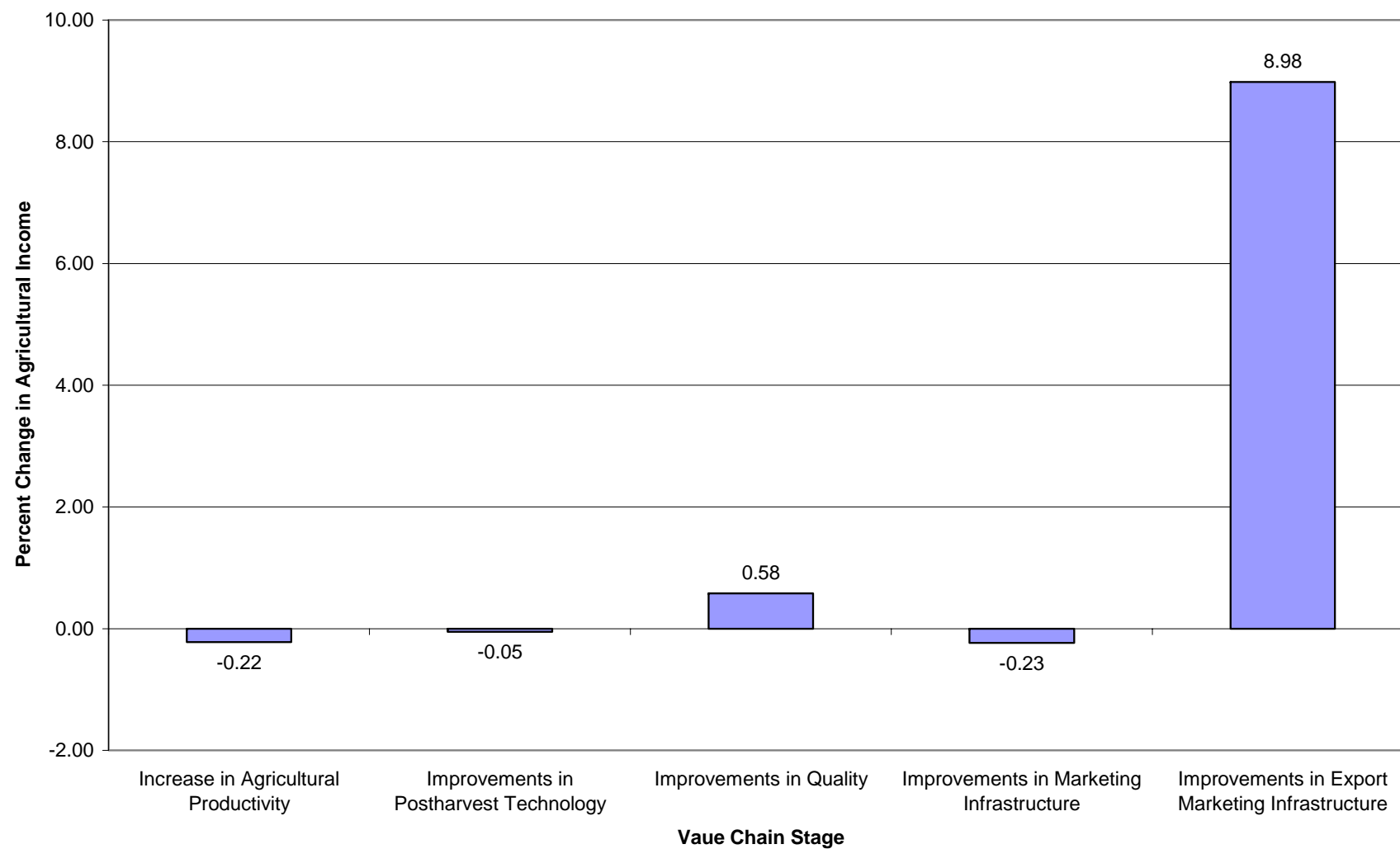
Source: CAMSEM Simulations

Figure 4 Quantification of the Value Added along the Value Chain of Rice from Program Interventions



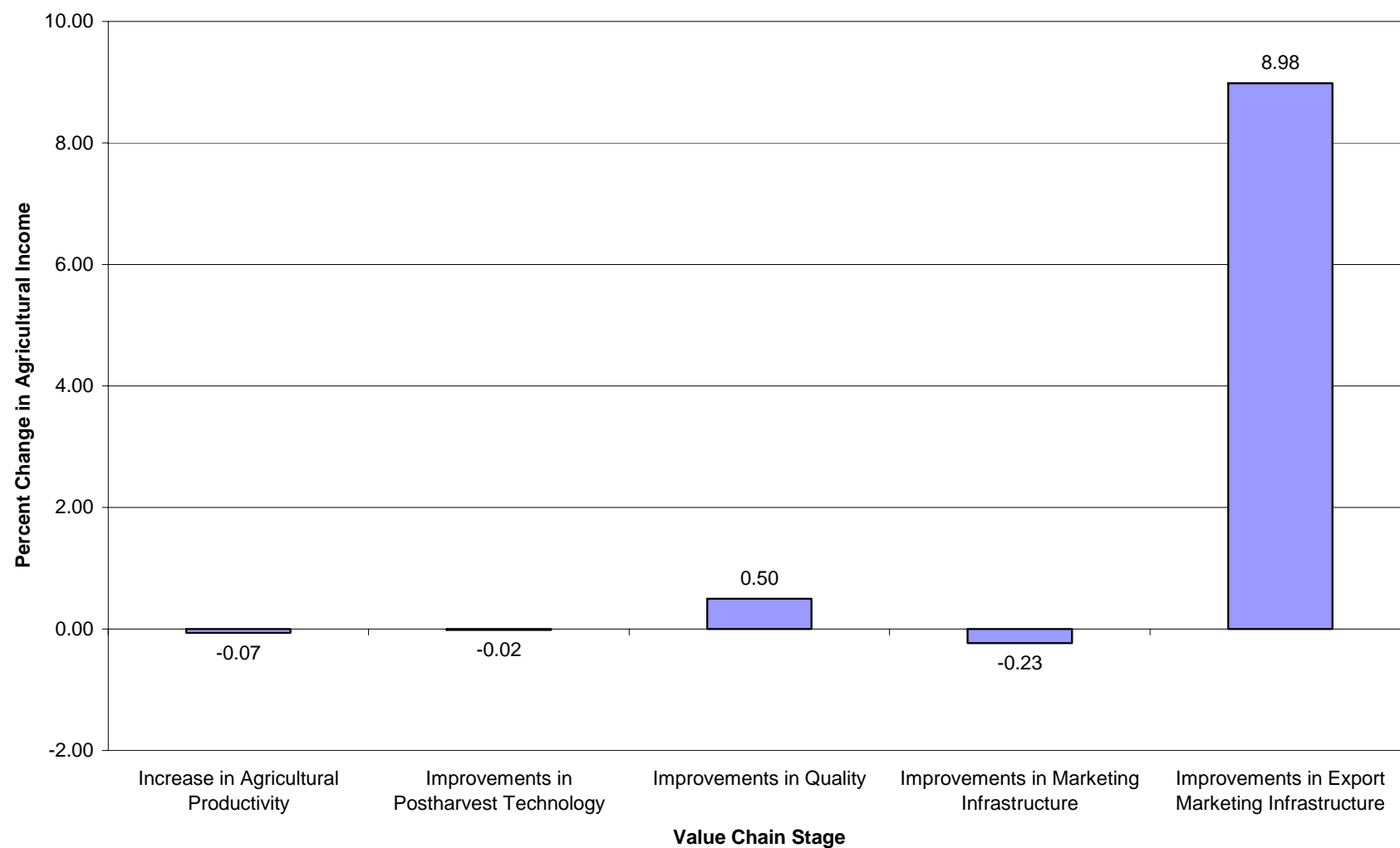
Source: CAMSEM Simulations

Figure 5 Quantification of the Value Added along the Value Chain of Maize from Program Interventions



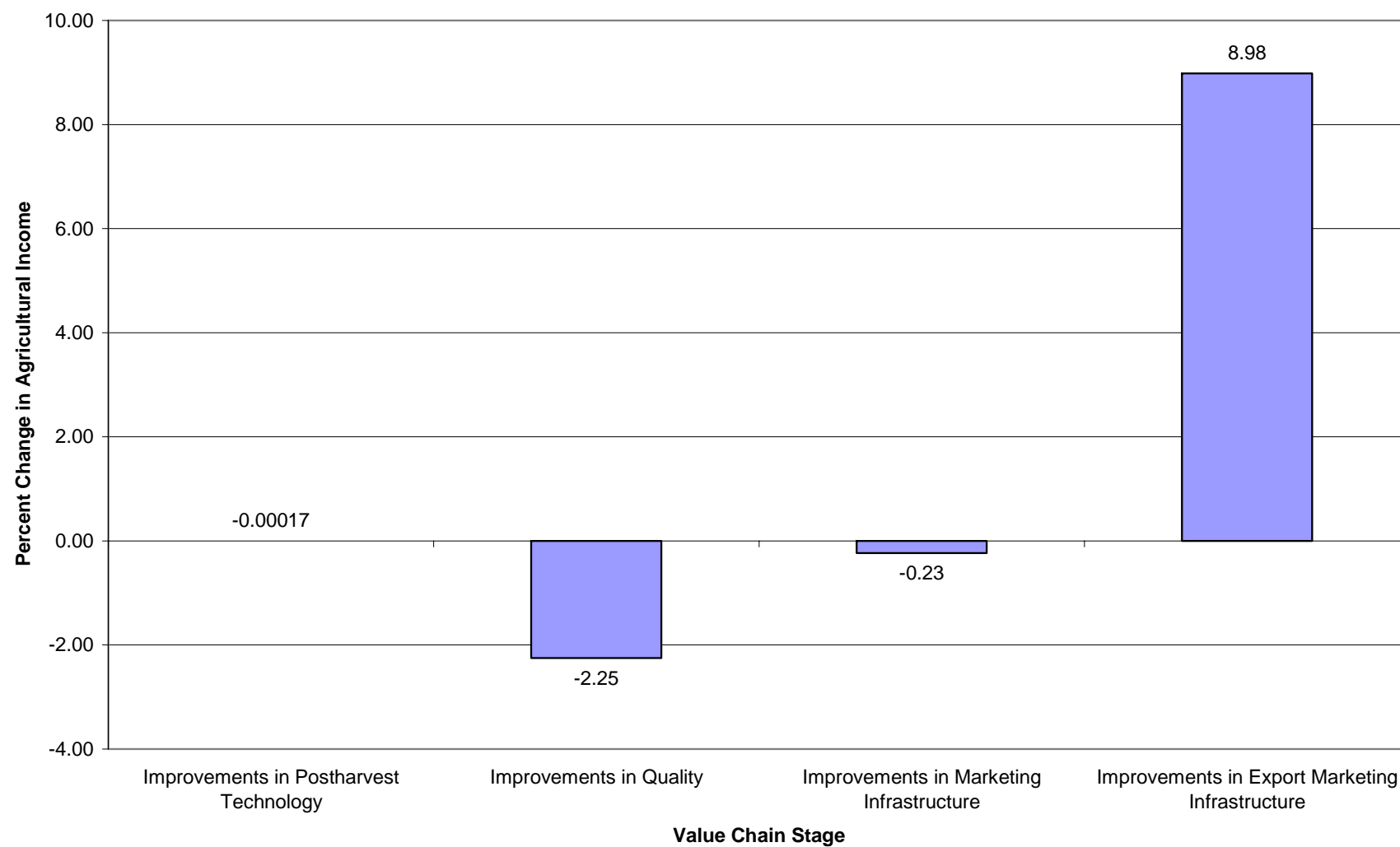
Source: CAMSEM Simulations

Figure 6 Quantification of the Value Added along the Value Chain of Vegetables from Program Interventions



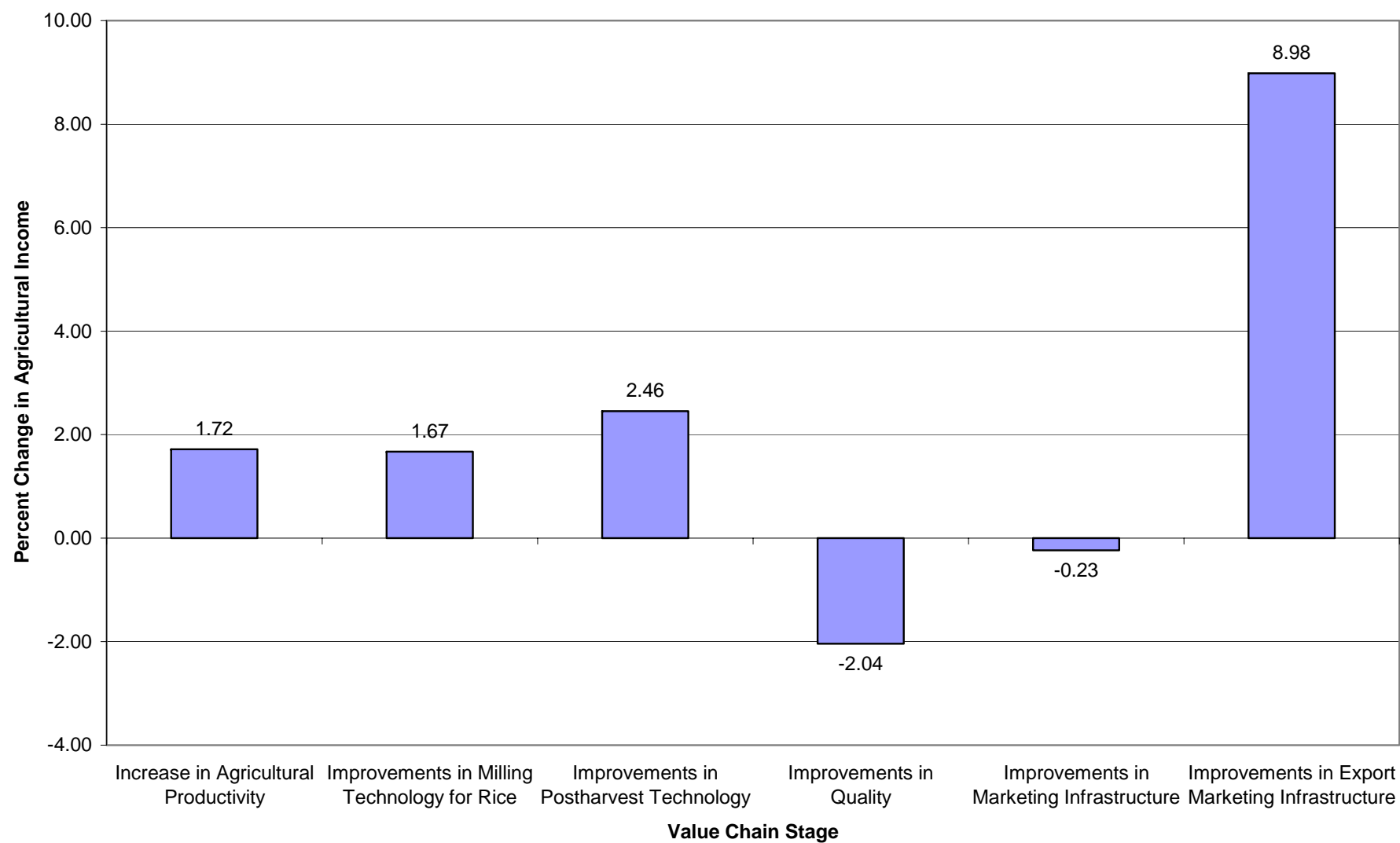
Source: CAMSEM Simulations

Figure 7 Quantification of the Value Added along the Value Chain of Soybeans, Cassava and Sweetpotato from Program Interventions



Source: CAMSEM Simulations

Figure 8 Quantification of the Value Added along the Value Chain of Fish from Program Interventions



Source: CAMSEM Simulations

Figure 9 Quantification of the Value Added along the Value Chain of Rice and Vegetables from Program Interventions

9 How could the Poor benefit from higher Value in Rice-based Farming Systems?

9.1 Different Categories of Poor

250. About 2 million smallholder farming households of Cambodia are the main producers and managers of the country's agricultural production. They are the main decision makers regarding what production (crop, livestock, fish, etc.) to undertake and when to do it. They are the main stakeholders of the rice-based farming systems. The farmers can be divided into several sub-groups (a possible typology is in Box 7) with different interests and needs.

251. The development of value chains in rice-based farming systems will affect different stakeholders (farmers, agro-entrepreneurs, and service providers) in different ways. Of particular importance is the effect on poor farm households.

252. The typology of the poor presented in Box 7 is useful to examine the possible channels through which a program for the development of value chains in rice-based farming systems could affect the poor. For the purpose of the analysis, it is worthwhile to consider three groups: the poorest, the poor, and the lower medium income.

Box 7 Typology of Farm Households in Cambodia

Poorest Households

- Little or no land. Perhaps one draft animal but no farming implements
- Housing made of thatch in very poor condition. Few household utensils
- Live on hand-to-mouth basis (food shortages for up to eight months)
- Much reliance on natural resources to meet subsistence needs
- Accumulated debts and inability to repay or borrow additional amounts
- No kinship support; and large families with 5-12 children

Poor Households

- Have land less of 2 ha in unfavorable locations (slopes, no water source)
- Usually have at least a pair of draft animals and at least some farm implements
- Houses made of thatch sometimes with tile roofs and bamboo walls
- Limited number of household utensils; food shortages of 3-6 months duration
- Able to borrow money for rice farming and family

Lower Medium Income

- Have land of less than 3 ha. Draft animals and farm implements
- Houses made of bamboo or wood, thatched roofs and walls, and tile roofs
- Food shortages of 3-4 months duration; able to borrow money for rice farming

Middle Income

- Landholding of up to 6 ha; 2-4 draft animals, some livestock, and all farm implements
- Houses made of wood with either bamboo or wooden floors and tile roofs
- Reasonable number of household utensils
- No food shortages, except when major crisis (ill-health) or ritual (wedding) occurs
- Limited cash savings. Small-scale business; and old motorbike or boat

Non-Poor

- Having more than one ha of very productive agricultural land
- At least two draft animals and many other livestock and farm implements
- Houses made of permanent building materials, including corrugated iron and tiles
- Full food security with limited surplus for lending, sale or labor exchange
- Well-furnished households, often with television sets
- Able and willing to lend money to other villagers

Soucre: ADB – TSRWSS-TA No. 4570-CAM

9.2 Need to Start from Some Basic Assets

253. Most of the examples of successful movement out of poverty encountered by the Consultant's Team and a review of similar experiences by other development practitioners point to a basic conclusion. A minimum set of assets (physical or human capital) are usually required for the movement of farm households out of poverty to occur. This is the approach followed also by most NGOs working in agricultural development. The poorest farm households, who have little or no land assets would require a different set of interventions from the ones usually associated with improvements in agricultural productivity and agroenterprise development.

254. This does not imply that the poorest household will not benefit from improvement in value added. It means however that to be successful in terms of poverty reduction, those interventions along the value chain will not be targeted to the poorest. Instead those interventions will be targeted to the poor, the lower medium income, the middle income and the non-poor groups. All these groups have a minimum set of assets (particularly land) on which to build and promote income generating activities that could benefit not only the direct beneficiaries of the interventions but also the poorest strata.

Box 8 Success Story of Ken Yean and his wife Neary

Seven years ago, Ken Yean and his wife Neary were typical rice farmers in the Mekong Delta region of Southeast Cambodia. They and their five children eked out an existence on one hectare of paddy land. In many years, failing to meet their basic food needs. At the same time, IDE was working with local manufacturers and dealers in their area to establish a supply chain for affordable foot-powered treadle pumps. Yean and Neary learned of the pump from their neighbors and purchased one from the local market. The total installation cost, including an 18-metre deep borehole, was about \$50, which they financed with their small savings and by borrowing from family members. Yean and Neary began growing vegetables, mostly cucumbers and bitter melon, and within a year had paid off their loans. In subsequent years, they have earned a net additional income of between \$100 and \$175. The extra income has helped them to purchase additional rice land and will finance all of their children, including the girls, through high school, an amazing achievement in rural Cambodia. "When the children are all educated, then I'll start improving the house," says Yean. A few years ago, Yean and Neary purchased a second treadle pump to use on another plot of land that is farther away from their house. And just this year, after seven years of use, they replaced their original treadle pump with a new one.

Source: <http://www.ideorg.org/page.asp?navid=203>

255. The examples of successful agroentrepreneurs (farmers, traders, and processors) reported in sections 6.2-6.7 and many farmers like the one described in Box 8 refer to households that started from being poor or lower medium income farm households and then progressed to higher income and improved livelihood through many of the activities typically included in a program to develop value chains in rice-based farming systems. The common factor of all these previously poor households is that they could start from some basic land or human capital asset. The land asset could be a small parcel of rice land, often less than one ha; the human capital could consist of some capacities acquired through outside employment, often in the big city or in neighboring countries.

256. Land distribution patterns suggest that the average size of landholdings is about 1.21 ha and about 77 percent of rural households have less than 3 ha of land (see Table 14). Landholding size in the two main rice-based regions, the Mekong and the Tonle Sap, is 0.89 ha and 1.34ha, respectively (see Table 16). It is suggested that farm household for program interventions should have at least 0.5 ha. According to the distribution described

in the previous tables, this implies that the lowest 10 percent in the distribution of landholding farmers would not be targeted directly by the program.

9.3 Paths of Poverty Reduction

257. Three main paths of poverty reduction could be envisaged in a program to develop value chains in rice-based farming systems:

- (i) creation of employment opportunities in the rural economy, both on farm and off-farm;
- (ii) productivity increases at the farm level resulting in higher value and income for the smallholder farmers; and
- (iii) enterprise development including micro, small, and medium enterprise involvement of rural households in the lower income strata.

258. The following Table 12 highlights which path is more likely to affect the poorest, the poor, and the lower medium income rural households.

Table 12 Main Paths for Poverty Reduction in a Program to Develop Rice-Based Farming Systems

	Path of Poverty Reduction		
	Creation of Employment Opportunities	Productivity Increase for Smallholders	Enterprise Development
Poorest	√		
Poor	√	√	√
Lower Medium Income		√	√

9.3.1 Creation of Employment Opportunities

259. Without physical assets, the poorest can only rely upon their own labor to get an income. The development of rice-based farming systems can induce a growth of the rural economy that results in an increasing demand for labor.

260. Normally, during peak periods of agricultural crop production (particularly during land preparation, transplanting, and harvesting) labor shortages often occur. As production expands, demand for labor increases. Currently, production volumes are limited by market demand and constraints in technology and access to water during the dry season. This limited production in turn implies limited and mostly seasonal demand for labor.

261. When demand for labor increases, this is sometimes accompanied by higher wages. While in most cases observed in the field agricultural wages range between R 3,000 and R 5,000 per day, in intensive systems or in higher value production systems like those related by the agricultural cooperative in Battambang described in Box 4, vegetable production, and in irrigated systems (like those in Chu Pring commune in Svay Rieng), agricultural wages range between R 5,000 and R 7,000 and can reach levels of R 14,000 per day.

262. Labor creation by processing activities and trading activities normally provides lower wages (around R 4,000 per day), but the labor requirements are for longer periods than the short terms associated with specific agricultural activities. Activities such as handling, loading and unloading, grading and sorting are often seasonal activities. However, as the volume of trade and processing increase, the total labor requirement also increases and

provides employment opportunities to the poorest. An unskilled laborer working 300 days per year at a wage of R 4,000/day could get an income comparable to a low-productivity farmer with 1 ha of land.

263. As the demand for labor increases and wage rise, the adoption of mechanization becomes more widespread. Whether mechanization is labor displacing or not is a complex issue. While on one hand mechanization reduces the cost of labor, on the other hand there are effects on demand for skilled labor (for example tractor operators) which is usually paid higher wages. The higher income associated with mechanization results in more spending in the rural economy, more demand for services (construction, food, industry, trade), and higher employment opportunities for rural households. Without a full assessment of the rural economy-wide effects is difficult to determine the impact on overall employment. At the macro level however, the multiplier effects from agricultural growth to overall growth of the rural economy are quite high and agricultural growth is generally considered the most effective way to reduce poverty in rural areas.

9.3.2 Productivity Increase for Smallholders

264. The majority of the poor in rice-based farming systems of Cambodia are to be found among the smallholder farmers who typically own less than 2 ha of rice land. For these households, increase in productivity at the farm level is perhaps the single most important determinant of poverty reduction.

265. Through increases in yield and crop intensity, diversification into higher value agricultural activities (vegetables, aquaculture, livestock, special rice), and integrated farming, income could increase well above the self-consumption level. The examples from the fieldwork of the Consultant's Team illustrate the experience of previously poor farmers who have achieved a status of middle income:

- Integrated Farming (see Case Study 9)
- Intensified Agriculture (see Case Study 5)
- Aquaculture (see Case Study 8)
- Glutinous Rice (see Box 4)
- Vegetable Farming (see Table 13)

Table 13 Kampong Thom Rice and Vegetable Farmer

	Cultivated Land (ha)	Gross Margins/ha (\$/ha)	Total Gross Margins of Household (\$)
Rice	2	89.63	179.25
cabbage	0.6	1,430	858
			1037.25

Source: Diagnostic Study Fieldwork

266. The case of the farmer in Table 13 highlights the high return to diversification. Typically a smallholder farmer with 2.6 ha will utilize the land only for paddy cultivation and, in rainfed conditions without stable access to irrigation, would not be able to grow two crops of rice in a year. However, just cultivating one third of the paddy land with vegetable, the total gross margin is almost 5 times higher. This does not suggest that the main strategy for poverty reduction is to abandon paddy cultivation and embark on vegetables. Obviously, the total demand for vegetables is considerably lower than for paddy. At the same time, vegetable cultivation is more risky given the perishability of the product and the higher incidence of pests and diseases. The key point is however that a strategy of

diversification is possible and profitable. The conditions for effective diversification depend on several factors including agroecological conditions, market demand, food security and risk concern of the household, and knowledge about markets and technology.

267. The examples above suggest that the path for poverty reduction based on increase of agricultural productivity can vary considerably from environment to environment. The common thread, however, is that poor households who have even very limited assets (say land of between 0.5 and 1 ha) can benefit from the development of value chains in rice-based farming systems.

9.3.3 Enterprise Development

268. Small and medium enterprises in agroprocessing or trade require more specialized activities and skills. Section 6 has discussed the various factors of entrepreneurship. Even though a program cannot “create” entrepreneurs, it could certainly facilitate the emergence of “latent” entrepreneurs and promote the existing ones through various interventions including capacity strengthening, training, facilitation of supply chain linkages, provision of information, and networking.

269. Some of the poor could become entrepreneurs in their own right, rather than been only providing labor to the agroenterprises. Micro-enterprises directly related to value chain in rice-based farming systems include retailing of food products, management of food outlets, transportation services, assembling of raw materials, handicrafts, food processing.

Table 14 Landholding and Land Distribution

Land distribution, ha	Operator, #	Area, ha	Operator, %	Area, %	Operator, Cum %	Area, Cum %
<0.5	21,327.0	7,005.5	36.7	10.0	36.7	10.0
0.5-1	15,772.0	12,224.0	27.1	17.4	63.8	27.4
1.01-2	10,274.0	16,031.5	17.7	22.9	81.5	50.3
2.01-3.0	7,418.0	18,604.5	12.8	26.5	94.3	76.8
3.01-5	2,533.0	8,991.0	4.4	12.8	98.6	89.7
5.01-10	750.0	5,016.0	1.3	7.2	99.9	96.8
10.01-100	44.0	2,033.0	0.1	2.9	100.0	99.7
>100	1.0	200.0	0.0	0.3	100.0	100.0
Total	58,119.0	70,105.5	100.0	100.0		
Average landholding		1.21				
Minimum landholding		<0.5				
Maximum landholding		200				

Source: ABiC Survey 2005

Table 15 Average Landholding by Landholding Group

Land distribution, ha	Operator, #	Average by group, ha
<0.5	21,327.00	0.3
0.5-1	15,772.00	0.8
1.01-2	10,274.00	1.6
2.01-3.0	7,418.00	2.5
3.01-5	2,533.00	3.5
5.01-10	750	6.7
10.01-100	44	46.2
>100	1	200
Total	58,119.00	70,105.50
Average landholding		1.21

Source: ABiC Survey 2005

Table 16 Operator and Landholding by Agro-ecological Zone

Zone	Operator, #	Operator, %	Landholding, ha	Landholding, %	Average landholding, ha
Northeast	9,274.00	15.96	18,624.70	26.57	2.01
Mekong	16,329.00	28.1	14,566.50	20.78	0.89
Coastal	14,204.00	24.44	12,310.50	17.56	0.87
Tonle Sap	18,312.00	31.51	24,603.80	35.1	1.34
Total	58,119.00	100	70,105.50	100	1.21

Source: ABiC Survey 2005

10 Lessons Learned

270. The field work offered the opportunity for the Consultant's Team to ask respondents the major lessons learned through their experience that could guide the formulation of the Program for AusAID. The lessons have been organized in several headings pertaining to (i) program implementation; (ii) farmers' organizations and market linkages; and (iii) value addition.

10.1 About Program Implementation

1. Provide an exit strategy since the very beginning. The program needs to be phased out and the impact should be made sustainable (Ms Bun Kisan from ADA, an NGO in Battambang, see Key Informant Interview 36).
2. Use local governments to the greatest possible extent in order to ensure coordination at the local level among different programs. While coordination at the central level is very difficult to attain, it is much easier at the local level (personnel communications from CAAEP and Provincial Departments).
3. Phase programs so as to allow refinements and improvements overtime, rather than having a rigid set of targets, activities, inputs, and outputs fixed at the beginning (focus group discussion with Team Leaders of AusAID projects).
4. Program implementation should have a built-in flexibility to take into account changed circumstances, such as in the case of a major new program launched by multilateral organizations (focus group discussion with Team Leaders of AusAID projects).
5. Need to know the resource available including not only the financial resources, but the physical, institutional, and human resources (focus group discussion with Team Leaders of AusAID projects).
6. Clarify possible conflicts among commercial and social objectives of the program (focus group discussion with Team Leaders of AusAID projects).
7. Do not be too ambitious. Realistic targets should be given. Design should take into account that longer times are often needed to implement activities (focus group discussion with Team Leaders of AusAID projects).
8. Do not focus exclusively on production, but address bottlenecks along the value chain and in the postharvest systems (Ms Pisseey of CCSF in Battambang, focus group discussion with Team Leaders of AusAID projects).
9. Do not use only one approach to extension. Different approaches including FFS, demonstrations, training and visits, media, workshops, and publications can be equally effective in different situations (Focus Group Discussions with Farmers in four provinces).

10. Do not replicate models that are not suitable to local conditions (Provincial Director of Department of Agriculture).
11. Do not encourage dependency, ensure that beneficiaries share the costs (GTZ in Kampong Thom)

10.2 About Farmers' Organizations and Market Linkages

1. There are increasing success stories of farmer organizations including production groups, marketing groups, and water use groups. Contrary to the hypothesis that Khmer rural households lack solidarity and are in continuous conflicts with each other, there are many examples of solidarity and communities that have organized themselves or with the help of service providers (NGO and provincial/district departments) to undertake joint production or marketing activities (eg CARE work in Siem Riep, Prey Nup project in Kampong Som).
2. Contract farming can be effective (in seed production and in procurement of high-value products) both as a marketing tool (for outputs and inputs) and as a technology dissemination tool (eg Angkor Kasekam mill).
3. Building trust among farmers and between farmers and traders, processors, and service providers takes time. Reputation could be destroyed very quickly, but it takes a long time to build (ACLEDA, Kampong Speu; CCSF in Battambang).
4. Commercial farming can benefit the very poor through labor absorption and introduction of innovations that will be adopted by small and medium farmers (Farmer in Kampong Thom).
5. Helping establishing good linkages between farmers and business provides a method to increase farmer income (World Vision International in Kampong Speu)
6. Group marketing at the village level strengthens smallholder farmers access to markets and inputs (Farmer Groups in Kampong Speu, Battambang, Svay Rieng, and Kampong Thom)

10.3 About Value Addition

1. New markets for rice other than Viet Nam and Thailand can be found (eg China, France, suggested by rice millers in Battambang)
2. The improvement of quality of rice milled is a precondition for exports (eg Angkor Kasekam mill exporting rice at a premium relative to Jasmine rice from Thailand)
3. Integrated farming systems can be successful (eg CRS in Svay Rieng)
4. On-farm processing can add value (eg banana dry chips in Svay Rieng, bottled pickled in Kampong Speu)

5. Simple improvements in postharvest technology (threshing, drying, storing, handling, and processing) lead to reduced postharvest losses, improved quality, and access to new markets (Provincial Departments of Agriculture)
6. Simple demonstrations can have a remarkable effect on increasing efficiency in water use and water storage; see Box 9, Box 10, and Box 11.
7. Do not over-emphasize double cropping of rice when other more profitable activities are possible or when access to water is not ensured or when irrigated agriculture have not been previously practiced (Ms Julie Guillaume of GRET Key Informant Interview 38)

Box 9 Improving Water Discharge Efficiency



The photo is of a 500mm discharge pipe discharging water into the primary supply channel. The total head or height the water is needed to be lifted is approx 10m. If the discharge was lowered 1.5m to the height of the water level in the channel, instead of free falling 1.5m one would require approximately 10 percent less energy to pump the same amount of water. In short, this photo represents a cost effective way (would only need to put a 90 degree steel elbow on the end of the pipe down into the supply channel, cost of approximately \$100-\$200 USD) to increase the efficiency of the pumping system. One is looking at gains of approximately 10 percent for the life of the system.

Source: Diagnostic Study Field Work

Box 10 Improving Water Reservoirs



This photo is a farm pond 40x40x3 meters deep (4800cubic meters of water). This farm pond is situated adjacent to the rainfed rice fields of the village. The pond fills to ground level at the end of each wet season to supply water to the vegetable growers of the village in the dry season. If the soil excavated from the pond was compacted into a bank (at the moment the bank is open so water will drain in) around the perimeter of the pond and a small pipe was placed through the bank there would be an opportunity to be able to hire a small pump for only 1 or 2 days to fill the dam above ground level at the end of the wet season. By only placing half the soil excavated, it is possible to double the storage capacity of the dam to 8000 cubic meters. This extra water could be used to complete the final irrigation of the rainfed rice crop or stored for the dry season to increase vegetable production.

Source: Diagnostic Study Field Work

Box 11 Increasing Pumping Efficiency



In this photo you will notice in the foreground the position of the pump is close to the water source. This is good. It vastly increases the efficiency of the pump compared to the pumps situated much higher on the bank in the background. As simple a thing as shifting the pump closer to the water source will increase the efficiency of the system dramatically. Depending on pump condition, increases in efficiency of 10 percent-20 percent can be achieved.

The reason for this improvement is it is far more efficient for water to be pumped from the pump than to be sucked or drawn up by the impellers from a water source. Water can only be lifted 10m before its own weight pulls it apart. The position of the pump is crucial when installing. If there is too much suction head or height the efficiency of the pump decreases.

What also impacts on suction efficiency besides the vertical height the water is to be lifted is the amount of friction generated in the pipe by the water flowing through it. Increases in friction equals increases in energy required which equals increases in diesel consumption. To increase the efficiency of a pumping system the suction side of the pump should be at least 1.25-1.5 times the size of the discharge. By increasing the diameter of the suction you decrease the friction losses required to draw the water up from the source. The purchase price for larger PVC suction pipe (75mm instead of 40mm) is in the vicinity of 10,000reil per 4M length. Another cheap way to improve pumping efficiency.

Source: Diagnostic Study Field Work

11 Problem Analysis

11.1 Core Problem, Impacts, and Causes

271. The field work has identified multiple constraints to the development of rice-based farming systems in Cambodia. Before proceeding to program formulation and design it is necessary to reorganize the information from the field through various stages of analysis. One of the stages involves a problem tree analysis (see Figure 10), consisting in identifying the core problem for program formulation, its impacts as related to the overall purpose of the program, and the immediate and underlying causes that could represent leverages for program intervention.

11.2 Identification of the Core Problem for Program Formulation

11.2.1 Low and Variable Growth of Agriculture

272. Even though agriculture contributes 31 percent of total GDP (as of 2004), agriculture is the main source of income for most of the population in the country. Moreover, for most of the poor in Cambodia, agriculture is the main source of their livelihood. Then, it is not surprising that the performance of agriculture is a key factor in raising the income of the rural population and reducing poverty. Moreover, agriculture has strong linkages with the rest of the rural economy. A strong agricultural performance usually leads to investment and increasing economic activity in the rest of the rural economy, thus contributing to rural employment and further poverty reduction.

273. Over the past few years growth of agricultural GDP in Cambodia has been slow and highly variable. As in Cambodia the rural economy is almost completely dominated by agriculture, a low growth of agriculture explains the low development of non-farm activities in rural areas. If the situation in rural areas has to improve, then agricultural growth has to accelerate and reach a higher and more stable level. Growth targets for agriculture have to reach at least 2 percent annual growth per capita if some clear result in poverty reduction has to be felt over a five-year plan period. An annual per capita growth rate of 2 percent would imply about 4.5 percent total growth of agricultural GDP, based on current rate of growth of population; over a course of a 5-year plan that would translate into real growth of almost 25 percent and possibly a 10 percent decrease in poverty. Agricultural growth in Cambodia has to accelerate, but also has to become more stable over time. Past growth in Cambodia has been quite variable, a reflection partly of its heavy dependence on weather (particularly rainfall patterns), the dominance of rice in the cropping patterns, and the small part of agricultural trade in total trade.

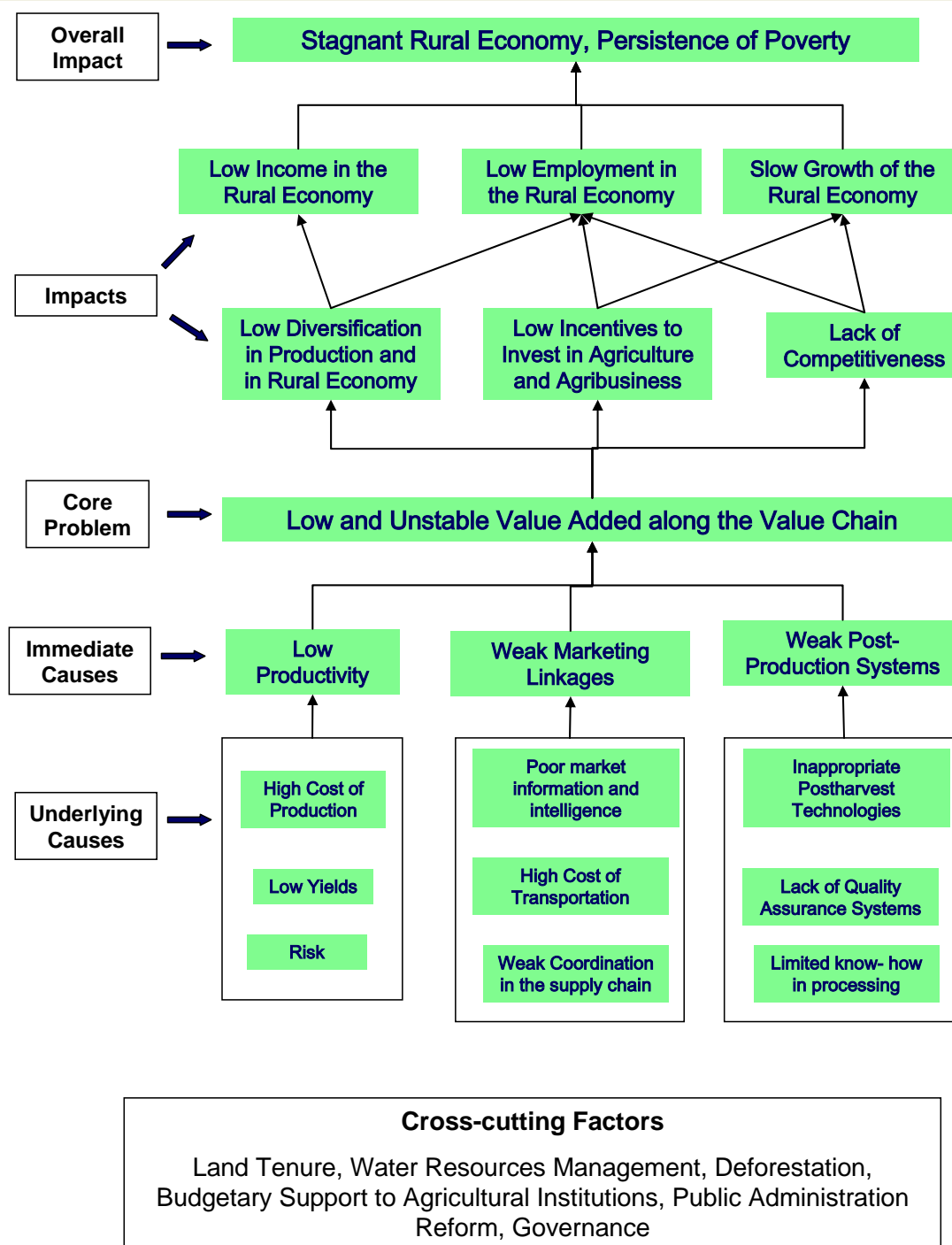


Figure 10 Problem Tree Analysis for Program Formulation

11.2.2 In spite of rice self-sufficiency, poverty is still widespread

274. Cambodia is an agrarian society, with agriculture representing a major share of GDP and the majority of the population (84%) living in rural areas and depending mostly on agriculture for their livelihood. Productivity of agriculture is low, both in terms of labor (about \$170/worker) and in terms of land (\$518/ha). Since the majority of the population depends on agriculture for their livelihood and most of this population consists of smallholders with less than 2 ha per household, it is not surprising that poverty is

widespread in the country (35 percent according to the 2006 Cambodia Poverty Assessment) and concentrated in rural areas.

275. The general outlook for development is improving, with infrastructure developing and, since 1998, political stability for the first time in a long period of recent history seeming to ensure the basic condition of peace. However, agricultural growth is still sluggish and the agricultural system is predominantly focused on rice. Production and productivity of rice have increased considerably over the past 10 years.

276. The growth of rice production over the 1990s by far outperformed the growth of population and contributed to a situation of rice self-sufficiency. Cambodia has reached a situation of self-sufficiency in rice and in fact rice and paddy are increasingly exported (via both formal and informal channels). However, for the majority of the Cambodian farmers rice cultivation continue to be regarded mainly as a source of food security and not as the main source for generating cash income and escaping poverty. With gross margins on rice varying between \$100 and \$200 per hectare, and an average rice land cultivated area of less than 2 hectares per household, the vast majority of Cambodian farmers will still face the challenge of overcoming poverty.

11.2.3 A vision of Cambodia Agriculture Based on Increasing Value-Added

277. The achievements of rice self-sufficiency have contributed to increase food security of the population and perhaps to set the basis for agricultural diversification. However, the achievements are fragile, as agriculture is largely dependent on rainfall, and a weak water control and irrigation system make smallholders vulnerable to the vagaries of the weather. Strategic decisions need to be made as related to the vision of agriculture in Cambodia over the next 10 years. In this vision, rice will continue to be the main crop in terms of cultivated areas and the rice sector as a whole will develop because of higher productivity, improved irrigation systems, integration with modern rice mills, and export orientation. However, the importance of rice in terms of value added within agriculture will decline. The share of higher value-added products such as non-rice crops, fisheries, and livestock will increase as the result of closer integration with rapidly growing urban and international markets. Competitiveness of Cambodia agriculture will increase and agricultural exports will jump up to reach several hundred million dollars from their low current volume in order to realize their comparative advantage. Rather than being a minor and declining share of total exports, agricultural products will become a dynamic engine of export growth and allow Cambodia to benefit from the access to WTO. This vision will clearly require a concerted effort to facilitate the commercialization of agriculture, the diversification towards high-value products, and the integration of smallholders with agroenterprises.

11.2.4 Unlocking the value in Rice-based farming systems

278. A number of features of rice-based farming systems of Cambodia have been reviewed in chapter 3. The field work has added more insights into the various constraints along the value chain. Chapter 8 has grouped these constraints into technology, marketing, water, and capital. The more detailed analysis in Appendix J has highlighted further constraints for the rice, vegetables, and aquaculture value chain. Chapter 8 and Appendix K have quantified the constraints along the value chain. Chapter 6 has considered different ways to unlock value. If growth of agriculture has to occur, the value in rice-based farming systems has to be unlocked. To do that the linkages in the existing

value chains have to be strengthened, economies of scale have to be promoted through organization of farmers and linkages with traders and processors, contract farming, and capacity strengthening of various stakeholders.

279. The wider binding constraints highlighted in the Cambodia Poverty Assessment 2006 (appropriability, cost of capital, and return to investment) could be removed through policy and institutional reforms related to property rights, governance, development of a rural financial systems, and investments in infrastructure (roads, irrigation, power) and technology.

280. At the same time, specific value chain interventions need to be formulated in order to increase value for the stakeholders (farmers, traders, and processors), benefit the poor, and accelerate the process of intensification, diversification, and market integration in rice based farming systems.

11.2.5 The Core Problem

281. The previous discussion can be summarized as follows:

1. Agricultural growth is low and highly unstable
2. Low and unstable growth are related to poverty, food insecurity, and vulnerability of rural households
3. More growth and more stability require intensification, diversification, and creation of value
4. Creation of value requires improved value chains
5. The objective is to address the problem of low and unstable value in rice-based farming systems.
6. The program approach addresses the issue of increasing value by strengthening value chain linkages.

The core problem for the development of rice-based farming system is the low and unstable value added along different stages of the value chain.

282. Discussions by the Consultant's Team undertaken with stakeholders during the Final Workshop have indicated a broad agreement with this statement (see Appendix M). The main tasks ahead are to understand the impacts and causes of the core problem and then to identify alternative strategies to address the core problem.

11.3 Impacts of the Core Problem

283. It is necessary to identify the impacts of the core problem so as to ensure that the resolution of the core problem will have the desired effects in terms of the overall project goals.

284. The analysis suggests that there are three immediate impacts in terms of:

1. **Low diversification in production and in the rural economy.** Given the low value added in production and postproduction of the value chains in rice-based farming systems, there is little scope for diversifying. Farmers who would like to

engage in higher value added activities, they will be constrained by the low value added in current postharvest systems, marketing, and processing. So, it will be difficult for them to find outlets for these other products, even though they might recognize that they could achieve higher value added in these other activities. Similarly, potential processors will not engage in new value adding activities if they have limited know-how and if the current value added in these activities is low. In turn, low diversification implies that there are few income opportunities in the rural economy surrounding current rice-based farming systems. This implies also low employment generation in the off-farm rural economy, which often results in youth moving away from rural areas and migrating to the capital (with additional urban congestion and social problems).

2. **Low incentives to invest in agriculture and agribusiness.** The presence of low value added along the value chain provides low incentives to invest in agriculture and agribusiness activities. The few stakeholders who have made considerable investment are not getting a good return on their investments. Those few who are getting a good return are usually small enterprises who have some difficulty in further expanding their operations. Low investment rates translate in low growth of the rural economy and limited employment opportunities.
3. **Lack of competitiveness.** Low value added also implies low value for the consumer. As a result the consumer will demand imported products that provide better quality, more diversified products, and consistency of supply. Similarly, foreign buyers will not be attracted by low value products, unless they are very competitive in price, which generally is not the case, due to high costs of production in Cambodia. Low competitiveness in turn results in low growth and low employment generation.

285. The combination of these effects (low growth, little employment generation, and low income) contribute to a stagnant rural economy with persistence of poverty; see Figure 11. Farmers' income remain low, employment opportunities for the poor are limited, and, in spite of food self-sufficiency for the country as a whole, several households remain food insecure because of risks associated to rainfed agriculture and limited income generation activities in production or post-production systems.

The Core Problem and its Impact

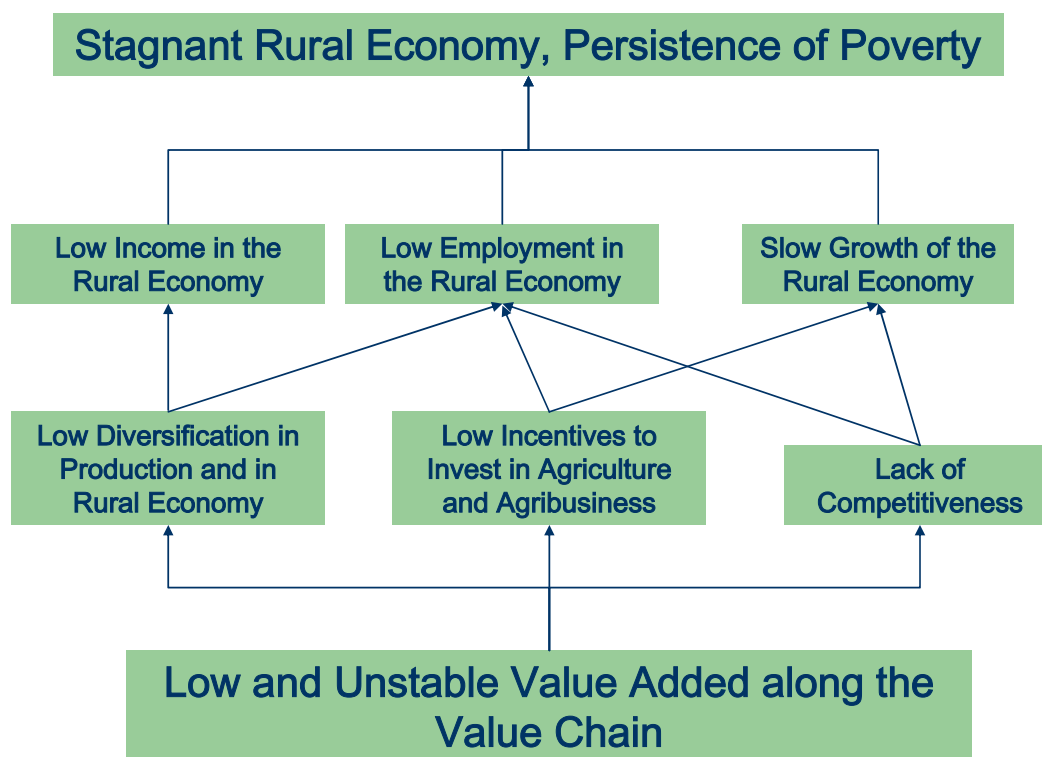


Figure 11 Impacts of the Core Problem

11.4 Causes of the Core Problem

286. There are three sets of immediate causes of the core problem of low value added in the rice-based farming systems of Cambodia. Each set of causes will in turn have underlying causes summarized in the paragraphs below.

287. The three immediate causes of the core problem are (1) low agricultural productivity, (2) weak marketing linkages, and (3) weak postharvest systems.

- **Low Agricultural Productivity.** We define productivity as the value of outputs minus the value of inputs to production. If agricultural productivity is low then also value added is likely to be low. This is certainly the case in farming enterprises. Low agricultural productivity is itself the outcome of underlying causes among which we consider the following:
 - a. **High cost of production.** High cost of production depends on (a1) high costs of inputs (chemicals, fuel and electricity, credit), and (a2) inefficient use of available inputs.
 - b. **Low yield.** Low yield depends on (b1) low quality of seed and inappropriate seed varieties, (b2) lack of water, (b3) inefficient use of inputs (water, fertilizer, chemicals), and (b4) poor management of plant nutrients, soils, water, pests and diseases.

- c. **Risk.** Risk in agriculture lowers agricultural productivity because of lower investments and losses derived from underlying factors. These underlying factors include (c1) predominance of rainfed agriculture and in particular erratic rainfalls; (c2) inadequate early warning systems in case of natural calamities; (c3) poor water management, particularly with respect to water reservoirs and drainage systems; (c4) natural calamities such as droughts and floods; (c5) deforestation resulting in soil erosion, lower water tables, and drying of water sources; (c6) pests and diseases; and food insecurity and malnutrition.
- **Weak Marketing Linkages.** Weak marketing linkages among farmers and between farmers and traders and processors in the value chain translate in low prices, little market shares, and reduced volumes of transactions, all of which impinge upon the low value added in the rice-based farming system. There are three underlying sets of causes explaining weak marketing linkages, including:
 - a. **Poor market information and intelligence.** Poor market information and intelligence is explained by (a1) limited knowledge of (i) price distribution and seasonality, (ii) distribution channels and outlets, and (ii) market demand (local, regional, national, or international); and (a2) few available sources of market intelligence (radio, briefings, reports, workshops, TV).
 - b. **Weak coordination in the supply chain.** Weak coordination in the supply chain is a consequence of (b1) scarcity of institutional mechanisms to link farmers to each other and to the markets (eg marketing groups, cooperatives, contracts); (b2) scarcity of institutional mechanisms to resolve supply bottlenecks arising in the procurement of raw materials by processors (eg contracts, alliances, nuclear enterprise models); (b3) unorganized market system characterized by the limited number of collection centers, packhouses, wholesale markets, market committees, distribution centers); and (b4) largely ineffective associations and chambers of commerce. Ultimately, the lack of trust among stakeholders and the lack of institutional mechanisms to deal with the lack of trust are responsible for weak marketing linkages.
 - c. **High cost of transportation.** High cost of transportation is the consequence of (c1) poor infrastructure, particularly rural roads; (c2) illegal fees; and (c3) high cost of containers.
- **Weak Postharvest Systems.** Weak postharvest systems are responsible for losses in the value chain, low quality of products, and weak capacity of processing raw materials. All of these factors contribute to lower value added in the rice-based farming systems. There are three underlying set of causes of weak postharvest systems, namely (1) inappropriate postharvest technologies, (2) lack of quality assurance systems; and (3) limited know-how in processing.
 - a. **Inappropriate postharvest technologies.** Inappropriate postharvest technologies are related to (a1) losses and inefficiencies in threshing, storage, and drying; (a2) credit constraints and high cost of capital to invest in improved equipment; and (a3) inappropriate handling and packaging of agricultural products (at harvest, transportation, and marketing).

- b. **Lack of quality assurance systems.** Lack of quality assurance systems depends on (b1) lack of standards and grading; (b2) lack of knowledge about procedures for quality assurance (see Box 12); and (b3) weak institutions to improve food safety.
- c. **Limited know-how in processing.** Limited know-how in processing is reflected in (c1) limited knowledge about primary processing, particularly at the village and commune level; and (c2) ineffective quality controls which are not linked to systems for improving processing methods; see Box 13.

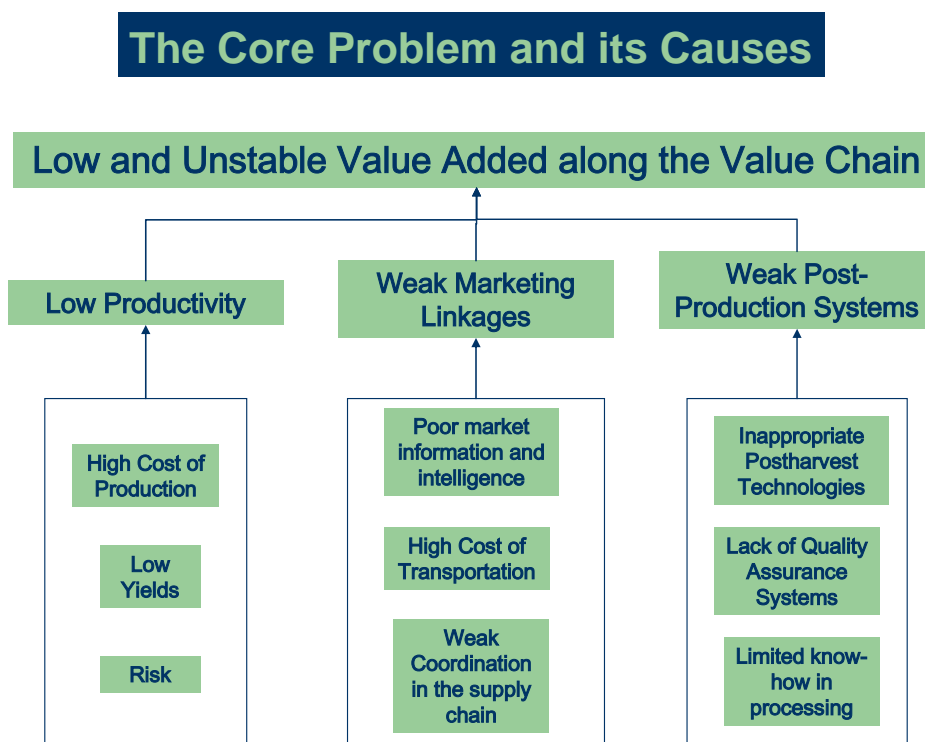


Figure 12 Causes of the Core Problem

Box 12 Measuring Moisture Content: Perception or Reality?

The lack of simple objective methods for moisture measurement is often a source of heated discussions between farmers on one side and traders and millers on the other side. Farmers dry paddy or other raw materials mostly on-farm without the use of dryers. This often implies high moisture contents during the wet season or as a result of a sudden rain. Traders and miller often have an incentive to overestimate moisture content because that implies a lower price paid to farmers. In the table below, moisture content for paddy is sometimes underestimated (14 percent moisture content would be considered appropriate for milling) and sometimes is overestimated. Lacking simple tools like a moisture meter, a simple and relatively inexpensive device to measure moisture, the results are not surprising; see Table 17. In spite of alleged experience, visual methods can be deceiving. Obviously, moisture is an issue not only because of negotiations about prices, but also more fundamentally because it leads to losses both in processing and in terms of storage (higher content of moisture is a more fertile environment for insects and bacteria to grow and damage the produce).

Table 17 Perceptions by Millers about Moisture Content of Paddy and Objective Measurement

Location	Paddy Variety	Source	Key Informant Perception	Moisture Meter Average (3 samples)
Kirireaksmey Village	Neang Malis	Farmer Dried	14%	18.1%
Kirireaksmey Village	Mixed	Farmer Dried	15%	14.8%
Kraing Chheay	Mixed	Farmer Dried	17%	14.3%
Samroung Torn District	Mixed	Farmer Dried	20%	14.5%

Source: Diagnostic Study Field Work

Box 13 Laboratory Tests for Quality of Processed Food

Ministry of Industry, Mines and Energy
 Department of Industrial Techniques
 Provincial Laboratory of Control
 (N°): 311.B/03

ប្រតិបត្តិការវិភាគគុណភាព
 Bulletin of Analysis

MIME
 N° 18 LAB

ឈ្មោះផលិតផល (Designation of Product):
 សញ្ញា (Trade Mark):
 ក្រុមហ៊ុន - សិប្បកម្ម (Name of Company / Handicraft):
 លក្ខណៈ (Received Date): 11-10-03 ថ្ងៃចេញលទ្ធផល (Issued Date): 20-10-03

វិភាគមីក្រូជីវសាស្ត្រ Microbiological Test	កម្រិតអនុញ្ញាតអតិបរមា Max. Permissible level	លទ្ធផល Results
Total Plate Count, number of c.f.u per ml	10 ³	7 x 10 ³
Molds and Yeasts per ml	10	0
Sulphite-Reducing <i>Clostridium</i> , per 20ml	0	0
Coliform Count, per 100ml	0	0
Thermotolerant Coliform, per 100ml	0	0

FLS

សន្និដ្ឋាន (Conclusion): គុណភាពមិនអនុញ្ញាតដល់ការប្រើប្រាស់ (Unacceptable)

បានយល់ព្រម Approved ថ្ងៃទី 21 ខែ 10 ឆ្នាំ 2003
 21 October 2003
 អគ្គនាយកដ្ឋានបច្ចេកទេសឧស្សាហកម្ម
 Director of DIT

បានពិនិត្យត្រឹមត្រូវ Verified ថ្ងៃទី 20 ខែ 10 ឆ្នាំ 2003
 P.Penh 20-10-2003
 ប្រធានមន្ទីរពិសោធន៍
 Chief of Laboratory

អ្នកវិភាគ Analyst ថ្ងៃទី 20 ខែ 10 ឆ្នាំ 2003
 P.Penh 20-10-2003

"They come regularly, 4 times per year, they take the money (US\$415/year) to do some lab tests, they discover the quality is no good, but do not say anything how to improve. The test results arrive 1 year later, but the money goes immediately."

A small food processor talking about the visit of the Department of Industry to her business.

The picture shows the laboratory exam by the provincial Department of Industry. The test shows unacceptable levels of plate count, a measure of bacteria. There are two issues. First, the processors got the lab exams one year later, too late to take corrective actions. Second, the Department did not provide any technical information to help the processor to improve the processing.

Source: Diagnostic Study Field Work

11.5 Cross cutting factors

288. The analysis above has focused on the immediate and underlying causes of the identified core problem of low value added for the program formulation. Many of the problems identified can be tackled to a certain extent by the formulation of the rice-based program. There are however a set of cross cutting factors that affect not only the rice-based farming systems but the overall rural economy and national economy. The following paragraphs discuss these cross-cutting factors.

1. **Land rights security.** Even though considerable progress has been made in clarifying land rights in general and for rice-based farming system in particular, there is still a lot of progress to be made. Land titles allocation has not yet been

- completed and the process of obtaining land titles is still cumbersome and expensive for many households. Landlessness affects a non-marginal number of households in most rural communities as the result of the return of demobilized soldiers and their families to the communities. Property rights in commons such as water bodies and forestry are a continuous source of conflict between farmers and powerful groups and lawlessness is still not eliminated.
2. **Deforestation.** Deforestation and illegal logging are proceeding. This has created and is still creating considerable damage to water basin with resulting effects in terms of soil erosion and drying up of water sources which result. Water scarcity is increasing even in those areas previously drained by small rivers.
 3. **Governance.** The persistence of illegal fees is a burden on business at all levels. Not only do illegal fees represent a high cost, but their often arbitrariness makes difficult the planning of business itself.
 4. **Weak institutions and Budgetary Support.** In spite of the recognized importance of agriculture in the national plans, the budgetary support for key institutions such as research and extension is lacking.
 5. **Underdeveloped financial system.** Agricultural banking is at an embryonic stage. ACLEDA Bank which has the largest branch coverage in the rice-based system as of 2004 had total disbursed loans of US\$65 million of which only 3 percent (about US\$2 million) to agriculture. High cost of credit to agriculture and SME makes it difficult to either finance investment capital or working capital.
 6. **Infrastructure.** Remarkable progress has been made in improving main roads in Cambodia in the past 10 years. Rural roads however are often in appalling conditions. Electrification is largely absent in rural areas making the cost of energy (pumping, processing) relatively high.
 7. **Water resource management.** After more than 6 years of the creation of the Ministry of Water Resources and Meteorology, there is not yet a proper inventory of water resources and hydrological studies to allow proper planning of scarce water resources. The Water Law is still under preparation.

289. The cross-cutting factors discuss in this section are closely related to the wider sector binding constraints highlighted in the source of growth approach of Hausman, Rodrik, and Velasco which was used in the Cambodia Poverty Assessment 2006 (World Bank 2006). The factors of low agricultural growth are analyzed in terms of three main binding constraints: appropriability of returns, high cost of capital, and low returns to economic activity (see Figure 13).

290. The wider constraint analysis point to the need of general policy and institutional reforms related to property rights, governance, and infrastructure in order to improve growth. Even though useful to have a general understanding of some of the wider constraints, this analysis falls short of indicating what type of interventions in a value chain are needed to increase value.

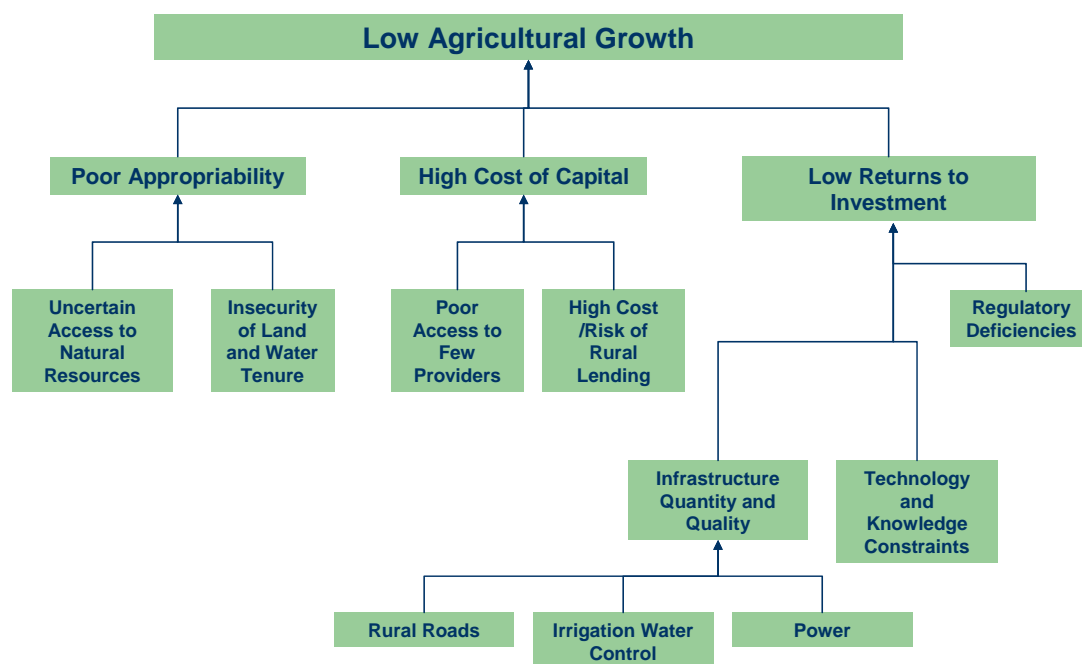


Figure 13. Binding Constraints to Agricultural Growth

12 Strategic Options for Program Formulation

291. The problem analysis in the previous section points to the core problem of low and unstable value added along the value chains in rice-based farming systems. For the purpose of program formulation, it is necessary to identify different strategic options to address the core problem. This section of the report analyzes alternative options and makes an assessment of each of them. The analysis of strategic options will be based on a SWOT analysis of each option and an evaluation of the expected costs and benefits. The outcome of this analysis should be the identification of those strategic options that may be further developed in program formulation and eventually be the basis for program design. Additional strategic options analysis is reported in the Program Concept Note submitted to AusAID.

12.1 Identification of Strategic Options

292. The identification of strategic options has been conducted by the Consultant's Team after a process based on fieldwork analysis, consultations with a large number of stakeholders, participatory workshops and discussions with the AusAID mission and peer reviewers.

293. The strategic options considered in the analysis below include:

1. Supply-driven Technologies
2. Demand-driven Technologies
3. Credit Interventions
4. Policy and Institutional Reforms
5. Infrastructure Development
6. Value Chain Linkages

12.2 Supply-driven Technologies Option

12.2.1 Description and Rationale

294. Technology dissemination to farmers and entrepreneurs could improve productivity both at the farm and the enterprise level thus contributing to higher value added in rice-based farming systems. Many of the technologies needed are well known and there is relatively expertise in the research and extension system to develop and disseminate these technologies. NGOs could also be effectively involved in the dissemination to farmers. This strategic option could take different shapes according to the specific technologies to disseminate or the method of dissemination. The option is supply-driven in the sense that the specific technologies and the methods of dissemination are decided by the experts and supplied by them to the beneficiaries. This does not imply that there will not be participatory approach at the community level. In fact some of the methods of delivering the technologies (for example the FFS) requires an intense participation by the farmers. However, the method of delivery and the content of what needs to be delivered (whether it is IPM or development of a new variety of paddy) are not decided by the beneficiaries.

295. In the assessment below, two examples of supply-driven technologies will be provided, namely FFS and Research Program on Improved Fragrant Rice Varieties.

12.2.2 SWOT Analysis

296. The main strengths of this option consist in:

1. A well-defined set of interventions that could be implemented
2. Clarity in the allocation of resources to different interventions, each with a specific budget and work plan
3. Possibility to identify “technological packages”

297. The main weaknesses of this option consist in:

1. Lack of clarity about the relevance of the technologies to different agroecological and socioeconomic conditions
2. Lack of link with market demand opportunities
3. Lack of flexibility to adapt the programs once they are established

298. The main opportunities of this option consist in:

1. Possibility to intensify agricultural production in suitable environments
2. Diversification of production

299. The main threats of this option consist in:

1. Possibility of imposing inappropriate technologies
2. Beneficiaries are often passive recipients
3. Danger of continuing the intervention even when it proves to be inappropriate because of the pressure to fulfill work plans

12.2.3 Expected Costs and Benefits

300. The cost of this option tends to be high since it is determined largely by the suppliers (research and extension providers) with little control and contributions by the beneficiaries. The benefits are uncertain, depending on the specific delivery mechanism. The same delivery mechanism might be appropriate in some circumstances and inappropriate in others. Moreover the impact on farmers' income is also uncertain given that the technologies are often developed and disseminated with the main objective of increasing production rather than income and little analysis of market demand is undertaken. Finally, the impact on the commercial attitude of beneficiaries and their capacity to innovate is generally low.

12.2.4 Assessment

301. A relatively low benefit-cost ratio and uncertain effects on the capacity of beneficiaries to embark on commercial agriculture and undertake innovative practices.

12.2.5 Example 1 of the Supply-Driven Technologies Option: The Farmer Field Schools Approach²⁶

302. The “Farmer Field Schools” approach has in the past decade been increasingly promoted by a varieties of organizations (including FAO and World Bank) and bilateral organizations (eg DANIDA), governments (Indonesia since the early 1990s and later Thailand, Sri Lanka, Bangladesh, Viet Nam, and a number of African countries), and innumerable NGOs as an extension approach that uses participatory methods to help farmers develop their analytical skills, critical thinking, and creativity, and help them learn to make better decisions. The approach sees the trainer more as a facilitator rather than as an instructor. Cambodia has also embarked on an Integrated Pest Management (IPM) program in 1993 using FFS, to disseminate IPM as a holistic crop management system that integrates a variety of methods to manage and protect crops.

303. There are a number of issues in evaluating the impact of FFS. These issues have been recently reviewed in a critical study by Feder, Murgai, and Quizon (2003). Most previous studies evaluating the impact of FFS report significant impacts of program participation on farm-level yields and profits, and a decline of pesticide use. However, most previous studies have not accounted for econometric problems that arise in estimating program impact when the placement of the program across villages and the selection of farmers for participation in the program are not done at random. When these problems are taken into account in the evaluation of impact, the empirical results do not indicate that FFS have induced significant improvement in yield or a reduction in pesticide use by those farmers who have been part of FFS relative to other farmers. The secondary diffusion effects on those exposed to the approach were also found to be not significant.

304. The literature on impact of FFS is still growing. This report is not the place to discuss the literature at length and to examine the evidence, although Appendix I does review some evidence for different countries including Cambodia. The Consultant’s Team is not in the position of taking side in this controversy. Suffice to say that the evidence on impact is still under discussion. In the case of the Cambodian experience with FFS as shown in Appendix I there are serious concerns that should invite caution about its alleged high impact.

305. The key points that the Consultant’s Team wants to raise in the current context is a different one. Assuming that the impact of FFS is a significantly positive one (in spite of the cautionary evidence to the contrary), it is not at all clear why the FFS approach should be considered as an option for a component of a program. It seems that there is confusion between “technological message” and “delivery” of the message. A component of a program (or an “output” according to the Logical Frame Approach) should clearly indicate what is needed to be achieved to support the overall objective of the Program. The FFS is an extension approach (that is a delivery mechanism), not an output; as such it cannot be a component of the program.

306. FFS or other extension approaches could and should be considered in the dissemination of technology to farmers. If farmers indicate a preference for the FFS approach and are willing to share the cost of delivery, then there are valid reasons to use such an approach. FFS might be appropriate in the case of complex technologies such as IPM. For other types of technologies (eg improving pumping efficiency, or improving on-

²⁶ This option was indicated by the AusAID Team Leader as a possible component for program formulation.

farm processing) there might be alternative delivery mechanisms (eg demonstrations) that could be more cost effective and more appropriate.

307. It is the view of the Consultant's Team that flexibility in the extension approach should be preserved in the formulation of the program, rather than embark on only one approach whose overhead costs are high and the benefit and impact might be in doubt.

12.2.6 Example 2 of the Supply-Driven Technologies Option: a Research Program to Select and Improve Aromatic Varieties of Paddy

308. Aromatic varieties of paddy receive a premium both in domestic markets and in international markets. Therefore they are part of the methods to increase value added in rice-based farming systems; see section 7.

309. The option of an "aromatic paddy component", presumably involves the establishment of a new research program or the strengthening of existing efforts in this direction at CARDI. The Consultant's Team would like to make some reflections on whether this program could be established in a different and more efficient way within the a demand-driven technology option (see section 12.3).

310. The main idea of a demand-driven technology option is that farmer communities make proposals for investment to be funded through a matching grant scheme. If sufficient communities consider the improvement of aromatic varieties a valid proposal, then they should submit the proposal for funding by the matching grant scheme. The important point here is that there should be a demand by the farming communities for this type of investment. For the sake of argument, let us assume that out of the 90 communes reached by the Program, at least 20 believe that this proposal is a valid one. Each community might well think that they would like to invest US\$15,000²⁷. Multiplied by 20, it would induce a demand for this type of investment amounting to US\$300,000. This amount could then be used by CARDI to finance part of the costs of the selection and improvement program. The advantage of this mechanism is that researchers would be in direct contact with the clients (the farmers) and be accountable to them.

311. It would be preferable that the contract between CARDI and farmers for carrying out this type of activities is done with the institution rather than with individual researchers.

312. There is another point to make in relation to this option. The main example of improvement of an aromatic variety in Cambodia is the effort conducted by the rice mill Angkor Kasekam in successfully selecting, multiplying, and using the high-quality variety Neang Malis (see Box 2). The mill had created a body of own extension agents who distribute seed to up 80,000 farmers and then engage in contracts to procure the paddy cultivated by the farmers. The rice processed by the mill sells in international markets at a premium above the Jasmine rice in Thailand. The extension agents of the company provide also technical services to farmers.

313. In summary, the precise evaluation of the "aromatic paddy component" might deserve more scrutiny during design phase, but the Consultant's Team would like to stress

²⁷ Note that assuming a 1500 ha of paddy in a commune and a seeding rate of 100 kg/ha, the total seed per commune would amount at about 150 tonnes. At a cost of Riel 1,600/kg (as seed from AQIP) or \$400/tonnes, the total cost of replacing the overall stock of seed would be \$60,000. However, assuming a 25 percent replacement, the cost would be \$15,000/year.

that alternatives ways to achieve the same result, perhaps even more effectively and efficiently, are possible within a demand-driven technology option.

12.3 Demand-driven Technologies Option

12.3.1 Description and Rationale

314. In this option, technologies to be delivered to farmers and entrepreneurs are based on demands by stakeholders. That implies that the specific technologies and methods of delivery are not decided a priori by the program; instead they vary depending on the specific agroecological and socioeconomic conditions of the stakeholders. In this option, demand-driven implies that stakeholders submit proposals, contribute to the overall costs, and pursue technological improvements which are responsive to market demand. Providers (from extension, research, and business service providers) are then engaged to provide the services requested by the stakeholders. Stakeholders are active rather than passive recipients of technologies. The overall purpose is not to introduce “technological packages” that could be applied everywhere and by everyone; instead the purpose is to acquire know-how that could directly contribute to value added and to meet market demand. Examples of specific interventions under this option are given in section 15, including a detailed analysis of economic and poverty impact.

12.3.2 SWOT Analysis

315. The main strengths in this option consist in:

1. Participation of groups and individuals in the formulation of specific technological interventions
2. Contribution to the costs of the proposals
3. Responsiveness of the intervention to market demand

316. The main weaknesses of this option consist in:

1. Need of social mobilization and capacity strengthening to formulate proposals that are responsive to market demand

317. The main opportunities of this option consist in:

1. Linking group and individual proposals to Community Marketing Plans
2. Ensuring dissemination of technologies appropriate to meet market demand

318. The main threats of this option consist in:

1. Demand by beneficiaries might divert the efforts of line agencies staff from other priorities or work plans unrelated to market demand

12.3.3 Expected Cost and Benefits

319. Cost of providing services tends to be lower than in the supply-driven option since they are shared and controlled by beneficiaries. However, there are additional costs for technical assistance to stakeholders and commune councils to formulate proposals and

marketing plans. The expected benefits in terms of income of stakeholders also are higher since the stakeholders are more likely to use technologies directly linked to increase value added and meet market demand.

12.3.4 Assessment

320. A relatively higher benefit/cost ratio than in the case of supply-driven technology option. The option requires a different pattern of utilizing service providers (public, private, and NGOs) than in most programs. Rather than being mere recipients of those services, stakeholders actually express a demand for those services and contribute to the costs of those services. As such the stakeholders have a better control on the service providers. This however requires a change in the way both stakeholders and service providers have been used to interact in most programs' implementation. The change is considerable but not completely new in the context of Cambodia. The process of decentralization has in fact already introduced the concept of participatory planning from the grass-root up to the VDC, CC, and PRDC. In the case of the program, the parallel is that farmers and entrepreneurs submit proposals for the introduction of technologies the costs of which are partly shared by the program and the stakeholders. Even though the process is consistent with overall planning at the local level, it is more straightforward and readily implementable.

12.4 Credit Interventions Option²⁸

12.4.1 Description and Rationale

321. Given the high cost of credit and capital constraints often referred by stakeholders, the option would propose to reduce the cost of credit and alleviate the capital constraint by forming an alliance with a commercial bank or NGOs and provide a line of credit at subsidized rates. Another possibility would be to directly transfer funds to farmer organizations which would then use revolving funds to finance the working capital requirements for their production activities.

322. The exact content of this option is not clear to the Consultant's Team. It would seem that its rationale is to address the high interest rate and credit constraints for farmers and entrepreneurs. The Consultant's Team has documented the perceptions of stakeholders during the field work interviews that the cost of credit is extremely high, at about 3 percent per month for farmers accessing credit from MFI and also ACLEDA Bank. Other commercial banks are usually not involved in credit to smallholder farmers.

323. The field work findings have also indicated that "capital" constraints, albeit being among the priority constraints, are not considered to be the "most" important constraint; see section 8.5.

²⁸ This option was indicated by the AusAID Team Leader as a possible component for program formulation.

12.4.2 SWOT Analysis

324. The main strengths of this option consist in:

1. Making credit available to beneficiaries at lower interest rates than those prevailing in the financial system
2. Providing funds to finance working capital requirements such as those involved in the purchase of inputs for agricultural production

325. The main weaknesses of this option consist in:

1. Distorting the financial system in Cambodia
2. Rationing credit and therefore creating a mechanisms for allocation of rationed credit to the better off, not necessarily those who are more likely to use capital more efficiently

326. The main opportunities of this option consist in:

1. Making capital available to undertake agricultural production and start new businesses

327. The main threats of this option consist in:

1. Retarding the process of making innovations in agricultural production and agribusiness
2. Continuing a culture of dependence

12.4.3 Expected Costs and Benefits

328. Apart from the costs of the funds involved in the credit line, other costs are related to supervision of the fund itself. The expected benefits in terms of increased productivity and creation of value chains are going to be marginal. Stakeholders who get funds at cheaper terms are not necessarily likely to do innovations in production or marketing and therefore will simply purchase inputs to continue operating in the same way as they have been operating in the past.

12.4.4 Assessment

329. It seems to the Consultant's Team that to embark on a "credit component" is a rather difficult proposition to accept. There is a considerable literature on the experience of credit components since the mid-1970s that suggest that credit components have performed poorly (see Box 14). To introduce distortions in the financial system in Cambodia at this juncture, when the financial system is developing on relatively sound financial principles (of profitability and sustainability) is an extremely dangerous option. Apart from the obvious fact that commercial banks – including ACLEDA – might not be interested at all in the disbursement of subsidized credit to farmers (for the simple reason that upon program completion the farmers would still expect similar rates and unfulfilled expectations might compromise the retaining of the clients in the future), there is the other obvious fact that the disbursement of credit per se would not necessarily improve the capacity and practices of farmers and entrepreneurs to make innovations in response to market demand. Unless those capacity and practices improve injection of a few million dollars in the credit system

will not necessarily create substantial impact or address the low value added in the rice-based farming systems.

330. The “credit option” if pursued seriously and in depth would require a completely different type of program and a fundamental reorientation of AusAID programs in agriculture. The Consultant’s Team does not recommend such an option. At the same time, the Consultant’s Team is aware of the binding constraint on capital. Rather than distorting the existing financial system, the proposed program should try to address market failures in the financial system. The market failure being the reluctance of the financial system to engage in funding capital investments in a risky environment like agriculture in Cambodia and the reluctance of the financial system to fund “semi-public” goods like formation of marketing groups, demonstrations of technology, market information and intelligence activities, and value chain linkages.

331. The use of matching grants rather than loans to finance investments in strengthening value chain linkages is justified by the presence of coordination failures. Value chain linkages either do not exist or are very weak. Market mechanisms will not resolve these coordination failures. The type of investments needed to overcome these coordination failures are not likely to be financed by financial institutions. The value chain linkages are “semi-public” goods in the sense that they benefit not only the direct beneficiaries but other stakeholders in the value chain. However, development of value chains will not take place unless these linkages are in place. Bottlenecks along the marketing chain; improvements in quality; innovation in production, processing, marketing, and management will require different stakeholders to cooperate; and an effective contract farming system will not develop unless trust and reputation are established. Once value chains are established or strengthened, then stakeholders will be in a better position to benefit from access to credit and financial institutions more inclined to provide credit at favorable terms.

Box 14 How do Credit Components Perform?

Since the mid-1970s, experience has shown that credit components have often performed poorly. By focusing on short-term objectives, donors can miss the opportunity to create permanent sources of finance.

- Credit components can de-capitalize quickly due to high costs, subsidized interest rates that do not cover costs, limited disbursements, and poor collection rates.
- Credit services may cease when a project is completed, offering little long-term impact. Since credit components are not used to build institutional capacity, the targeted client group is often left without permanent access to financial services.
- Credit designed as an input can create unsupportable levels of borrower debt. By encouraging people to borrow for investments they would not otherwise make, subsidized credit may impoverish the very people it intends to help.
- Subsidized credit components can crowd out the development of both local credit and savings organizations and branch networks of viable financial institutions. An ILO survey in Uganda found that the presence of large rural investment credit components caused MFIs to shy away from the sector. Given their commitment to long-term viability, the MFIs could not compete with subsidized interest rates nor tolerate high levels of delinquency and default.
- Credit lines can encourage donor dependence when channeled through financial institutions and provide strong disincentives for these institutions to begin or continue savings services. In addition, financial institutions often stop lending to the target group after the credit line finishes.

What are some reasons for the poor performance of credit components?

- Conflicting objectives. A perceived trade-off between supporting sustainable financial services and meeting specific objectives for a target group may lead donors to loosen sustainability requirements.
- Confusion between resource transfers and financial services. Most agencies do not have clear policies for when professional financial services should be used to meet social or economic objectives, and when those objectives are better met through resource transfers or other types of interventions.
- Assumption that credit is a binding constraint. Project designs may assume that credit is a binding constraint for the target group, although this is not always the case.
- Management by non-specialized entities. The institutions or project units that channel credit components rarely have a specialized technical background in microlending or a commitment to long-term sustainability.
- Significant pressure to commit funds. Credit can make a small project larger and attract clients to the project as a sweetener. It is also relatively easy to create a budget line for a credit component at the end of a fiscal year.

GGAP, Credit Components, Donor Brief No 10, February 2003

12.5 Policy and Institutional Reforms

12.5.1 Description and Rationale

332. As highlighted in the problem analysis of section 11, several cross-cutting issues including land titles, land concessions, deforestation and illegal logging, water resource management, illegal fees, public administration reforms, and institutional weaknesses in research and extension affect the performance of the rice-based farming systems and the core problem of low and unstable value added. Policy and institutional reforms to address these issues are necessary to ensure an enhancing environment for private sector investment and an improved performance of value chains. Reducing illegal fees, for example, would expand trade considerably and reduce the cost of doing business. Curbing illegal logging and reversing the trend towards deforestation would contribute to reduction of soil erosion and conservation of water basins. Water resource management policies could lead to an improvement of the information database about uses of water and effective planning of water resources allocation. A “policy component” in the proposed

program could facilitate the policy dialogue with MAFF and MOWRAM and create a more conducive environment for the success of other interventions proposed in the program.

12.5.2 SWOT Analysis

333. The main strengths of this option consist in:

1. Addressing some of the fundamental reasons for poor performance and under-development of rice-based farming systems

334. The main weaknesses of this option consist in:

1. Being ineffective without a clear commitment to reforms
2. Lacking backing up with any form of conditionality
3. Already existing policy dialogue initiatives conducted by donors with RGC

335. The main opportunities of this option consist in:

1. Establishing a conducive environment for private investment and the basis for sustainable use of natural resources

336. The main threats of this option consist in:

1. Lack of a committed policy counterpart to carry out the policy dialogue and reforms

12.5.3 Expected Costs and Benefits

337. The expected cost of a policy component would be relatively low. However, the real costs would be the “adjustment costs” that the government would have to bear while undertaking a policy reform. Clearly any major policy reform involves huge costs (some of which are political, other economic, other social). Policy programs are often conducted in terms of facilitating the absorption of the “adjustment costs”. The precise evaluation of these costs would require a clear definition of the specific policy reforms to be undertaken. The benefits of the policies are usually large and long-lasting.

12.5.4 Assessment

338. The benefit-cost ratio of successful policy and institutional reforms could be very high. However, the success of policy reforms depends on two critical issues, namely commitment on the part of the government and credibility on the part of the donor. Commitment on the part of the government is required to initiate and implement policy reforms, and credibility on the part of the donor is needed to ensure that failure to meet the conditions of policy reforms will result in withdrawal of funds and support by the overall financial system. Multilateral agencies are in a much more credible position of initiating policy dialogue leading to reforms. Loans rather than grants are more effective tools to accelerating the process of policy and institutional reforms. Even the threat of a withdrawal of a grant of \$30 million will not represent a credible threat to a government. Only if the government starts the process of reforms of its own, then a program funded by a bilateral donor could be instrumental in accelerating the process of policy reforms.

339. Policy dialogue might be a useful step in the direction of policy reforms. However, policy dialogue could not be effective unless a committed counterpart among policy makers is involved. At this stage of program formulation, this is not yet happening. In fact, there already is ongoing policy dialogue in the Technical Working Group for Agriculture and Water (TWGAW), which involves a number of multilateral organizations such as World Bank, IMF, and ADB and bilateral organizations such as AusAID. However, it is not clear to the Consultant's Team the effectiveness of this ongoing policy dialogue in furthering policy reforms.

340. More generally, the formulation of the policy dialogue part of the ACAP is not clear. As already mentioned, some policy dialogue on several of the cross-cutting issue is already occurring between the RGC and a number of multilateral and bilateral organizations including AusAID. While policy dialogue might be useful for the resolution of some of the cross-cutting issues identified in the problem analysis of section 11.5 (such as land titles, infrastructure, illegal fees, deforestation, water resource management at the basin level), it is not clear what mechanisms the new agricultural program of AusAID will avail itself for ensuring that the policy dialogue translates into policy and institutional reforms. Also not yet clear is the commitment or interest of the counterparts (MAFF and MOWRAM) in engaging in this policy dialogue with AusAID. Such policy dialogue necessarily should involve the higher levels of decision makers (Director Generals, Secretaries, and Ministers). Unless a committed counterpart at MAFF or MOWRAM at the policy level is identified and committed to initiate a policy dialogue, the formulation of a policy dialogue component within the program is deemed to be a largely unproductive exercise.

341. Whether a policy dialogue component should be part of the ACAP is a matter that needs to be decided by AusAID and policy counterparts in the RGC. The main recommendation of the Consultant's Team is that the key constraint to be resolved at this stage is the identification by the AusAID mission of a committed counterpart within MAFF to undertake this policy dialogue.

12.6 Infrastructure Development

12.6.1 Description and Rationale

342. A considerable part of the costs of doing business is the low state of infrastructure development of the country, particularly in rural areas. This is primarily related to road infrastructure, lack of rural electrification, scarcity of irrigation systems, and limited marketing infrastructure (such as market places, collection centers, storage facilities).

12.6.2 SWOT Analysis

343. The main strengths of this option consist in:

1. Lowering the costs of doing business and engaging in agricultural production

344. The main weaknesses of this option consist in:

1. High costs of infrastructure investment

2. Need to ensure participation of stakeholders in sharing the costs of investment and maintenance

345. The main opportunities of this option consist in:

1. Facilitating the linkage of farmers to markets
2. Resolving supply chain bottlenecks

346. The main threats of this option consist in:

1. Unwillingness of beneficiaries to share the costs of maintenance

12.6.3 Expected Costs and Benefits

347. The costs of major infrastructure development would probably exceed the total resources available for the program. The expected benefits take a long time to occur.

12.6.4 Assessment

348. Rates of returns for large infrastructure development projects are generally low. Impact would take a long time to materialize. Moreover, infrastructure development is already part of the overall country socioeconomic plans and other programs are already trying to address infrastructure deficiencies. While embarking on major infrastructure development would be probably outside of the scope of an agricultural program and prohibitively expensive, limited infrastructure development could be envisaged to be part of some of the interventions in the program, particularly if there is a clear case of direct relevance to improvement of value chains in rice-based systems and contribution of stakeholders both in the initial investments and in the maintenance of the built infrastructure. The types of infrastructure sub-projects that could be part of the programs are small rural roads, collection centers, storage facilities, pack-houses, and small irrigation systems and reservoirs.

12.7 Value Chain Linkages

12.7.1 Description and Rationale

349. Marketing problems have been indicated by all stakeholders as a major constraint to the development of rice-based farming system. Underlying the “marketing problems” is the lack of effective value chain linkages between farmers and markets. Farmers and entrepreneurs do not establish linkages among themselves thus failing to realize economies of scale that could overcome their limited size and constraints in accessing capital, information, and markets. The fundamental reasons behind the lack of effective value chain linkages are the lack of capacity in establishing linkages and the lack of trust. To overcome these problems a value chain linkages component of the program would strengthen capacity of stakeholder to work with each other to pursue common economic interests.

12.7.2 SWOT Analysis

350. The main strengths of this option consist in:

1. Facilitating the establishment of effective linkage among farmers and between farmers and entrepreneurs

351. The main weaknesses of this option consist in:

1. Limited institutional capacity in facilitating value chain linkages

352. The main opportunities of this option consist in:

1. Facilitating the achievement of higher value
2. The existence of expertise among NGOs and agencies in working with farmer groups and other types of farmer organizations

353. The main threats of this option consist in:

3. The danger that weak governance mechanisms might result in the dominance of some interest groups in the formation of value chains at the detriment of weaker stakeholders in the value chains

12.7.3 Expected Costs and Benefits

354. The major costs in a value chain component consist in technical assistance and capacity strengthening activities. In addition, access to investment funds need to be included in the costs so that stakeholders have the opportunities to test and strengthen the new skills acquired during the capacity building activities. The expected benefits would be in enhanced competitiveness leading to higher value added and income for the beneficiaries.

12.7.4 Assessment

355. Unless a specific effort is made in order to build effective value chain linkages among farmers and entrepreneurs, between farmers and entrepreneurs, and between farmers/entrepreneurs and service providers, the agricultural program will consist mainly of technological interventions which, even if they might be successful in terms of introducing and adopting new technologies, do not necessarily result in higher value added. Value is ultimately what consumers pay for the products. Without a determined effort to meet consumer demand and direct production, processing, and marketing efforts to meet consumer demand, technological innovations will be ineffective. The benefit-cost ratio of a value chain component is expected to be high. However, the main challenge is to establish a suitable institutional arrangement for program implementation that makes possible the mobilization of existing capacities and expertise within line agencies and NGOs, while at the same recognizing that considerable technical assistance will be needed to facilitate the strengthening and utilization of the existing capacities. The next sections of the report present some specific recommendations to ensure that a value chain linkages component could be implemented in the proposed program.

12.8 Summary of Alternative Strategy Options

356. The previous discussion is summarized in the Decision Matrix reported in Table 18. Among the 6 alternative strategy options to address the core problem of low and unstable value added in rice-based farming systems, the two options that are considered more promising for program formulations are the Demand-Driven Technologies option and the Value Chain Linkages option.

Table 18 Summary Decision Matrix of Alternative Strategic Options to the Core Problems of Low and Unstable Value Added

Strategic Option	Feasibility		Impact		
	Institutional	Economic	Farmer Income	Poverty	Benefit/Cost
1. Supply Driven Technology	Line agencies at the provincial level and NGOs could implement this option. MAFF and MOWRAM would be the main line agencies involved, with MRD and MWA possible involvement	Medium Cost, depends on the number of targeted beneficiaries	Medium Effects, mostly realized at the farm level through productivity increases	Medium impact, depending on the actual poverty profiles of beneficiaries who are likely to be mostly poor, lower middle income, and middle income smallholder farmers. The poorest, landless farmers are not likely to be affected.	Medium and mostly related to farmers with little linkages to postproduction stages in the value chain
2. Demand-Driven Technology	Line agencies at the provincial level, NGOs, and Business Service Providers could be the service providers chosen by the beneficiaries (farmers, processors, and traders) implement this option. Various line agencies would be involved including those related to industry and commerce; chamber of commerce and trade association would be also involved.	Medium-Low Cost, depending on the number of targeted beneficiaries. Lower costs of supply-driven interventions since there would be co-sharing of costs by beneficiaries and more control by the stakeholders formulating the proposals. However, there would be additional costs in terms of TA provided to the Commune Councils and Provincial Departments to improve their capacity of evaluating proposals and preparing Marketing Plans.	Medium-high effects realized not only because of improvements in productivity at the farm level, but also because of better response to market demand. Moreover, farmers will benefit from similar improvements in the postharvest systems undertaken by processors and traders (see also analysis in section 15 of the report)	Medium impact, depending on the actual poverty profiles of beneficiaries who are likely to be mostly poor, lower middle income, and middle income smallholder farmers. The poorest, landless farmers are not likely to be affected directly by the interventions, but they benefit from expanded employment opportunities generated by a higher value-added rural economy.	Medium-high and including effects both on farmers and other stakeholders in the value chain (traders, and processors)
3. Credit	Subsidized lines of credit might be of interest to some MFI and Commercial Banks. However, whether these institutions will be actually willing to charge lower interest rates is an issue to be confirmed. The main problem would be in distorting the financial system in Cambodia currently development on sound principles of profitability and sustainability.	Medium, depending on the size of the credit line. The total cost would also involve considerable monitoring and supervision costs to ensure transparency of operations.	Low. Farmers would not change their way of doing business. They will invest in doing what they are already doing. In fact, there might be an over accumulation of debt that farmers might not be able to repay back.	Negative. Subsidized credit would induce credit rationing and favor those households with better connections, usually not the poor.	Low. There are not shortcuts to develop a sound financial system.
4. Policy and Institutional Reforms	Commitments of policy makers and credibility of donors has to occur for reforms to occur. Policy dialogue per se without commitment and credibility is	High. The real costs of the option is in covering the “adjustments costs” of the policy/institutional reform. If the reform is sensitive (like in the case of illegal fees, land tenure, illegal	The impact on farmer income and business income might be very high.	The impacts on poverty are less clear, depending on the specific policy reform.	Potentially High, but heavily dependent on commitment and credibility.

Table 18 Summary Decision Matrix of Alternative Strategic Options to the Core Problems of Low and Unstable Value Added

Strategic Option	Feasibility		Impact		
	Institutional	Economic	Farmer Income	Poverty	Benefit/Cost
	likely to be not effective.	logging, etc) the costs of overcoming interest groups and inertia are quite high.			
5. Infrastructure Development	The main bottleneck in infrastructure development would be the maintenance of the system.	High costs both in terms of initial investment and maintenance, especially since user fees usually do not cover the costs of the systems.	Potentially high, but might take a long time to be implemented.	Neutral impact	Medium but over long periods.
6. Value Chain Linkages	Line agencies at the provincial level, NGOs, and Business Service Providers could be the service providers chosen by the beneficiaries (farmers, processors, and traders) implement this option. Various line agencies would be involved including those related to industry and commerce; chamber of commerce and trade association would be also involved.	Medium-Low Cost, depending on the number of targeted beneficiaries. Lower costs of supply-driven interventions since there would be co-sharing of costs by beneficiaries and more control by the stakeholders formulating the proposals. However, there would be additional costs in terms of TA provided to the Commune Councils and Provincial Departments to improve their capacity of evaluating proposals and preparing Marketing Plans.	High because farmers would be better able to improve their productivity (reduce the costs), increase market share (increase quantity sold to the market), and get higher prices.	Medium impact, depending on the actual poverty profiles of beneficiaries who are likely to be mostly poor, lower middle income, and middle income smallholder farmers. The poorest, landless farmers are not likely to be affected directly by the interventions, but they benefit from expanded employment opportunities generated by a higher value-added rural economy.	Medium-high and including effects both on farmers and other stakeholders in the value chain (traders, and processors)

13 Approach to Program Formulation

13.1 Introduction

357. The fieldwork findings, the problem analysis, and the analysis of alternative strategy options to address the core problem provide the basis upon which to propose the approach for Program Formulation of the AusAID Agricultural Sector Program (ACAP). Several of the ideas presented in this section have already been discussed in the Final Workshop held on 24 March 2006 and have received general support and comments for improvement. The Aide Memoire/Debriefing Note has also discussed these ideas. The Consultant's Team has held discussion with both the AusAID Mission at the Debriefing Meeting of 28 March 2006 and with MAFF during the presentation of 5 April 2006. The comments by the Final Workshop participants, the AusAID Team, MAFF, and the Peer Review have been taken into account in the following sections.

13.2 General Features of the Program

358. The general features of the Program include:

1. **Value-added.** The program will address the core problem of low and unstable value added in rice-based farming systems in Cambodia.
2. **Value chain linkages and technologies.** It will do so by facilitating (i) effective value chain linkages (among farmers, between farmers and markets, between farmers and service providers) and (ii) access and adoption of improved technologies and practices both at the production level (farmers) and at the post-production level (traders and processors)
3. **Demand-driven interventions.** Program interventions will be demand-driven. That is proposed interventions will be (i) responsive to the demand of farmers and entrepreneurs (farmers and entrepreneurs should participate in the costs), and (ii) aimed at improving the capacity to respond to market demand (eg not just increasing production without an understanding of what the market could absorb). This is a practice already adopted by some international NGOs in poverty reduction worldwide and in Cambodia (see Box 15).
4. **Capacity strengthening and demand-driven investments.** The program will facilitate the acquiring of improved farming and business practices through capacity strengthening interventions and demand-driven investments.
5. **Measure of success.** The success of the program is measured by the improved capacity of farmers and entrepreneurs to respond to the market and increase value added of farmers and entrepreneurs in the rice-based farming system²⁹.

²⁹ This will require a well articulated Monitoring and Evaluation system during the design phase. Section 14.6.1 indicates some indicators.

Box 15 The IDE Approach to Poverty Reduction.

In its programs worldwide, the international NGO International Development Enterprise (IDE) helps create market conditions that enable the rural poor to become successful market participants. Concepts and practices usually associated with private business are applied to the problem of poverty as IDE works to:

1. Identify market opportunities that can be exploited by poor people
4. Develop technologies that the poor can use to generate income
5. Establish supply chains to deliver technologies to the poor at affordable prices
6. Conduct promotional campaigns to convince smallholders to invest in income-generating technologies
7. Establish linkages with output markets
8. Ensure that everyone in the market network, especially the smallholder, receives a fair profit

Source: <http://www.ideorg.org/SectionIndex.asp?SectionID=125>

13.3 Guiding Principles

359. The guiding principles for program formulation include:

1. **Focus.** To be successful the program interventions should have focus. Clearly, not all the problems and constraints to farmers and entrepreneurs in rice-based farming system could or should be addressed by the ACAP. Some of the problems affecting value added require macro interventions that are outside of the scope of the program. The formulation should focus on addressing those constraints that, given the resources available and overall policy and institutional environment, are considered more severely binding the realization of higher value added in rice-based farming systems.
2. **Innovations.** The program should promote the adoption of innovations in technology, management, and organization. Increase in value added cannot be attained without farmers and entrepreneurs doing things differently from the past. Innovations must be suitable to the current conditions and development stage of the stakeholders in rice-based farming system (see lesson 10 in section 10.1). To innovate, however, some initial conditions are needed: farmers and entrepreneurs must have a minimum set of skills and assets which are unlikely to be found among the bottom 20 percent of the income distribution³⁰.
3. **Commercial Sustainability.** By learning how to respond to market demand, farmers and entrepreneurs acquire and use farming and business skills that will make them able to increase value added. By doing so, farmers and entrepreneurs improve farming and business practices that will ensure their commercial sustainability.

13.4 Focus

360. To be effective, the program will need to focus on the constraints, the geographical areas, the beneficiaries, and the value chains.

³⁰ This is a comment also made by IDE, an international NGO working in Cambodia, during the Strategy Workshop of 10 March 2006.

1. **Prioritize the constraints.** Prioritization of constraints by the stakeholders was reported in section 8.5. According to that prioritization the key constraints are related to technologies, marketing and quality, water resources and management, and capital. The next step is to take stock of the priorities identified by the stakeholders and clarify what constraints could be and should be addressed by the program and what constraints could not or should not be addressed by the program; see section 13.5.
2. **Selection of Provinces for Farming Systems Interventions.** The program should not try to cover all the rice-based farming systems of Cambodia. Even though value chains cut across provincial, regional, or national boundaries, farming systems are location specific. Backward linkages to the supply of raw materials suggest selecting some of the provinces with higher potential for development of the value chains of rice-based farming systems. It is recommended that the program should not try to cover more than four provinces for conducting activities to enhance farmers' capacity to add value (see section 13.6). In each province the program should target a sufficient number of communes (eg 20 communes) in order to have noticeable impact by program completion. In the initial stages of implementation, the Program should probably focus only on two province and consider later expansion to other provinces, based on assessment of performance and lessons learned.
3. **Selection of Beneficiaries.** Beneficiaries of the program will include farmers and agroentrepreneurs (including processors, millers, traders, and agribusiness enterprises). While farming systems location specificities suggest that the program should target a limited number of provinces to achieve economies of scale, in the case of non-farm stakeholders (processors, traders, business enterprises) their location could be outside of the selected provinces. Value chains cut across boundaries of provinces, regions, and even nations. The most successful rice milling enterprise in Cambodia is based in Kandal but reaches farmers located in several provinces of the country.
 - a. **Farmers.** It is suggested that the program target farmers who have a minimum amount of land assets (see section 9.2). The main focus should be on smallholder farmers who are not at the lower end of the income distribution (the poorest farm households with virtually no land assets). Among the targeted farmers there will be the poor and the lower middle income farm households who typically have less than 2 ha of land. Middle income farm households and non-poor farmers should also be part of the program, but will not represent the bulk of the beneficiaries.

The targeting of farmers in the middle of the income distribution (including those a little below and above the poverty line) is argued on the basis of three considerations. First, extreme poverty in Cambodia rural areas is often associated with isolation and distance from markets, landlessness, very insecure land property rights, and lack of other non-land assets (livestock, equipment, structures, and education). At this end of the income distribution (well below the poverty line), the most binding constraints to increase value added are largely related to macro issues such as land tenure, road infrastructure, education, health, and sanitation for which specific programs and policies are required in the first place before embarking on a program of

adding value and integrating smallholders with markets. Second, the program to be designed will aim to have an impact on the poorest households by creating a demand for labor for these households and therefore provide additional and more stable sources of income and livelihood (see section 9.3. The program however will not be effective in attaining higher value added if it targets farm households who have no land or other assets. Third, in order to ensure benefits of the program to occur to the households at the bottom of the income and wealth distribution, linkages of the ACAP with NGOs and government programs should be promoted. The overall program, according to the TOR (see Appendix A), includes an NGO component that is formulated separately from this present study and it is the understanding of the Consultant's Team that the NGO component will address the concerns of the poorest segments of the farm households.

- b. **Agroentrepreneurs.** The program should provide services and facilitate the adoption of innovations in technologies and value chain linkages of traders, processors, and other agribusiness enterprises (for example input suppliers and exporters). The vast majority of agroentrepreneurs in Cambodia are small. Moreover, they are few. In a province as large as Battambang, for example, the ordinary members of the Chamber of Commerce (mostly consisting of small enterprises) are about 450 of which the largest majority is related to agribusiness activities. While most of the agroentrepreneurs will be small and medium enterprises, a few of them (most notably rice millers) are large in size.
4. **Limited number of value chains.** Unlocking value along the value chain requires acting at different levels (see section 7) and working with different stakeholders in the value chain: farmers, traders, processors, and service providers. Among the value chains in the rice-based farming systems - rice, horticulture, aquaculture, small livestock, maize, soybeans, and mungbeans – some initial choices have to be done. Rice will be the first choice. Vegetables are sufficiently broad-based to be considered for inclusion. Perhaps no more than 4 value chains should be considered. Possible candidates for further examination during the design phase are aquaculture and soybeans. The possible inclusion of livestock will have to be evaluated at a further stage during program implementation (as per instruction of the TOR). In the initial stage of implementation it is recommended that only 2 value chains are considered. After an initial period, a decision to expand to additional value chains will be taken based on evaluation of performance and lessons learned.

13.5 Prioritizing the Constraints to be addressed by the Program

361. The constraints analysis in section 8 and the problem analysis in section 11 have highlighted several constraints that limit the realization of higher value added. In order to focus the program, it may be useful to categorize constraints in four groups: (i) constraints that the program cannot address, except at a general level of policy dialogue; (ii) constraints that the program should not address; (iii) constraints that the program could address; and (iv) constraints that the program should address; see Figure 14.

Constraints the Agricultural Program ...

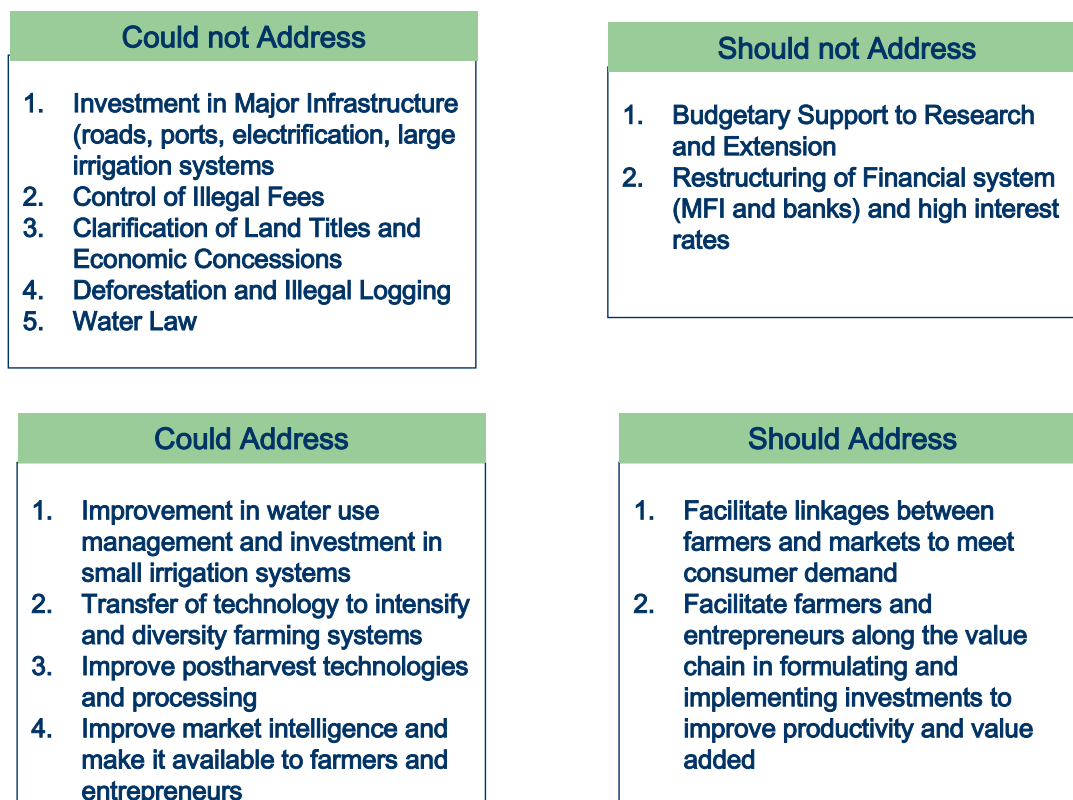


Figure 14 Clarifying the Constraints to be Addressed by the Program

13.5.1 Constraints the Program could not address (except at a general level of policy dialogue)

362. An indicative list of constraints that the program could not address includes:

1. Investment in Major Infrastructure (roads, ports, electrification, large irrigation systems)
2. Control of Illegal Fees
3. Clarification of Land Titles and Economic Concessions
4. Deforestation and illegal logging
5. Water Law

363. The reasons why these constraints could not be addressed by the program are:

1. Limited resources;
2. They require major policy reforms and institutional building; and
3. They require a committed policy counterpart.

364. The RGC and several donors are already aware of these issues and are engaged in policy dialogue to find solutions to these problems. If a policy dialogue component of the program is suggested for inclusion during the program design, then it is important to

identify a committed policy counterparts within MAFF and MOWRAM (see discussion of Strategic Options in section 12.5)

13.5.2 Constraints the Program should not address

365. An indicative list of constraints that the program should not address includes:

1. Budgetary Support to Research and Extension; and
2. Restructuring of Financial system (MFI and banks) and high interest rates

366. The reasons why these constraints should not be addressed by the proposed program are:

1. The major institutions of research and extension are CARDI and the Department of Extension. Both institutions have received support from AusAID over the past 10 years. The understanding of this past support was that over time the RGC would increase its contribution to the budget of these organizations. The current situation is however that the two organizations are still “project-funded” by CARDI-AP and CAAEP-II. Once the two projects end, it is not clear how the two institutions will be able to carry out their activities unless expansion of budgetary support by RGC is provided. To try to address this issue in the proposed program would imply that a substantial part of the resources of the program would have to be devoted to CARDI and Department of Extension. Moreover, it is doubtful that the sustainability of CARDI or Department of Extension activities could be assured by a project fund without further commitment by the RGC.
2. The fact that proposed program should not focus on addressing budgetary support of CARDI or Department of Extension does not imply that the program will not make investments in research or extension activities. Demand-driven investments by the farm communities and entrepreneurs will most certainly involve technology dissemination that requires experts and specific activities by research and extension organizations. The farmers and the entrepreneurs will be in the position of asking for those services that are directly relevant to their constraints to increase value added. The service providers from the research and extension organizations (either private or public) will then be “hired” by farmers and entrepreneurs to deliver those services. This will ensure direct relevance of the research and extension efforts to the needs of the farmers and entrepreneurs and accountability of service providers to their clients (the farmers and the entrepreneurs in the value chain).
3. High interest rates for smallholder farmers and small enterprises (about 3 percent per month) are often prohibitively high to engage in productive or marketing activities. The result is often that farmers and enterprises finance both their investment and working capital requirements by their own funds. Lowering interest rates requires lowering the cost of capital to the institutions (a macroeconomic issue) and lowering the costs of administration and delivery of funds to the clients (a microeconomic issue). Lowering the costs of administration and delivery of funds to the communities requires institutional strengthening, infrastructural improvements, and development of economies of scale. These are complex issues that require complex programs beyond the scope of the proposed program. Trying to introduce a “credit component” in the proposed program and deliver credit at low interest

rates will basically crowd out efforts of MFI and banking system to introduce a market system in the financial sector (see more discussion in section 12.4).

4. The fact that the proposed program should not try to lower interest rates does not imply that the program will completely ignore the capital constraint of farmers and entrepreneurs. Capital investment will be needed to fund small irrigation schemes, formation of marketing groups, technology dissemination, and improved postharvest facilities, among other things. In order to address this capital constraint, investment funds will be made available through a matching grant scheme (see section 16.8).

13.5.3 Constraints the Program could address

367. Examples of constraints the program could address:

1. Improvement in water use management and investment in small irrigation systems
2. Transfer of technology to intensify and diversity farming systems
3. Improve postharvest technologies and processing
4. Improve market intelligence and make it available to farmers in the communities and entrepreneurs

368. The reasons why these constraints could be addressed by the program are:

1. They are feasible within the resources available for the program
2. They are consistent with past interventions in technology dissemination
3. There is already a body of expertise among research and extension providers in the public, NGO, and private sector that could be utilized during program implementation.

13.5.4 Constraints the Program should address

369. Examples of constraints the program should address:

1. Facilitate linkages between farmers and markets to meet consumer demand
2. Facilitate farmers and entrepreneurs along the value chain in formulating and implementing investments to improve productivity and value added

370. The reason why these constraints should be addressed in the proposed program is that unless value chain linkages are established among stakeholders (farmers, processors, traders, and service providers), the achievement of higher value in rice-based system will be retarded considerably. The formulation of a program that is only focused on technology dissemination does not promise to meet the challenges that stakeholders in Cambodia are facing in the presence of an open economy, exposed to both the opportunities and threats of international markets and the recent accession to WTO. To meet these challenges implies to increase competitiveness through improved capacity to access the markets, lower costs of production and costs of doing business, and increase value and market shares.

371. The issue is not whether the program should address these constraints. The key issue is whether the program could address these constraints. Program formulation and design consist exactly in answering this question of how the program could address the fundamental constraints discussed in this section.

13.6 Selection of Provinces for Farming System Interventions

372. As already noted (see 13.4), the value chain concept transcends administrative boundaries like provinces and districts. Production areas suitable for the procurement of raw material could be cutting across provinces and districts. Moreover, production areas are not necessarily the areas where the entrepreneurs in the post-production stages of the value chain are located. In fact, traders, processors, input supplies, and exporters might be operating across provinces, regions, and nations.

373. Nevertheless, as agricultural production is location-specific and several interventions of the program involve activities with farm communities, there are arguments for selecting provinces where a large production basis is located, have already surplus production of rice, and are more likely to embark on a development of value chains with large impacts on value added and income of stakeholders. Moreover, the additional advantage of selecting a few provinces as units for program interventions related to farmers is that existing government structures (ie the provincial departments of agriculture, water resources, etc.) could be involved in program activities. Finally, coordination between the ACAP and other programs of the RGC and donors could be more easily achieved at the local level if provincial departments of line agencies are involved.

374. Regarding the number of provinces, it would be advisable to select a small number of provinces, not exceeding 4 to ensure that sufficient resources are devoted to obtain the desired impacts. One of the frequently heard complaints of service providers and value chain stakeholders is the scarcity of funds to conduct adequate extension activities and effective investments. Increasing the number of provinces would most likely result in a loss of focus and critical mass of human and financial resources needed to carry out the program effectively.

13.6.1 Process of Selection

375. Assuming that no more than 4 provinces will be selected, it is necessary to clearly indicate the criteria and the process of selection. Criteria of selection of provinces where the program would be working with farm communities include:

1. Potential for value chain development
2. Impact on farmer income and poverty reduction
3. Coordination with other existing programs

376. From the point of view of value chain development, it is important to consider those provinces where the potential for unlocking value from rice-based farming systems is the highest. At the same time, the overall purpose of increasing income and livelihood of the rural poor should be one main consideration in the recommendation of the selection of provinces for interventions.

377. Value Chain development includes different dimensions including:

1. Large production basis
2. Large marketable surplus

3. Relatively developed value chains (seed, inputs, milling, traders)
4. Relatively good linkages with interior and exterior markets

378. On the basis of these dimensions several provinces are excluded, either because their production basis is too small or because their infrastructure development and location is less suitable for the development of rice-based value chains. Table 19 shows the process and the data used to narrow down the number of provinces suitable for selection.

379. Based on this process of selection, 6 provinces who could be good candidates for the development of value chains in rice-based farming systems have been identified, namely:

1. Battambang
2. Kampot
3. Prey Veng
4. Siem Riep
5. Svay Rieng
6. Takeo

380. Out of these 6 candidates, 2 provinces (Battambang and Siem Riep) are in the Tonle Sap region and the remaining 4 provinces (Kampot, Prey Veng, Svay Rieng, and Takeo) are in the Plains region.

381. One important point to note is that in all the identified 6 provinces, there is a large number of the poor among the rural population. The number of the poor (with income less than \$1/day) according to the World Bank (Table 19) in the 6 provinces is:

1. Battambang - 160,492
2. Kampot - 193,643
3. Prey Veng - 321,226
4. Siem Riep - 201,668
5. Svay Rieng - 209,962
6. Takeo - 196,185

382. As a second step narrowing further the number of provinces, one could argue that it makes sense to consider 2 provinces in the Tonle Sap Region and 2 provinces in the Plains Region to take into account differences in agroecological and market conditions. Since there are 4 candidates for the Plains Region, we need further criteria to exclude 2 of the 4 provinces identified in the Plains Region.

383. Consultations with stakeholders indicate that Takeo is already the focus of various activities centered on rice-farming systems. It would therefore make sense to exclude this province on the basis of the argument that the ACAP could make a larger impact on a province where there is a lower number of other ongoing programs. Finally, one could look at the number of the poor: both Svay Rieng and Prey Veng have a higher number of poor households than Kampot, suggesting that Kampot could be also excluded based on this criterion.

384. Following this process, 4 provinces are left for selection, namely:

1. Battambang
2. Prey Veng

3. Svay Rieng
4. Siem Reap

385. The main dimensions that have been taken into account in the selection are:

1. Value chain development for rice-based farming systems,
2. Differences in agroecological areas
3. Number of the poor
4. Existence of other programs

386. The common feature of the four provinces is a relatively (with respect to the rest of Cambodia) large production base for rice-based farming systems. The provinces include Prey Veng and Battambang who produce the highest amount of rice in the country. At the same time, a province such as Siem Riep with a relatively lower production base produces sufficient rice to generate a considerable surplus (about 60,000 tonnes) of rice. The four provinces are either well connected to major transportation routes or located close to major urban centers (Phnom Penh), tourist centers (Siem Riep), or close to the border with Thailand and Viet Nam. This suggests considerable scope for un-locking value in the chains to target domestic consumers in major urban centers and foreign demand in neighboring countries. In the four provinces the farming systems are characterized by smallholder farmers and include a large number of the poor.

387. Notwithstanding these common features, there are also enormous differences in level of development of the value chains (more developed in Battambang and Prey Veng and less developed in Siem Riep and Svay Rieng), poverty indices, productivity, agroecological conditions, and level of commercialization. These differences indicate the need for a flexible approach in program implementation.

388. It is necessary to note that the final choice of the provinces for program implementation of the proposed farming systems interventions will be a matter to be decided by AusAID in consultation with MAFF and the RGC.

Table 19 Process of Selection of Provinces for Field Work.

	Yield Wet (tonnes/ha)	Production Wet (tonne)	Yield Dry (tonnes/ha)	Production Dry (tonne)	HDI	Food Surplus (tonne)	Main Reasons for Exclusion	Main Reasons for Inclusion
Banteay Meanchey	1.746	321,293	3.431	1,870	0.409	29240	Poor Infrastructure	
Battambang	2.166	440,997	3.154	5,362	0.456	30922		Large Rice Production, Important Link to Thailand, Commercial Milling
Kampong Cham	2.31	352,411	3.07	132,140	0.475	-10074	Rice Deficit, Largely Diversified	
Kampong Chhnang	1.564	144,250	2.6	42,086	0.453	42623	Limited Rice Production	
Kompong Speu	1.92	179,318	2.501	1,836	0.456	-13954	Limited Rice Production, Rice Deficit	
Kompong Thom	1.337	156,842	2.554	12,170	0.336	1842	Limited Rice Production and rice surplus	
Kampot	2.305	281,841	2.444	4,125	0.448	68670		Large Rice Surplus
Kandal	2.66	108,565	3.837	195,811	0.496	-44936	Rice Deficit	
Koh Kong	1.58	12,527	-	-	0.374	-18229	Limited Rice Production	
Kratie	2.754	65,539	3.2	29,795	0.506	-18563	Limited Rice Production	
Mondul Kiri	1.942	19,260	-	-	0.216	617	Limited Rice Production	
Phnom Penh	2.685	18,910	3	2,661	0.936	162762	Limited Rice Production, Mostly Urban, High HDI	
Preah Vihear	1.928	40,906	-	-		-6710	Limited Rice Production	
Prey Veng	1.978	449,227	3.179	190,225	0.419	95873		Large Rice Production, Important Link to Viet Nam, Seed Company, Commercial Milling
Pursat	1.883	132,521	2.44	3,157	0.401	22017	Limited Rice Production	
Rattanakiri	2.115	47,052	-	-	0.375	-2038	Limited Rice Production	
Seam Reap	1.35	232,289	2.135	24,506	0.325	59810		Large surplus, Low HDI
Sihanouk Ville	2.667	28,376	-	-	0.659	-18218	Limited Rice Production	
Steung Treng	2.042	33,950	-	-	0.371	1176	Limited Rice Production	
Svay Rieng	1.742	279,406	2.91	34,930	0.429	59676		Large surplus, dry rice, important link to Viet Nam, seed company
Takeo	2.462	424,431	3.179	192,326	0.432	121876		Large surplus, seed company
Otdor Meanchey	1.663	59,382	-	-	na	31592	Limited Rice Production, poor infrastructure	
Kep	2.545	7,390	-	-	na	na	Limited Rice Production	

Source: Data based on (ACI 2002; ACI 2005)

14 Proposed Components of the Agricultural Program

14.1 Program Framework

389. The Program will contribute to the **development goal** of ensuring food security for all people, increase income and improve livelihood for rural poor farmers by improving agricultural productivity and diversification of agriculture in Cambodia. The **purpose** of the Program is to generate higher value added in rice-based farming systems resulting in higher income of farmers, workers, and entrepreneurs, particularly the poor among them. In order to achieve its purpose, the Program will be organized into interrelated **components** and **subcomponents**:

3. Value Chain Development Component (VCDC). This component will improve value added through the implementation of sub-projects based on demand-driven proposals related to upgrading of technologies, value chain linkages, and irrigation and marketing infrastructure. Its subcomponents include: (1.1) Technologies; (1.2) Marketing and Value Chain Linkages; (1.3) Water Management and Irrigation Infrastructure; and (1.4) Marketing Infrastructure.
4. Policy, Capacity, and Management (PCMC). This component will contribute to the improvement of the policy environment and stakeholders' capacity through policy dialogue, capacity building, and coordination in the implementation of the Program. Its subcomponents will be (2.1) Policy Dialogue and Coordination; (2.2) Capacity Building and Awareness; and (2.3) Program Management.

390. The relations between components, subcomponents, goals, purpose, and outputs are illustrated in Figure 15,

391. Figure 16, and

392. Figure 17.

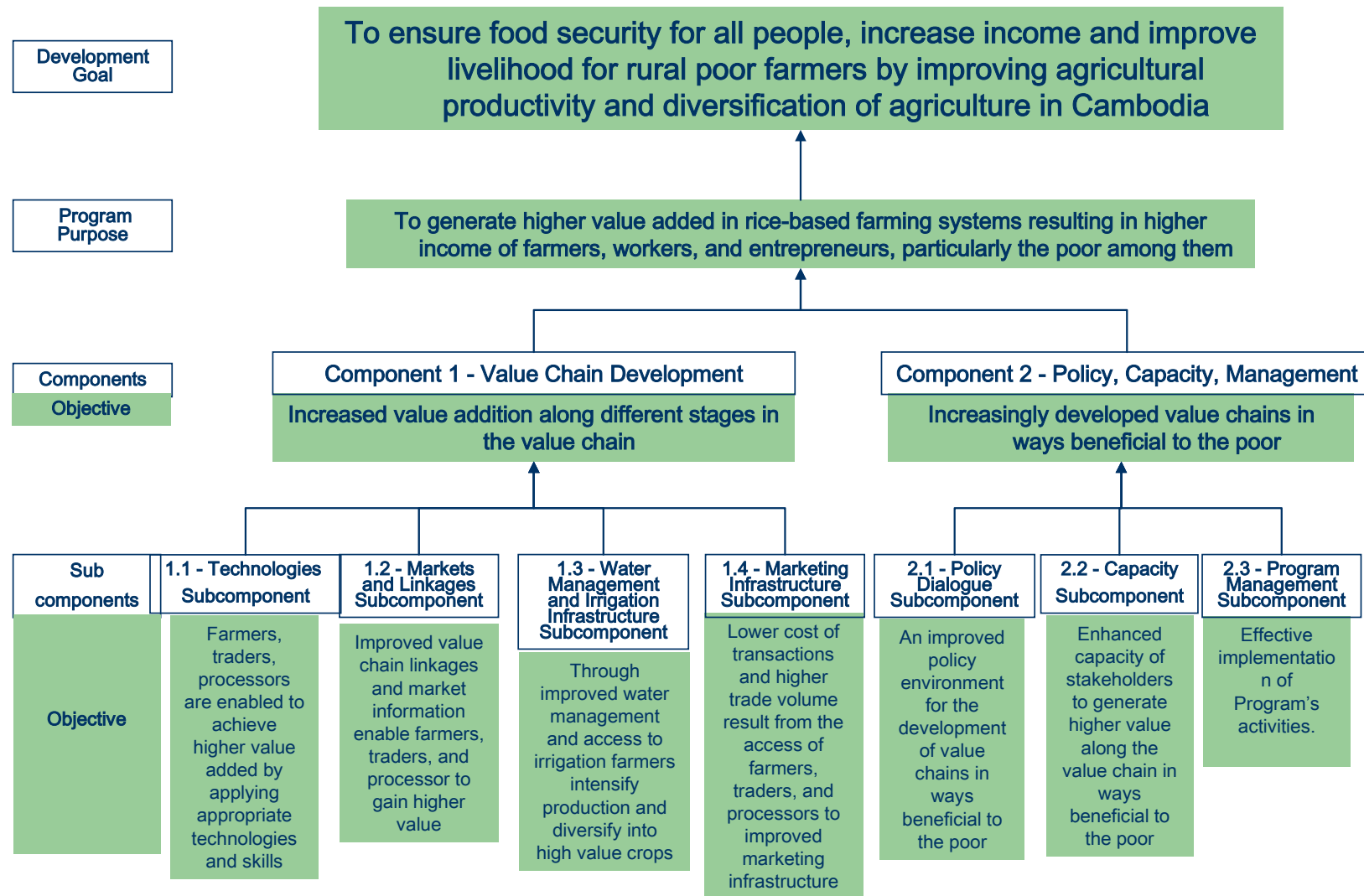


Figure 15 Program Framework

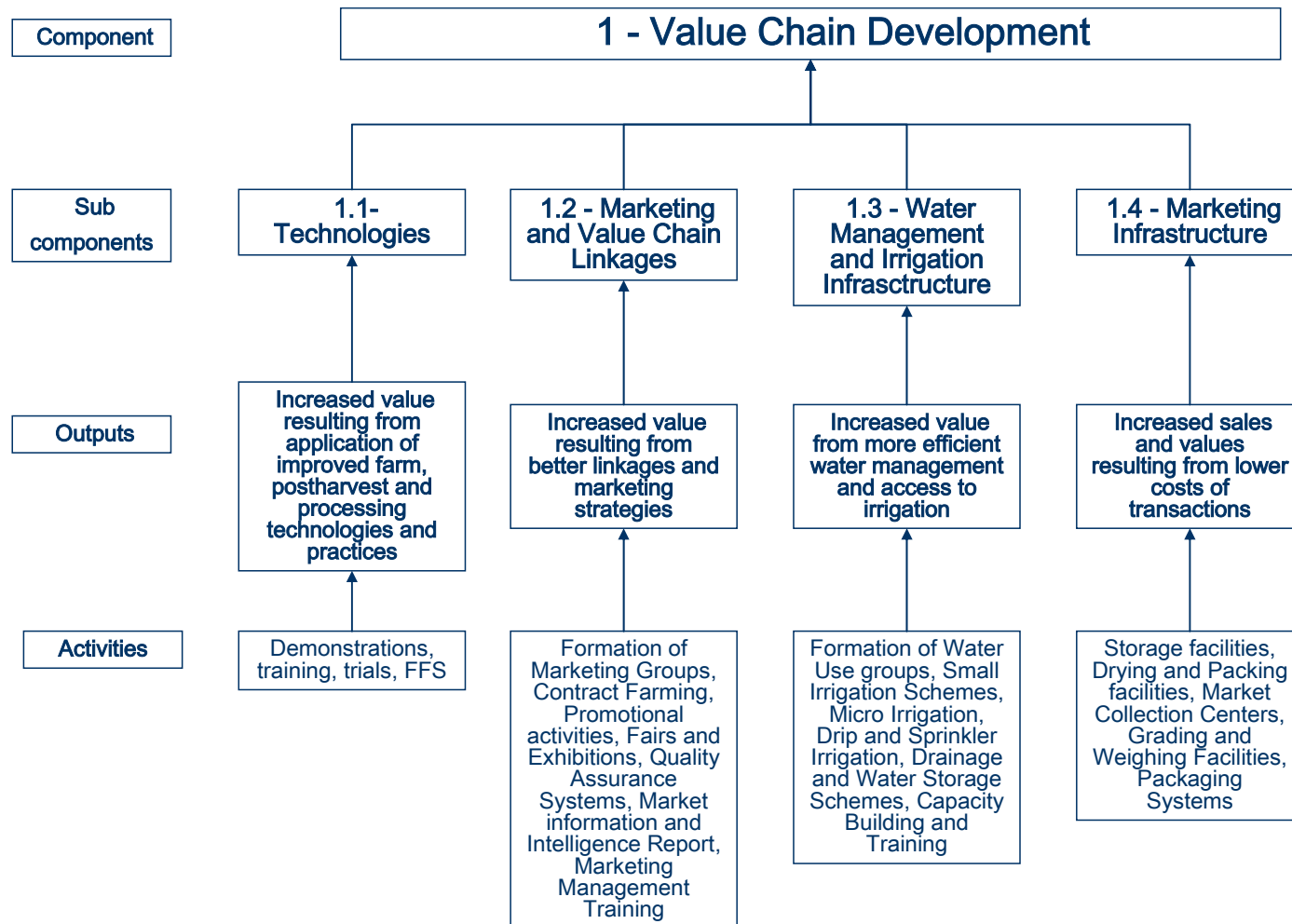


Figure 16 Component 1 - Value Chain Development Component

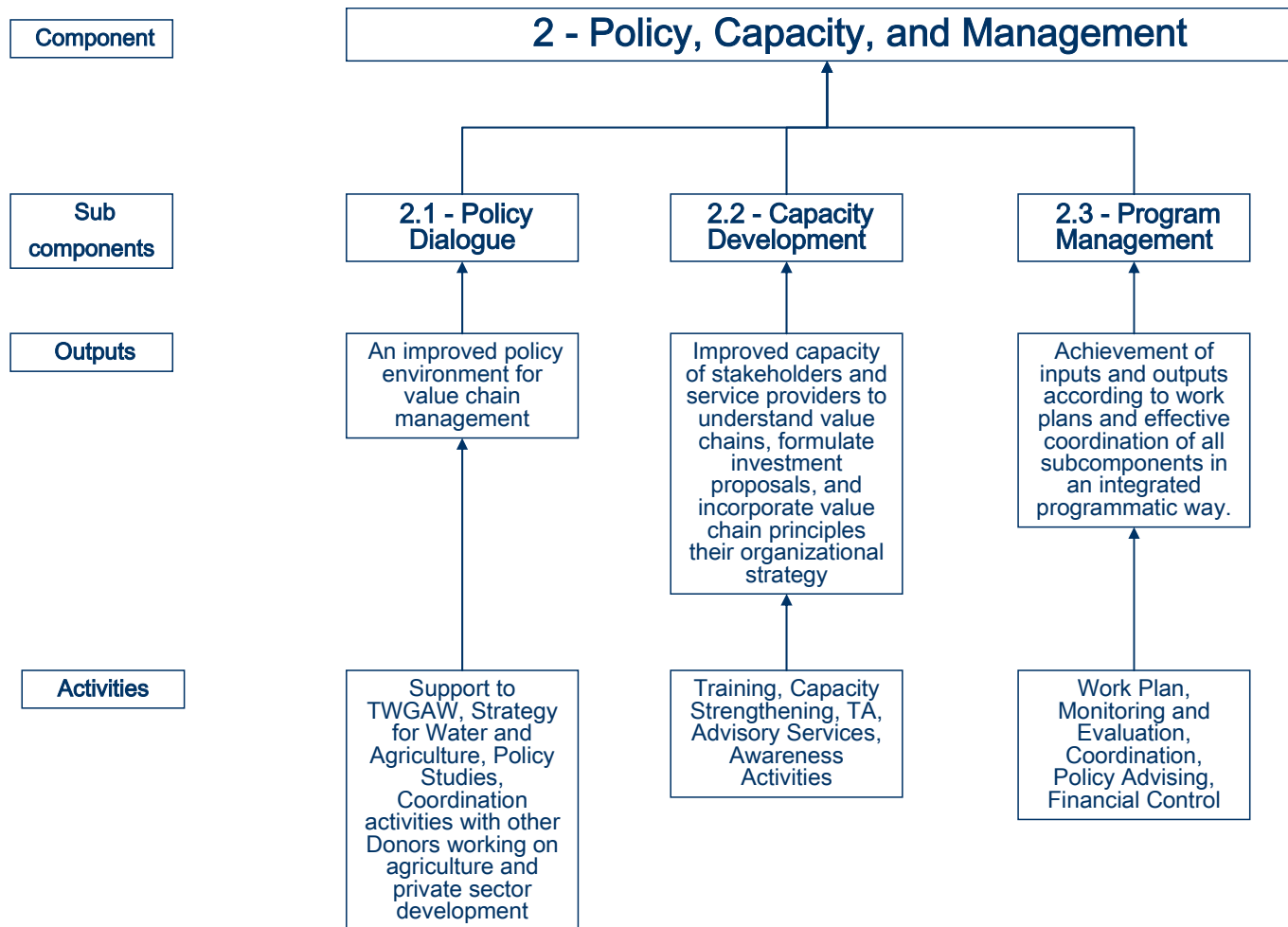


Figure 17 Component 2 - Policy, Capacity, and Management

14.2A Fully Integrated Value Chain Program

393. The selected subcomponents will enable a **fully integrated value chain** Program. Just as linkages and governance along the value chain are a vital aspect of the program intervention, linkages between the subcomponents are a vital aspect of program management. Having the individual interventions (Technologies; Marketing and Value Chain Linkages; Water Management and Irrigation Infrastructure; and Marketing Infrastructure) as separate components of the Program runs the **significant risk of duplication** of project management, separate lines of decision making and investment approval, and a lack of a coordinated approach to value chain development.

14.3 The Value Chain Development Component (VCDC)

394. The aim of this component is to upgrade value chains through the implementation of demand-driven investment proposals related to technology, marketing, and infrastructure. The proposal will involve both hard investments (e.g. small scale irrigation schemes, storage facilities, grading and drying facilities, collection centers) and soft investment (e.g. capacity building, training, advisory services, studies, processes, protocols).

395. The rationale of this component is the need of overcoming the constraints faced by smallholder farmers and entrepreneurs in gaining access to appropriate technologies, markets, and infrastructure that contribute to increase and stabilize value added in the value chain and generate higher income for farmers, workers, and entrepreneurs.

396. This component entails the following 4 **fully interlinked subcomponents**.

Sub-Component 1.1: Strengthening and Upgrading Value Chain Technologies

397. This subcomponent will address the requirements of farmers and non-farm entrepreneurs in the selected value chains for value adding technologies and practices. In the case of farmers, these technologies include those related to production (e.g. crop husbandry, soil and land management, plant nutrient management, water management, pest and disease management), on-farm processing and postharvest operations. In the case of traders and processors, the technologies include those related to postharvest operations (storage, handling, grading, processing, packaging) and quality assurance systems. Farmers, traders, and processors will submit proposals to improve productivity, quality, and value consistent with market opportunities and the development of value chain linkages.

Sub-Component 1.2; Strengthening and Upgrading Marketing and Value Chain Linkages

398. This subcomponent will address some of the key marketing issues faced by farmers and entrepreneurs through the provision of information, technical services, and capacity building aimed at strengthening value chain linkages. Proposals submitted by farmers and entrepreneurs will relate to investments in market information and intelligence, feasibility studies, organization of marketing groups, contract farming, branding, quality assurance systems, promotions, and exhibitions.

Sub-Component 1.3: Strengthening and Upgrading Water Management and Irrigation Infrastructure

399. This subcomponent addresses the lack of water control and supplementary irrigation in most of Cambodia agriculture. The subcomponent recognizes that the issue is not only lack of infrastructure but also weak capacity in water management and water use organizations. Rather than being mainly a technical issue, effective water management and irrigation requires effective linkages among farmers and service providers and the understanding of marketing issues that will ensue once the expected gains in production are realized. The subcomponent will focus on the development and rehabilitation of small irrigation scheme, micro irrigation, and other types of water management and control measures as well as support to water user organizations.

Sub-Component 1.4: Strengthening and Upgrading Marketing Infrastructure

400. This subcomponent addresses the lack of marketing infrastructure to facilitate linkages between farmers and markets. Examples include storage, drying, grading, and packaging facilities; collection and distribution centers; and market places. The guiding principle of these investments will be that they facilitate the linkage among a large number of stakeholders (farmers, traders, and processors) and therefore promote the emergence of economies of scales in marketing and processing.

14.3.1 Target Groups

401. The Program will work with farmers and agroentrepreneurs. Most of the target farmers will be smallholder households with less than 2 ha of land. Agroentrepreneurs will include traders, processors, millers, and agribusiness enterprises related to the selected value chains. Most of the target agroentrepreneurs will be SMEs. While the majority of the target farmers will be located in the selected provinces for Program interventions, the agroentrepreneurs targeted by the Program might be located elsewhere in Cambodia, provided that the related interventions impact value chain activities in the selected provinces.

14.3.2 Service Providers and Demand-driven Investments

402. The common thread of these subcomponents is that farmers and entrepreneurs formulate investment proposals of their choice. Rather than imposing specific technologies, extension approaches, and organization structures upon stakeholders, the Program give the opportunity to farmers and entrepreneurs to choose and cofinance the investments they believe will increase their capacity to innovate, add value, and meet market demand profitably.

403. In order to implement these investments, stakeholders will utilize service providers. Stakeholders will be allowed to choose the service providers of their choice. The Program will provide capacity building, advisory services, and technical assistance that help stakeholders to identify the most appropriate service providers able to meet the needs of the investment proposals within the budget available. The Program will help stakeholders to link with the service providers from the public sector (e.g. research and extension services available at CARDI, Provincial Departments of Agriculture or Water Resources, central Department at MAFF or MOWRAM, SME unit of MIME, etc), private sector (consulting firms and business development providers), and NGOs. If the services required by the stakeholders are not available within the country, the Program will assist in identifying suitable providers from other countries in the region (e.g. seed suppliers from Vietnam, cross-border traders from Thailand).

404. The Program will also undertake capacity building of service providers (see subcomponent 2.2) to facilitate the development of linkages in the value chain. While these capacity building activities might involve organizations with a national coverage, their expected impact is on the Program's selected provinces and value chains.

405. In order to strengthen linkages throughout the value chain, service providers will be encouraged to work together with farmers and entrepreneurs during the submission of investment proposals.

14.3.3 Coordination with Other Projects and Initiatives

406. In order to avoid duplication of efforts and maximize synergies, it is important for the Program's **activities to be coordinated effectively with other donors** or Government's projects and programs in the selected provinces or in the country. This is essential given that the specific investments which are formulated by the stakeholders are not known in advance, as necessarily is the case in a demand-driven approach.

407. The coordination in the various subcomponents is the overall responsibility of the management of the Program. At the same, the Program supports the formulation of Commune Marketing Plans by Commune Councils and pre-screening by the Program Provincial Committee (see next section). These mechanisms ensure that the plans of individuals, farmer groups, entrepreneurs, and communities are coordinated at the level of each Commune or Province with other Government and donor programs in the same areas.

14.4 The Policy, Capacity, and Management Component (PCMC)

408. The aim of this component is to facilitate the emergence of an enabling policy environment for the development of value chain, build capacity of stakeholders in the understanding of value chain management principles and practices, and ensure a smooth management of the Program in an integrated fashion and in coordination with other agencies at the central and local level. The component consists of three subcomponents.

Sub-Component 2.1: Policy Dialogue and Coordination

409. This subcomponent will promote policy dialogue about the cross-cutting policy issues that constrain the achievement of higher and less variable value added in rice-based farming systems. The cross-cutting issues include but are not limited to land titles, land concessions, deforestation and illegal logging, water resource management, illegal fees, public administration reform, institutional weakness in research and extension, and lack of budgetary support to agriculture. The subcomponent will **ensure that the current effort of AusAID and other donors** in promoting policy and institutional reforms **will continue in a coordinated manner and AusAID will maintain visibility** in the policy debate on agriculture in Cambodia. The policy dialogue and coordination subcomponent will include the following activities:

- a. Support to TWGAW (the Technical Working Group for Agriculture and Water) in order to develop a national Strategic Framework for the Agriculture and Water Sector.
- b. Policy Studies to advance the dialogue on value chain development and policy and institutional reforms in Cambodia agriculture.
- c. Policy advocacy including periodic workshops and discussions on cross-cutting policy issues of interest to MAFF, MOWRAN, and AusAID to facilitate the successful implementation of ACAP.

- d. Donor Coordination activities to improve effectiveness of ACAP and maintain high visibility of AusAID in the sector. The Program will continue and strengthen ongoing coordination of AusAID with ADB and AFD on issues related to water management and irrigation (see subcomponent 1.3); with GTZ and MPDF on issues related to private sector development and SME in agriculture; with EU on agribusiness; and expand new areas with other donors.
- e. Coordination between the Program's activities described in this document and another part of the Agricultural Sector Program of AusAID involving NGOs (ADRA and CARE).

Sub-Component 2.2: Capacity Development and Awareness

410. This subcomponent will ***strengthen the capacity*** of farmers, entrepreneurs, service providers, and local organizations for understanding and incorporating ***value chain management principles*** into the strategies and operations of their organizations. The service providers include public and private providers of extension and research services, NGOs, farm and business development service providers, and finance providers. Local organizations include farm and trade associations, commune councils and provincial coordination committees. By improving capacity, stakeholders will be in a better position of formulating investments and coordinating actions and plans that lead to higher value added and income. The subcomponent include the following activities:

- a. Capacity strengthening for farmers, traders, and processors to improve the understanding of value chains principles and the capacity for planning investments and establishing value chain networks.
- b. Capacity strengthening for associations to improve capacity of providing effective services to their members and establishing transparent governance rules, strengthen the management of the association, improve horizontal linkages among members, and improve vertical linkages with other stakeholders.
- c. Capacity strengthening for service providers to improve the understanding of value chain principles and learn how to incorporate these principles into the strategies of their organizations to improve coordination with the Program.
- d. Capacity strengthening of Commune Councils and Provincial Coordination Committees to improve the formulating of marketing plans and the screening and selection of investment proposals.
- e. Awareness Creation to ensure that the Program's activities and plans are broadly disseminated and value chain development issues become part of the provincial and national debate.

Sub-Component 2.3: Program Management

411. This subcomponent will ensure smooth implementation of the Program. The Program Management will include the **Program Management Unit (PMU)** at the central level and the **Provincial Coordination Units (PCUs)** at the provincial level. The PMU will report to a **Steering Committee** headed by MAFF and include representatives of key ministries, private sector, and AusAID. A **Program Monitoring and Evaluation Unit (PMEU)** independent of the PMU will also report to the Steering Committee. The PCUs will report to the PMU and will coordinate Programs' activities at the province level with the **Program Provincial Committees (PPC)** and the **Commune Councils**. The PPC will include the representatives of the key line agencies and private sector organizations in each province. The Commune Councils with the technical assistance of the Program will formulate **Commune Marketing Plans**. The institutional framework of the Program is illustrated in Figure 18.

412. The **Commune Marketing Plans** will combine the investment proposals presented by farmers, farmer groups and enterprises at the village and commune level into a single demand that will take into account of other activities ongoing in the commune. The Commune Marketing Plan will be **formulated by the Commune Councils** with the **assistance of the Program**. The Plan will leverage the institutional process under SEILA and under CAAEP. The Commune Marketing Plans and other investment proposals originating by entrepreneurs outside of the Program-selected communes will then be submitted to the PPC for screening and initial selection. The PMU will be responsible for the final selection and approval. The PPC will differ from the Provincial Rural Development Committee (PRDC) in terms of composition (much smaller) and functions (limited to screening and initial selection of investment proposal). While the PPC will be consistent with the decentralization process under SEILA, their smaller composition and focused function will **ensure rapid decisions**.

413. It is recommended that PMU reports directly to the Steering Committee; that the Director of the PMU be recruited by the Steering Committee through competitive process; and that the Director of the PMU have a proven record of program management and expertise in value chain development. The institutional location of the PMU will have to be further discussed during design. At this stage, the recommendation is for the **PMU not to be located under any specific ministerial department**. The cross-sector nature of agricultural value chains implies the need of involving not just the traditional agencies responsible for agricultural development (i.e. MAFF and MOWRAM), but also agencies related to rural development, industry, commerce, and women affairs (e.g.. MRD, MOI, MOC, MWA), and private sector organizations (e.g. Chambers of Commerce and Trade Association).

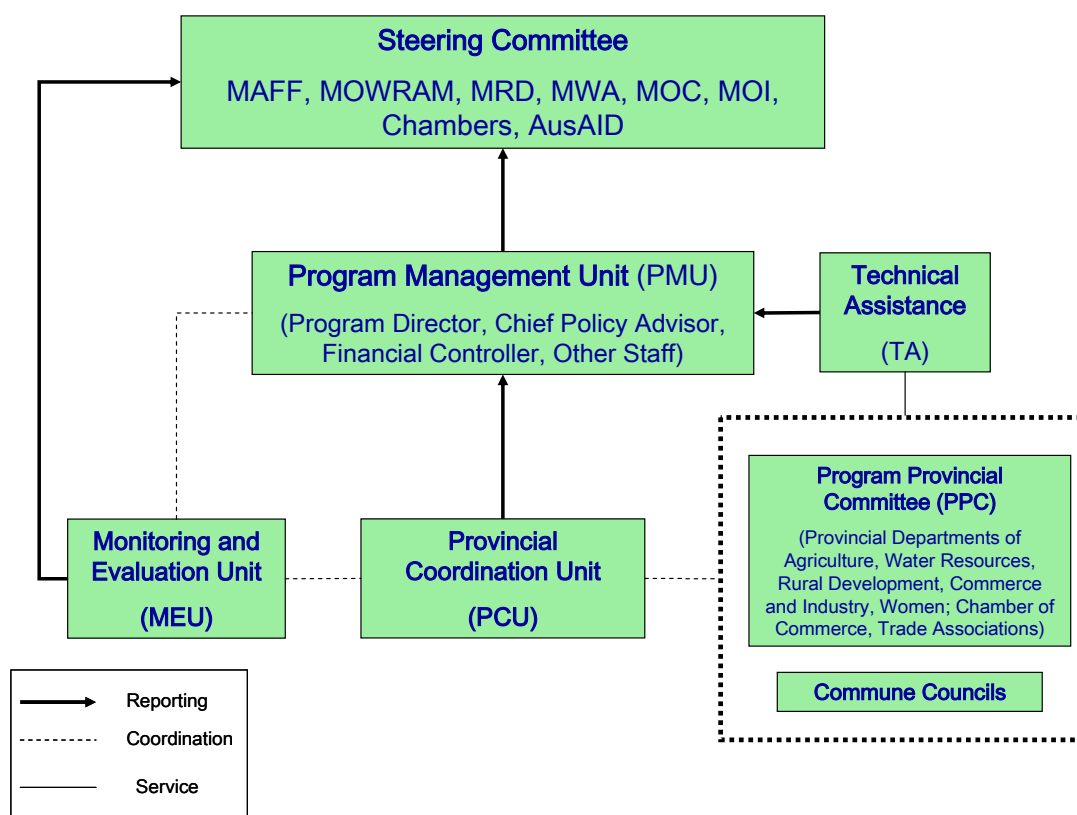


Figure 18 Program Institutional Structure

14.5 Common Thread

414. The common thread of the proposed components is that farmers and entrepreneurs formulate investment proposals that lead to higher income while meeting market demand. Rather than imposing specific technologies, extension approaches, and organizational structures, farmers and enterprises choose and cofinance the investments they believe will increase their capacity to innovate, add value, and meet market demand. In order for this approach to be effective, capacity strengthening of local organizations and stakeholders will be required. At the same time, investments will be funded through a matching grant scheme.

415. The program aims at increasing productivity and income of farmers, traders, and processors by strengthening value chain linkages and increasing value added at the farm and at the post-production levels. Different stakeholders in the marketing chain are targeted so that overall value added could be increased.

14.6 Inputs, Outputs, Activities, and Indicators

416. Technical assistance will be provided in both the investment proposal stage as well as during implementation stage. During the investment proposal stage the Program Management Unit (PMU) will provide essentially business development services; giving technical assistance, advice and proposal preparation services to communes to develop their Commune Marketing Plan and selected agroenterprises who seek their assistance in proposal preparation. Screening and selection of investment proposals will be assisted by the PMU, but actually carried out by the selection committees at the provincial level. During the implementation phase the PMU will provide technical assistance, training and capacity building services according to the proposal's plan of action. The PMU will assist in obtaining outside technical consultancies as needed for each investment proposal, and assist the activities of the Monitoring and Evaluation Unit (MEU).

417. The activities will fall into four categories; matching grant scheme, training, investment, and technical assistance. Some of these activities will be carried out by the PMU, and other activities will be carried out by contracted facilitating organizations or the enterprises/farmer groups themselves. The specific activities will depend on the actual proposals submitted and the Components that they fall under.

418. Under each proposal there are several indicative examples of likely training, investment and technical assistance measures:

1. Technology, for example the development and testing of new packaging material from locally available materials, or the provision of expertise to upgrade processing practices and processed-product quality for agricultural and livestock products (e.g. rice, poultry, horticulture);
2. Infrastructure, for example the specification and construction of a produce collection and grading/packing center for horticultural farmers;
3. Marketing and Information, for example advisory and design services assisting the establishment of a brand for a particular niche agricultural product; and
4. Capacity and Training, for example advisory and training services to strengthen the capacity of a group to meet grading standards for selling produce and to arrange services testing such standards (e.g. rice, poultry and horticulture).

419. The outputs of the proposals will be several or all of the following:

1. Improved management of value chains
2. Effective agribusiness linkages
3. Improved quality of agricultural products
4. Improved quality assurance systems
5. Increased employment opportunities for the rural labor force
6. Increased trade volumes
7. Increased value added
8. Increased productivity

420. It will not be sufficient to have only one of these outputs arising from the successful completion of an investment proposal, but a substantive number of these outputs need to occur for the investment to be classified as a success.

14.6.1 Indicators

421. The indicators of success of the program can be classified into several general indicators for each of the organizations eligible for the matching grant scheme. These indicators will be measured both generally with a baseline survey of the selected value chain sectors by the MEU at the start of the program, and specifically within the submitting organizations own operations.

422. The indicators of success could be:

1. Improved management of value chains
 - a. Reduction in post-harvest losses
 - b. Reduction in cost of transportation
2. Effective agribusiness linkages
 - a. Increased number of stakeholders with linkages
 - b. Increased number of formal and informal contracts between stakeholders
 - c. Reduced number of stakeholders reneging on contracts
3. Improved quality of agricultural products
 - a. Introduction of quality standards and application of those standards
 - b. Increases in percentage of agricultural produce graded to higher standards
4. Improved quality assurance systems
 - a. Introduction of quality assurance procedures and manuals, adoption of such procedures
5. Increased employment opportunities for the rural labor force
 - a. Increases in labor employment for different groups of the rural labor force
6. Increased trade volumes
 - a. Increases in quantity of agricultural produce produced and sold by participating farmers
7. Increased value added

- a. Increases in farm gate prices received by participating farmers and farmer groups
 - i. Increases in wholesale and retail prices received by participating wholesalers and retailers
- 8. Increased productivity
 - i. Increases in yield

423. In addition to each of these indicators, specific investment proposals submitted for funding by the project will have specific indicators of success dependent on the actual investment proposals put forward. The MEU will work closely with each successful applicant during the contract drafting stage to develop proposal-specific indicators which will need to be mutually agreed upon by the MEU, PMU and the submitting organization.

14.7 Indicative Sub-Projects for Funding

424. Qualifying investment sub-projects for funding under each of the above components are those of a nature which would not normally be financed by a bank, even to borrowers with substantial collateral, good credit ratings and proven commercial track records. Instead, they are 'semi-public' investments in services or infrastructure, which either benefit more than one party by their direct implementation; or, being risky and innovative in nature, will if successful, probably stimulate imitation by other parties, thus helping to unlock the value in rice-based farming systems. They are in other words 'promotional' or 'developmental' investments or programs, and the co-financing of them will accordingly be in matching grant form.

425. The critical criteria is not in the proposed intervention requiring technical services or investment, but in how that proposed intervention will improve farm level productivity, increase production efficiency, reduce post harvest losses, and finally strengthen value chain management and agribusiness linkages. The proposal should not be funded unless there is a clear link between the proposed investment and improvements in productivity, efficiency, value chain management and agribusiness linkages.

426. The qualifying areas in which such proposals may be made can be categorized in many ways, but as a summary indication it will be sufficient to categorize them as: technology at any point in the value chain; infrastructure; information and marketing; and capacity development. Some examples may be given of each category in Table 20 (for illustrative purposes only: the examples are not intended to represent the range or diversity of each category).

427. In addition to satisfying the eligibility criteria, the project proposals would need to demonstrate a clear link between the proposed investment and improvements in value added, value chain management and strengthened agribusiness linkages. Three sets of examples of proposals are given in Box 16 and Box 17; Box 18 and Box 19; and Box 20 and Box 21. In each set of examples the first one is a fundable proposal and the other not. For the fundable proposal, an indicative set of benefits and costs are presented in Section 15.

Table 20 Example of Eligible Proposals under the Matching Grant Fund

Category of Proposal	Example of Proposals
Technology	<ul style="list-style-type: none"> • Development and testing of a commune-level drying technology unit for grains • Development and testing of a village or farm-level cool storage unit for horticultural crops • Development and testing of low cost cool storage chain technology • Development and testing of early maturing varieties of agricultural crops (e.g. horticulture, rice crops) • Production of disease-free rice seed • Control of common vegetable/rice diseases • Development and testing of new packaging material from locally available materials • Development and testing of new packaging material for handling and transporting fresh and processed products • Provision of expertise to upgrade processing practices and processed-product quality for agricultural and animal products (e.g. rice, fish, horticulture) • Development and testing of a computerized system for recording and monitoring farmer-enterprise contracts
Infrastructure	<ul style="list-style-type: none"> • Specification and construction of a produce collection and grading/packing center for horticultural farmers • Specification, construction and training to use small irrigation system including channels and drip/sprinkler irrigation • Specification and construction of a produce collection and grading/packing center for horticultural processing
Marketing and Information	<ul style="list-style-type: none"> • Advisory and design services assisting the establishment of a brand for a particular Niche agricultural product • Feasibility study for investment in an agricultural product • Development of facilities and protocols for testing and grading various agricultural products (e.g. animal feed ingredients) • Feasibility studies for contract farming • Identification of suitable areas and farmers for contract farming • Identification of suitable enterprises and suppliers for contracting • Development of logistics and supply chain management for contract services (production, harvesting, transportation) • Development of logistics and supply chain management for raw material supply services (production, harvesting, transportation) • Advisory and design services assisting the establishment of a brand for a particular Niche agricultural product • Feasibility study for investment in an agricultural product
Capacity and Training	<ul style="list-style-type: none"> • Advisory and training services to strengthen the capacity of a group to meet grading standards for selling produce and to arrange services testing such standards (e.g. rice, fish, and horticulture) • Extension and training programs for farmers in farm management • Training in quality assurance systems • Trip to fairs and exhibitions for food technologies in other regions in Cambodia and in other countries • Advisory and training services to strengthen the capacity of farmers to meet supplier requirements • Development of contract documents; including legal drafting, specifications of terms and conditions, product standards and quality, credit arrangements, and dispute resolution • Advisory and training services to strengthen the capacity of farmers to meet contract standards for selling produce • Advisory and training services for suppliers and NGOs to organize and facilitate contracts • Extension and training programs for farmers in contract arrangements • Extension and training programs for field service officers of enterprises and suppliers to ensure correct agro-economic practices and compliance with contract provisions.

	<ul style="list-style-type: none"> • Transfer of technology, with an awareness of adaptation problems that smallholders could face • The use of cropping schedules to ensure the correct timing and sequencing of all contractual activities • Training for extension staff and farmers, and research into varieties and cultivation practices • Training programs for enterprises for contract development, implementation and monitoring • Training and capacity building for the ordering and supply of inputs and provision for farmer credit • Training and capacity building for planning of logistical support for input delivery and product transport • Training programs for enterprises for development, implementation and monitoring of supply/sales arrangements • Extension and training programs for enterprise in business and supply chain management
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Box 16 Example of Proposal for a Smallholder Irrigation Scheme - 1

Project Proposal for the Rehabilitation of a Smallholder Irrigation Scheme

Description

A commune in Kampong Speu puts forward a proposal for the rehabilitation of a smallscale irrigation scheme of 100 hectares for the production of wet season rice and dry season rice. The 100 hectares of irrigated land is owned by 200 farmers in the commune (average of 0.5 hectares per farmer). The plan is to extend dry season cultivation to allow rice production by farmers. Average gross income from rice production is around \$210 per hectare if irrigation water is available.

If the irrigation system was built, the farmers could extend rice production into the dry season and get another crop of rice, doubling their incomes.

Outcome

The proposal meets several eligibility criteria of the project; the proposed investment fits with one of the examples given in Table 20. However, as it stands, the proposed investment does not meet the fundamental criterion of improvement in efficiency, value chain management and agribusiness linkages. As such the proposal would have to be rejected.

Reasons

Firstly, while the proposal does result in a doubling of farm incomes if a second crop of rice is planted, there is no mention of the feasibility of diversifying out of rice production in the dry season and into a higher valued crop.

Secondly, there is nothing in the proposal to indicate the technical feasibility of constructing the irrigation system. Are there low cost alternatives to standard irrigation construction design – what would be the size of the scheme?

Thirdly, how is value chain management going to be improved? There is nothing in the proposal to indicate that the management, procedures and operations of the group are going to substantively change after the construction of the irrigation system. How is the irrigation system going to be managed? What about maintenance funds and longer term sustainability?

Fifthly, how are agribusiness linkages going to be improved? Are the current marketing linkages sufficient for getting good quality product directly to consumers or end users? Is the group going to make direct linkages with retailers, processors or suppliers? What quality and variety specifications are required by the end user? How can their current management processes be changed to improve the prices received by their product in the market?

Box 17 Example of Proposal for a Smallholder Irrigation Scheme - 2**Project Proposal for the Rehabilitation of a Smallholder Irrigation Scheme****Description**

A commune in Kampong Speu puts forward a Commune Marketing Plan which details the rehabilitation of a smallscale irrigation scheme of 100 hectares for the production of wet season rice and the use of supplementary irrigation for dry season vegetable production. The 100 hectares of irrigated land is owned by 200 farmers in the commune (average of 0.5 hectares per farmer). The plan is to extend dry season cultivation to allow vegetable production by farmer groups which will then be marketed and sold in the nearby district town. Average gross income from rice production is around \$210 per hectare while vegetable production is around \$900 per hectare if irrigation water is available.

They have not been organized as a farmer marketing group and have found it difficult to sell their vegetables for profitable returns in the market due to highly variable prices (influenced by lack of rain) and significant losses in quality when they store their harvest. The farmers in the village need to sell their vegetables directly after harvest, because they need to repay their debts to their input suppliers, and lose significant amounts of money due to low market prices. The group currently sells their products to collectors who come directly to the village. They hear on the radio that the market price in the district town is much higher than that offered by the traders, but they don't know who else they can sell their produce to. They have several proposals they would like funded:

1. They want assistance in rehabilitating a degraded smallscale irrigation scheme (canal, headworks, etc) to take advantage of supplementary irrigation opportunities at the end of the wet season for high valued vegetable production.
2. The farmer group realizes that they have no experience in water management, and so would like assistance in developing water management protocols.
3. The farmers also would like some assistance and training on horticulture production so they can produce more high quality vegetables.
4. They would like some assistance in making linkages directly with wholesalers, retailers and perhaps processors so they can receive a higher price. They think that if they can offer a large amount of produce to their buyers, by organizing the harvest amongst the farmers, they may receive a higher price. They are unsure of the specifications and types of horticulture product demanded by different buyers and so would like to find out what traders and enterprises are interested in their product, and how they can link with them.
5. Finally, the farmers have limited business skills and would like some training in business management.

Outcome

The proposal meets several eligibility criteria of the project; the proposed investment fits with one of the examples given in Table 20. The proposed intervention will increase incomes and diversification, and increase agribusiness activities in their region by providing larger quantities of high quality vegetables for retail or processing activities. Importantly, the proposed investment meets the fundamental criterion of improvement in value added, value chain management and agribusiness linkages. As such the proposal would be accepted.

Reasons

Irrespective of the actual investment which is being sought – in this case the irrigation system - significant investment in technical assistance and non-infrastructure related activities such as farm level value chain management, market information, and marketing linkages is being sought. The farmer group requesting the assistance from the project is aware that firstly, there are critical weaknesses in their current management and procedures and secondly, that they do not have the skills and resources to improve value chain management and agribusiness linkages themselves. Because the investment proposal outlines their needs in terms of value chain management and agribusiness linkages, and demonstrates a clear link between their investment and improved management and linkages, the project would be accepted.

Box 18 Example of Proposals for Farmers Linking to Market - 1**Project Proposal For a Cool Storage Shed***Description*

A commercial farmer marketing group in Kampong Thom approaches the project wanting to develop a cool storage shed at the village level for horticultural crops. The farmer group comprises 150 households, and average gross income from vegetable production is around \$900 per year. Most of the farmers are highly commercialized, with over 80 percent of their harvest sold in the market place. They have been organized as a farmer marketing group for the past three years, but have found it difficult to sell their vegetables in the market due to highly variable prices and significant losses in quality when they store their harvest. The farmers in the village need to sell their vegetables directly after harvest, because they need to repay their debts to their input suppliers, and lose significant amounts of money due to low market prices. They want assistance in developing, testing and building an insulated cool storage facility in the village so that fruits and vegetables can be stored until the market price increases.

Outcome

The proposal meets several eligibility criteria of the project; the proposed investment fits with one of the examples given in Table 20, the farmer marketing group has been organized for over two years, they sell over 75 percent of their production, there are over 100 households involved in the marketing group, and combined sales are over \$10,000. The proposed intervention will reduce post-harvest losses, and increase agribusiness activities in their region by providing larger quantities of high quality vegetables for retail or processing activities over a longer period of time than is currently the case with short harvest seasons.

However, as it stands, the proposed investment does not meet the fundamental criterion of improvement in value chain management and agribusiness linkages. As such the proposal would have to be rejected.

Reasons

Firstly, the proposal notes that farmers receive low prices in the market when product is sold directly after harvest and thus a cool storage facility is warranted. However, the proposal also notes that a high level of indebtedness is the main reason for farmer sales directly after harvest and a cool storage facility would not solve this problem. Irrespective of the existence of the storage facility, farmers would still be forced to sell directly after harvest.

Secondly, there is nothing in the proposal to indicate the technical feasibility of constructing the facility. Would the cool storage facility require access to power in order to run any refrigeration units? Is the village connected to the national electricity grid? What would be the consequences of power loss on the products being stored? Are there low cost alternatives to standard cold storage construction design – what would be the size of the facility?

Thirdly, what markets currently exist for the fruit and vegetables being sold by the farmer marketing group? What new markets or different prices would the group receive if they delayed sale of the harvest? Would the marketing group continue to sell through their existing marketing channels, or do they need to develop new marketing channels?

Fourthly, how is value chain management going to be improved? There is nothing in the proposal to indicate that the management, procedures and operations of the group are going to substantively change after the construction of the cool storage facility. How is perishability going to reduce under the new investment? What post-harvest activities are going to be carried out (such as grading and sorting) in order to reduce losses? How are the fruits and vegetables going to be stored and packed? How is harvesting procedure going to differ?

Fifthly, how are agribusiness linkages going to be improved? Are the current marketing linkages sufficient for getting good quality product directly to consumers or end users? Is the group going to make direct linkages with retailers, processors or suppliers? What quality and variety specifications are required by the end user? How can their current management processes be changed to improve the prices received by their product in the market?

Box 19 Example of Proposals for Farmers Linking to Market - 2

Project Proposal For a Horticulture Produce Collection, Grading and Packing Center

Description

A commercial farmer marketing group in Kampong Thom approaches the project wanting to develop a horticulture produce collection, grading and packing center at the village level for horticultural crops. The farmer group comprises 150 households, and average gross income from vegetable production is around \$900 per year. Most of the farmers are highly commercialized, with over 80 percent of their harvest sold in the market place. They have been organized and registered as a farmer marketing group for the past three years, but have found it difficult to sell their vegetables in the market due to highly variable prices and significant losses in quality when they store their harvest. The farmers in the village need to sell their vegetables directly after harvest, because they need to repay their debts to their input suppliers, and lose significant amounts of money due to low market prices. The group currently sells their products to collectors who come directly to the village. They hear on the radio that the market price in the district down is much higher than that offered by the traders, but they don't know who else they can sell their produce to. They have several proposals they would like funded:

1. They want assistance in developing and building a horticulture produce collection, grading and packing center in the village so that fruits and vegetables can be graded and packed correctly in order to increase the price they obtain in the market.
2. The farmer group realizes that they have no experience in the required technology, and so would like assistance in developing harvesting protocols and sorting and grading standards to meet the market requirements.
3. The farmers also would like some assistance and training on horticulture production so they can produce more high quality vegetables.
4. They are aware that some farmers and traders are using plastic crates and cardboard boxes to pack their produce, but think that the cost of these are too high, and not robust enough to withstand the carrying and transport to market. They would like some assistance in developing low cost alternatives, which use locally available materials.
5. They would like some assistance in making linkages directly with wholesalers, retailers and perhaps processors so they can receive a higher price. They think that if they can offer a large amount of produce to their buyers, by organizing the harvest amongst the farmers, they may receive a higher price. They are unsure of the specifications and types of horticulture product demanded by different buyers and so would like to find out what traders and enterprises are interested in their product, and how they can link with them.

Outcome

The proposal meets several eligibility criteria of the project; the proposed investment fits with one of the examples given in Table 20, the farmer marketing group has been organized for over two years, they sell over 75 percent of their production, there are over 100 households involved in the marketing group, and combined sales are over \$10,000. The proposed intervention will reduce post-harvest losses, and increase agribusiness activities in their region by providing larger quantities of high quality vegetables for retail or processing activities. Importantly, the proposed investment meets the fundamental criterion of improvement in value chain management and agribusiness linkages. As such the proposal would be accepted.

Reasons

Irrespective of the actual investment which is being sought – in this case the grading and packing center - significant investment in technical assistance and non-infrastructure related activities such as farm level value chain management, market information, packing technology, and marketing linkages is being sought. The farmer group requesting the assistance from the project is aware that firstly, there are critical weaknesses in their current management and procedures and secondly, that they do not have the skills and resources to improve value chain management and agribusiness linkages themselves. Because the investment proposal outlines their needs in terms of value chain management and agribusiness linkages, and demonstrates a clear link between their investment and improved management and linkages, the project would be accepted.

Box 20 Example of Proposals Under Farmer to Enterprise Contract Farming System- 1

Project Proposal For a Integrated Smallholder Contract Farming System Linked with a Processing Enterprise

Description

A combined rice miller and exporter in Battambang submits a proposal for linking rice farmers directly with the processing operations through a contract system. Currently, the processor obtains paddy through traders but cannot get enough paddy quantity or quality to support the available capacity within the milling plant. The miller believes that if they can contract directly will farmers in a consolidated area close to the milling plant they can get enough paddy to supply their plant.

Outcome

The proposal meets several eligibility criteria of the project; the proposed investment fits with one of the examples given in Table 20, and the eligibility criteria of the submitting organization has been met. However, as it stands, the proposed investment does not meet the fundamental criterion of improvement in value chain management and agribusiness linkages. As such the proposal would have to be rejected.

Reasons

The proposal would have to be rejected for the following reasons. Firstly, there is no real attempt in the submitted proposal to address the issue of agribusiness linkages. While the proposal wishes to link farms producing rice with the company's operations, there is little development of linkages between different value chain stakeholders outside of the integrated chain.

Secondly, there are no provisions within the submitted proposal for value chain management development. Presumably the company is satisfied with their internal supply chain management protocols and how the different units are interlinked. If this is not the case, the only issue would be the supply chain management protocols underpinning the company operations.

Box 21 Example of Proposals Under Farmer to Enterprise Contract Farming - 2**Project Proposal For a Contract Farming System Linking Farmers to Processing Enterprise***Description*

A combined rice miller and exporter in Battambang submits a proposal for linking rice farmers directly with the processing operations through a contract system. Currently, the processor obtains paddy through traders but cannot get enough paddy quantity or quality to support the available capacity within the milling plant. The miller believes that if they can contract directly with farmers in a consolidated area close to the milling plant they can get enough paddy and be able to control quality and other value chain management issues. The proposal outlines several investment interventions:

1. Assistance in identifying a suitable area of paddy production close to the factory so that all production and transportation arrangements can be coordinated and there is minimal time between harvesting and processing.
2. Assistance in drafting contracts, specification of the terms and conditions for paddy standards and quality, and facilitating the signing of contracts with farmers through a local supplier or NGO.
3. Development of harvesting and post-harvesting protocols for paddy so that the paddy arrives at the mill in the best possible condition.
4. Advisory and training services to strengthen the capacity of farmers to meet contract standards for producing and selling paddy.
5. Training of extension workers hired by the milling company to extend advisory and support services to farmers in a Farmer Field School approach.
6. Training and capacity building for the milling company to manage the contract and value chain logistics.
7. Construction of collection depots for paddy with drying and cleaning facilities for proper grain handling.

Outcome

The proposal meets several eligibility criteria of the project; the proposed investment fits with one of the examples given in Table 20. As the processor is involved in exporting rice, it would meet the commercialization and income requirements and thus be eligible to submit the proposal. However, given the parlous state of the milling industry with significant numbers of processing plants operating at below capacity, careful attention needs to be paid to the financial health of the company to see whether it remains a financially sound company. As it stands, the proposal would meet the requirements of the project in that it promotes agribusiness linkages between different levels of the value chain, and outlines sound interventions aimed at improving value chain management. As such the proposal would be accepted.

Reasons

The investment which is being sought is significant in terms of technical assistance and non-infrastructure related activities such as farm level value chain management, post-harvest protocols and transportation technology, and marketing linkages. The miller requesting the assistance from the project is aware that firstly, there are critical weaknesses in their current management and procedures and secondly, that they do not have the skills and resources to improve value chain management and agribusiness linkages themselves. Because the investment proposal outlines their needs in terms of value chain management and agribusiness linkages, and demonstrates a clear link between their investment and improved management and linkages, the project would be accepted.

15 Economic Analysis and Viability of Matching Grant Projects

15.1 Introduction

428. Several indicative projects are presented in Section 14 as examples of the type of activity that could be financed using grant-aided support under the different components of the proposed project. Financial and economic analyses have been conducted as indicative examples of the type of interventions to be supported under these components by elaborating the general outlines into specific requests and developing models showing their potential impact. Each of the examples is presented below by first elucidating the proposals set out in Section 14, then converting this into a costed intervention, and then incorporating it into an indicative model that indicates the with and without project situation. Based on these models, financial analyses have been undertaken and sensitivity tests conducted. The findings are used to evaluate the likely economic and financial viability of the support.

15.2 Project Proposal for the Rehabilitation of a Smallscale Irrigation Scheme, Vegetable Production and Marketing under a Commune Marketing Plan

15.2.1 Outline of Proposed Grant Aided Support

429. A commune in Kampong Speu puts forward a Commune Marketing Plan which details the rehabilitation of a smallscale irrigation scheme of 100 hectares for the production of wet season rice and the use of supplementary irrigation for dry season vegetable production. The 100 hectares of irrigated land is owned by 200 farmers in the commune (average of 0.5 hectares per farmer). The plan is to extend dry season cultivation to allow vegetable production by farmer groups which will then be marketed and sold in the nearby district town. Average gross income from rice production is around \$210 per hectare while vegetable production is around \$900 per hectare if irrigation water is available.

430. They have not been organized as a farmer marketing group and have found it difficult to sell their vegetables for profitable returns in the market due to highly variable prices (influenced by lack of rain) and significant losses in quality when they store their harvest. The farmers in the village need to sell their vegetables directly after harvest, because they need to repay their debts to their input suppliers, and lose significant amounts of money due to low market prices. The group currently sells their products to collectors who come directly to the village. They hear on the radio that the market price in the district town is much higher than that offered by the traders, but they don't know who else they can sell their produce to. They have several proposals they would like funded:

1. They want assistance in rehabilitating a degraded smallscale irrigation scheme (canal, headworks, etc) to take advantage of supplementary irrigation opportunities at the end of the wet season for high valued vegetable production.
2. The farmer group realizes that they have no experience in water management, and so would like assistance in developing water management protocols.

3. The farmers also would like some assistance and training on horticulture production so they can produce more high quality vegetables.
4. They would like some assistance in making linkages directly with wholesalers, retailers and perhaps processors so they can receive a higher price. They think that if they can offer a large amount of produce to their buyers, by organizing the harvest amongst the farmers, they may receive a higher price. They are unsure of the specifications and types of horticulture product demanded by different buyers and so would like to find out what traders and enterprises are interested in their product, and how they can link with them.
5. Finally, the farmers have limited business skills and would like some training in business management.

15.2.2 Interventions Proposed for Supporting the Proposal

431. The project proposal can be translated into seven immediate interventions that would be supported through a combination of the grant-aided funds and beneficiary contributions, with the beneficiaries expected to cover 20 percent of the costs. The interventions would fall under the following categories and comprise:

1. Increasing Agricultural Productivity
 - a. Rehabilitation of 100 hectares of irrigation scheme at a cost of \$150 per hectare (\$15,000 in total);
 - b. Formation of a Water Users Group to operate and maintain the irrigation system (\$500);
 - c. Conducting water management training courses for farmers (\$4,000); and
 - d. Conducting extension training in horticulture and rice agronomy for farmers (\$4,000 each type of training).
2. Increasing Marketing Opportunities
 - a. Formation of a Farmer Marketing Group for horticultural sales (\$500);
 - b. Conducting training courses on post-harvest quality control (\$4,000);
 - c. Conducting training courses on small business management (\$4,000); and
 - d. Facilitating market linkages between farmers and traders (\$1,600).

432. The total investment in this proposal is estimated at \$37,600 over two years, \$36,600 in the first year and \$800 in the second.

433. In addition to these costs the farmer's group would be expected to maintain the irrigation scheme as an ongoing commercial enterprise, which would involve covering the costs of labor (management, accounting), operating costs, and routine maintenance. These are anticipated to amount to about \$2500 in each year. The irrigation scheme is anticipated to remain operational for 20 years. These costs will be recovered by charging the farmers for access to the irrigation water.

434. Every 5 years a refresher course on the extension methodologies would be run. These would cost an additional \$8,500 which would be paid by the farmers themselves

15.2.3 Details of Indicative Model

435. The indicative model has been developed based on the findings of the field work and secondary data sources. These data have also been used for the earlier activity budget estimation. Based on these data it is assumed that the average size of the paddy rice farms is 0.5 hectare, and that under existing conditions average production is 1.556 tonnes per hectare for wet season rice. These data correspond to 2004/2005 average yields in Kampong Speu province. Paddy prices are assumed to be \$135 per tonne for wet season varieties. The gross income of farmers is therefore computed as \$210 per hectare, and with costs of \$118 per hectare, this leaves a net income of \$93 per hectare. The situation is not expected to change without the project.

436. Based on the crop budgets developed from the field work and the assumption that farmers are producing a mixture of vegetables, it is estimated that the average gross income of the vegetables produced under current conditions is \$0.15/kg, which implies that with an average production of 12 tonnes per hectare revenue is \$1,800 per hectare. Production costs are estimated at \$0.07/kg, excluding the costs of land, and net revenue is \$0.08/kg. Assuming each farmer has 0.5 hectares under vegetable production. The annual net income from vegetables of the farmers is \$480. These basic data have been used to construct the Without Project scenario in Table 21.

437. In the With Project scenario, farmers' incomes are assumed to benefit from increased yields following the adoption of improved crop husbandry promoted under the training courses and the supply of irrigation water during the dry season. Yield increases are assumed to be 25 percent per year over a three-year period, an increase that is quite reasonable given the low initial yields and the findings of farmer-based trials, which suggest that increases of over 100 percent are readily achievable. The projected yield increase results in farmers' average vegetable production increasing from 6,000 kg to about 11,700 kg (about 23 tonnes per hectare) while rice yields increase from 1.556 tonnes per hectare to 3.039 tonnes per hectare). While the farm gate price of paddy remains the same, it is assumed that the price received for vegetables increases slightly from \$0.15/kg to 0.16/kg by year 3. This reflects the improved prices that will be obtained through the improved market linkages with wholesalers and retailers.

438. With the increased availability of irrigation water and increased knowledge on production techniques, farmers are assumed to apply more inputs to their rice and vegetable production systems. The cost of rice production increases from \$118 per hectare up to \$150 per hectare, while the cost of vegetable production increases by 10 percent per year for three years, going from \$0.07 per kg up to \$0.091 per kg. Net revenue increases from \$526 per farmer up to \$939 per farmer. This results in an increase in farmer group net revenue from \$105,256 to \$187,746. Details of the calculations for the 20-year period are shown in Table 21.

15.2.4 Impact on Poverty Reduction

439. Overall, the proposed intervention is estimated to provide an increase in per farmer net revenue from \$480 to \$526 per farmer up to \$939 per farmer per year. This is based on a 0.5 hectare plot of land cultivated with vegetables during the dry season period with irrigation available, and rice being grown during the wet season.

440. The impact on poverty reduction depends on the relative poverty distributions at the commune and village level. According to (ACI 2005, Table 45), over 63.8 percent of households have under 1ha of land, and 36.7 percent have less than 0.5 ha of land. As a

consequence, the proposed intervention has the potential to reach around 63 percent of the farming households in the targeted areas. These will not be the households in the lowest quintile of the distribution, but rather those households that have the ability to engage in commercialized production systems.

15.2.5 Financial Viability

441. Table 21 also presents the summary of the incremental cash flow resulting from this capital investment of \$37,600. Incremental recurrent costs of maintaining this investment, including the cost of maintaining the irrigation scheme are estimated at \$2,500 in the first few years increasing to a maximum of \$11,000 in the fifth year and every 5 years after that. Incremental net income of the farmers' group is estimated at \$15,579 in year 2, \$55,341 in year 3, and \$82,903 in year 4 and beyond. As a result the incremental cash flow is negative in the first year, part of which is financed through the grant, and is expected to become positive in year 2 and thereafter. As a result the financial net present value (FNPV) of the investment at a 12 percent discount rate is estimated at \$412,879, while the financial internal rate of return (FIRR) is estimated at 104 percent. This is considered acceptable given the prevailing cost of funds in Cambodia.

15.2.6 Sensitivity Tests

442. Given the large number of variables in the model and the assumptions required to estimate the FIRR, many sensitivity tests could be formulated to examine the impact of different parameters on the overall result. However, such an analysis would not provide an overall indication of the sensitivity of the results. Hence the current analysis has opted to present sensitivity tests for four standard scenarios - a 10 percent increase in investment costs, a 10 percent reduction in benefits, a 10 percent increase in production costs together with a 10 percent reduction in benefits, and a one-year lag in benefits. In addition, the implications of the farmer's group pulling out of the investment before the 20 year period is finished are also investigated. The results of these tests are shown in Table 22.

443. As might be expected with such an extremely high base IRR, the sensitivity analysis suggests that the contract model is highly robust with respect to changes in all of the major parameters and should therefore be accepted for financing. With a 10 percent increase in project costs the FIRR falls from 104 percent to 97 percent and with both an increase in costs and reduction in benefits the FIRR is still 89 percent. The greatest impact comes from a delay in the benefit stream, with a one year delay reducing the FIRR to 69 percent.

444. As mentioned above, there is a concern that the farmer's group involved in the project intervention may not be willing to commit themselves to a 20 year maintenance of the irrigation scheme. In this situation we investigate what would happen if the benefit stream was cut short by the farmer's groups abrogating their responsibilities. There is no appreciable change in the FIRR when the project is reduced to even just a 5 year project, with the FIRR falling to 93 percent (down from 104 percent). If the project only lasted 3 years of the AusAID funded intervention the FIRR would fall to 38 percent. As such, the risks for the project seem to be small and the project intervention should be funded.

15.3 Project Proposal for a Horticulture Produce Collection, Grading and Packing Center

15.3.1 Outline of Proposed Grant Aided Support

445. A commercial farmer marketing group in Kampong Thom approaches the project wanting to develop a horticulture produce collection, grading and packing center at the village level for horticultural crops. The farmer group comprises 150 households, and average gross income from vegetable production is around US\$900 per year. Most of the farmers are highly commercialized, with over 80 percent of their harvest sold in the market place. They have been organized as a farmer marketing group for the past three years, but have found it difficult to sell their vegetables in the market due to highly variable prices and significant losses in quality when they store their harvest. The farmers in the village need to sell their vegetables directly after harvest, because they need to repay their debts to their input suppliers, and lose significant amounts of money due to low market prices. The group currently sells their products to collectors who come directly to the village. They hear on the radio that the market price in the district down is much higher than that offered by the traders, but they don't know who else they can sell their produce to. They have several proposals they would like funded:

1. They want assistance in developing and building a horticulture produce collection, grading and packing center in the village so that fruits and vegetables can be graded and packed correctly in order to increase the price they obtain in the market.
2. The farmer group realizes that they have no experience in the required technology, and so would like assistance in developing harvesting protocols and sorting and grading standards to meet the market requirements.
3. The farmers also would like some assistance and training on horticulture production so they can produce more high quality vegetables.
4. They are aware that some farmers and traders are using plastic crates and cardboard boxes to pack their produce, but think that the cost of these are too high, and not robust enough to withstand the carrying and transport to market. They would like some assistance in developing low cost alternatives, which use locally available materials.
5. They would like some assistance in making linkages directly with wholesalers, retailers and perhaps processors so they can receive a higher price. They think that if they can offer a large amount of produce to their buyers, by organizing the harvest amongst the farmers, they may receive a higher price. They are unsure of the specifications and types of horticulture product demanded by different buyers and so would like to find out what traders and enterprises are interested in their product, and how they can link with them.

15.3.2 Interventions Proposed for Supporting the Proposal

446. The project proposal can be translated into five immediate interventions that would be supported through a combination of the grant-aided funds and beneficiary contributions, with the beneficiaries expected to cover 20 percent of the costs. The interventions would comprise:

1. Investment in a simple packing shed and grading facility including grading and packing equipment for a cost of \$10,000;

2. An investment of \$2,500 for developing harvesting protocols, which would require the contracting of local experts;
3. Training of farmers in horticultural production over a period of three years costing a total of \$5,000, equivalent to US\$33/farmer;
4. Investment in developing in the first year and testing for the next two years of low-cost packaging at a total cost of \$4,200 mainly for the contracted technical assistance; and
5. Assistance to develop market linkages with wholesalers and retailers at a cost of \$2,500, which would be undertaken in the second year as soon as graded produce is available.

447. The total investment in this proposal is estimated at \$24,200 over three years, \$17,200 in the first year, \$5,500 in the second, and \$1,500 in the third.

448. In addition to these costs the farmer's group would be expected to maintain the grading facility as an ongoing commercial enterprise, which would involve covering the costs of labor (management, accounting and packhouse workers), operating costs, packaging materials (assumed to cost \$2 per 20-kg container), and routine maintenance. These are anticipated to amount to about \$200 in the first year prior to the packhouse becoming operational, \$3,055 in the second, \$3,101 in the third, \$3,158 in the fourth, and \$3,230 in the fifth and subsequent years. The packhouse is anticipated to remain operational for 20 years. These costs will be recovered by charging the farmers for grading of the produce that passes through the packhouse.

15.3.3 Details of Indicative Model

449. Based on the crop budgets developed from the field work and the assumption that farmers are producing a mixture of vegetables, it is estimated that the average gross income of the vegetables produced under current conditions is \$0.15/kg, which implies that with an average production of 12 tonnes per hectare revenue is \$1,800 per hectare. Production costs are estimated at \$0.07/kg, excluding the costs of land, and net revenue is \$0.08/kg. Assuming each farmer has 0.5 hectares under vegetable production. The annual net income from vegetables of the farmers group is \$480. These basic data have been used to construct the Without Project scenario in Table 23.

450. In the With Project scenario, farmers' incomes are assumed to benefit from increased yields following the adoption of improved crop husbandry promoted under the training courses and the differentiation of farmers' output into two grades, grade 1 and 2. Yield increases are assumed to be 25 percent per year over a three-year period, an increase that is quite reasonable given the low initial yields and the findings of farmer-based trials, which suggest that increases of over 100 percent are readily achievable. The projected yield increase results in farmers' average production increasing from 6,000 kg to about 11,700 kg. Grade 1 produce is assumed to account for 30 percent of output, which will be packed in the improved low-cost packaging and sold at a premium. The remaining 70 percent will be graded as Grade 2 and sold at the same price as currently achieved. Grade 1 produce is estimated to receive a 20 percent premium in the first year of grading and 40 percent in subsequent years. This reflects the improved prices that will be obtained through the improved market linkages with wholesalers and retailers. The gross revenue thus obtained for Grade 1 produce increases from \$0.15/kg to \$0.18/kg, and then to \$0.21/kg. Since the proposals do not involve any increase in the cost of purchased inputs, net revenue increases from \$0.08/kg to \$0.12/kg and the average net revenue per farmer

increases from \$480 to \$1,148. This results in an increase in farmer group net revenue from \$72,000 to \$172,266. Details of the calculations for the 20-year period are shown in Table 23.

15.3.4 Impact on Poverty Reduction

451. Overall, the proposed intervention is estimated to provide an increase in per farmer net revenue from \$480 per year to over \$1,148 per year. This is based on a 0.5 hectare plot of land cultivated with vegetables during the dry season period with irrigation available.

452. The impact on poverty reduction depends on the relative poverty distributions at the commune and village level. According to (ACI 2005, Table 45), over 63.8 percent of households have under 1ha of land, and 36.7 percent have less than 0.5 ha of land. As a consequence, the proposed intervention has the potential to reach around 63 percent of the farming households in the targeted areas. These will not be the households in the lowest quintile of the distribution, but rather those households that have the ability to engage in commercialized production systems.

15.3.5 Financial Viability

453. Table 23 also presents the summary of the incremental cash flow resulting from this capital investment of \$24,200. Incremental recurrent costs of maintaining this investment, including the cost of packaging material are estimated at \$200 in the first year increasing to a maximum of \$3,230 in the fifth year. Incremental net income of the farmers' group is estimated at \$8,100 in year 2, \$38,250 in year 3, and \$65,813 in year 4 and \$100,266 in year 5 and beyond. As a result the incremental cash flow is negative in the first 2 years, part of which is financed through the grant, and is expected to become positive in year 3 and thereafter. As a result the financial net present value (FNPV) of the investment at a 12 percent discount rate is estimated at \$477,940, while the financial internal rate of return (FIRR) is estimated at 130 percent. This is considered acceptable given the prevailing cost of funds in Cambodia.

15.3.6 Sensitivity Tests

454. Given the large number of variables in the model and the assumptions required to estimate the FIRR, many sensitivity tests could be formulated to examine the impact of different parameters on the overall result. However, such an analysis would not provide an overall indication of the sensitivity of the results. Hence the current analysis has opted to present sensitivity tests for four standard scenarios - a 10 percent increase in investment costs, a 10 percent reduction in benefits, a 10 percent increase in production costs together with a 10 percent reduction in benefits, and a one-year lag in benefits. The results of these tests are shown in Table 24.

455. The proposal for a grading and packing center is found to be relatively insensitive to the impact of either an increase in costs or a decrease in benefits, or these two combined, in all cases remaining well above the acceptable IRR. It is most sensitive to a one-year lag in benefits although even in this case it is considered sufficiently robust to justify the

investment. Overall the sensitivity analysis indicates that the investment is highly robust to changes in the essential parameters and should be accepted for financing.

15.4 Project Proposal for a Contract Farming System Linking Farmers to Milling Enterprise

15.4.1 Outline of Proposed Grant Aided Support

456. A combined rice miller and exporter in Battambang submits a proposal for linking rice farmers directly with the processing operations through a contract system. Currently, the processor obtains paddy through traders but cannot get enough paddy quantity or quality to support the available capacity within the milling plant. The miller believes that if they can contract directly with farmers in a consolidated area close to the milling plant they can get enough paddy and be able to control quality and other value chain management issues. The proposal outlines several investment interventions:

1. Assistance in identifying a suitable area of paddy production close to the factory so that all production and transportation arrangements can be coordinated and there is minimal time between harvesting and processing.
2. Assistance in drafting contracts, specification of the terms and conditions for paddy standards and quality, and facilitating the signing of contracts with farmers through a local supplier or NGO.
3. Development of harvesting and post-harvesting protocols for paddy so that the paddy arrives at the mill in the best possible condition.
4. Advisory and training services to strengthen the capacity of farmers to meet contract standards for producing and selling paddy.
5. Training of extension workers hired by the milling company to extend advisory and support services to farmers in a Farmer Field School approach.
6. Training and capacity building for the milling company to manage the contract and value chain logistics.
7. Construction of collection depots for paddy with drying and cleaning facilities for proper grain handling.

15.4.2 Interventions Proposed for Supporting Proposal

457. The project proposal can be translated into seven immediate interventions that would be supported through a combination of grant-aided funds and beneficiary contributions, with the beneficiaries expected to contribute a significant proportion of the costs. Due to the long-term nature of the interventions, further expenditures would be required by the miller to ensure the maintenance of the improvements. Three interventions relate to establishment of contracts. These are:

1. Identification of approximately 2,500 paddy producers in the designated service area at a cost of about \$5 per farmer or a total cost of \$12,500;
2. Assistance to the milling company in drafting contracts and agreeing these with the producers costing \$10,000 including professional services and workshops; and
3. Signing and maintenance of farmer contracts at a cost of \$2/farmer, equivalent to \$95,000 over the 20 year period.

458. The overall cost for establishment of contracts would therefore be \$117,500. The second set of interventions would cover extension and training, including:

1. Developing of harvesting and post-harvesting protocols to improve the quality of the paddy at a cost of \$10,000;
2. Development of extension and training services for \$10,000;
3. Intensive training of 100 extension workers (based on one extension worker for every 25 farmers) at a cost of \$500 per worker per year for the first 3 years for an overall cost of \$150,000;
4. Refresher courses for the extension worker every year thereafter at an overall cost of \$8,500;
5. Salaries and Field allowances for the extension workers at an annual cost of \$600 per worker for an overall cost of \$1.2 million over 20 years;
6. Farmer Field Schools at a cost of \$20 per farmer and held once every 5 years for a total cost of \$200,000; and
7. Training and capacity building for employees and officials of the milling company at a cost of \$15,000.

459. The total cost of these extension and training activities would thus be \$1,593,500. The third a set of interventions would involve investment in collection depots at a rate of one for every 500 farmers and a cost of \$10,000 each, or an overall cost of \$50,000. These collection depots would have facilities for drying, cleaning and grading grain, which costs around \$3 per tonne; resulting in an overall cost of \$1,462,487 over the 20 year period.

460. The project proposal would thus be estimated to cost \$3,225,287.

461. To justify such an investment, the miller would be expected to cover all the costs beyond the initial 3 year period. These costs would be associated with maintenance of the production contracts beyond the initial three-year period, provision of salaries of the extension workers from their initial employment, provide ongoing refresher training for the extension workers, cover the costs of the farmer field schools, and cover the costs of the collection centers and drying and grading services. At full development these would be expected to cost either \$142,668 or \$192,668 per year, depending on whether one of the Farmer Fields Schools was being run in that year. Details of the investment costs are shown in Table 25.

462. The project would be expected to be financed by the miller after year 3, indicating that the project would only be responsible for funding \$649,942 out of the full \$3,225,287 (20 percent of the total).

463. The onus would be on the milling enterprise to fund the rest of the intervention over the next 17 years. In Section 15.4.6 we explore the ramifications of the miller pulling out of the investment prior to the end of the time period. In summary, even if the intervention lasts just 3 years the FIRR is very high at 120 percent and the NPV of the intervention is over \$320,000. This suggests that even if the miller pulled out of the investment at the end of the project intervention, the benefits to both farmers and the miller significantly outweigh the costs and the project is viable.

15.4.3 Details of Indicative Model

464. The indicative model has been developed based on the findings of the field work and secondary data sources. These data have also been used for the earlier activity budget estimation. Based on these data it is assumed that the average size of the paddy rice farms is 1 hectare, and that under existing conditions average production is 2.195 tonnes per hectare for wet season rice and 3.073 tonnes per hectare for dry season rice. These data correspond to 2004/2005 average yields in Battambang province. Paddy prices are assumed to be \$135 per tonne for wet season varieties and \$125 per tonne for dry season varieties. The gross income of farmers is therefore computed as \$680 per hectare based on double cropping, and with costs of \$400 per hectare, this leaves a net income of \$280 per hectare. The situation is not expected to change without the project.

465. Traders purchase paddy from farmers at the above prices and then sell to millers, making a small profit of \$2.46 per tonne with a further \$6.34 per tonne going into costs of trading.

466. The miller purchases 13,170 tonnes of paddy from the trader at an annual cost of \$1,816,931. Currently the miller is losing 10 percent of the volume of paddy due to storage and post-harvest problems, and is only able to get a 60 percent recovery rate due to the poor quality of the paddy.

467. With the project, the traders will be eliminated from the marketing chain and farmers are assumed to receive a farm gate contract price of \$137.46 per tonne for wet season and \$127.46 per tonne for dry season paddy, equivalent to the trader's profit of \$2.46 per tonne. The labor and transportation costs will continue to be incurred either by the farmers' group or the processor, depending on arrangements, and no cost savings are anticipated. The main gains from the improved system are through increased farmer's yields from the benefits of the extension system and improved income to the miller through better quality paddy and reduction in the rate of losses. Although demonstration fields have shown that large yield increases are possible, the model has assumed a very modest gain of 25 percent per year over a period of 3 years. Given the increased prices and production farmers' net incomes increase from \$293 to \$754 over this period.

468. With the introduction of farmer field schools and other extension methodologies, farmer yields are assumed to increase by around 25 percent per year over the first 3 years and then stabilize after that. This increase in yield is assumed to be attributed to better management techniques learnt from participation in training courses as well as increases in inputs. Total cost of production is assumed to increase from \$400 per hectare per year to \$600 per hectare per year with increased applications of fertilizer and pesticide.

469. The development of the collection depots with grain drying, grading and storage facilities is assumed to enable the miller to not only reduce storage losses but also increase the quality of the paddy, thereby increasing the percentage of header grain from the milling equipment.

470. The miller is assumed to be able to reduce his losses from 10 percent to 7.5 percent over a five-year period, and extremely modest reduction that should easily be achieved, with the result that he is able to significantly increase income given the simultaneous increase in production from the contracted farmers.

471. In addition, the miller is assumed to be able to increase the recovery rate from 60 percent up to 64 percent and this enables him to significantly increase income by selling higher quality rice.

472. The full details of this model and calculations are shown in Table 25.

15.4.4 Financial Viability

473. The incremental financial costs and benefits, together with the incremental cash flow, are shown in Table 25. The incremental capital investment amounts to \$259,300, while incremental recurrent costs start at \$149,510 and increase to a maximum of \$192,668. Incremental benefits comprise the additional income of farmers, less the losses of the traders, plus the gains of the miller. In aggregate, the most significant gains are to the farmers (\$1,184,590 per year), due to the large number that will share in the increased income. However the miller also receives significant gains (\$400,770 per year). Based on a 20-year project life, the FNPV at a 12 percent discount rate is estimated at \$7,549,967, while the FIRR is estimated at 209 percent, reflecting the potential of major production gains.

15.4.5 Impact on Poverty Reduction

474. Overall, the proposed intervention is estimated to provide an increase in per farmer net revenue from \$280 per year to \$754 per year. This is based on a 1 hectare plot of land cultivated with both wet and dry season rice in a double cropping system with irrigation available.

475. The impact on poverty reduction depends on the relative poverty distributions at the commune and village level. According to (ACI 2005, Table 45), over 63.8 percent of households have under 1ha of land, and 36.7 percent have less than 0.5 ha of land. As a consequence, the proposed intervention has the potential to reach around 63 percent of the farming households in the targeted areas. These will not be the households in the lowest quintile of the distribution, but rather those households that have the ability to engage in commercialized production systems.

15.4.6 Sensitivity Tests

476. Given the large number of variables in the model and the assumptions required to estimate the FIRR, many sensitivity tests could be formulated to examine the impact of different parameters on the overall result. However, such an analysis would not provide an overall indication of the sensitivity of the results. Hence the current analysis has opted to present sensitivity tests for four standard scenarios - a 10 percent increase in investment costs, a 10 percent reduction in benefits, a 10 percent increase in production costs together with a 10 percent reduction in benefits, and a one-year lag in benefits. In addition, the implications of the miller pulling out of the investment before the 20 year period is finished are also investigated. The results of these tests are shown in Table 26.

477. As might be expected with such an extremely high base IRR, the sensitivity analysis suggests that the contract model is highly robust with respect to changes in all of the major

parameters and should therefore be accepted for financing. With a 10 percent increase in project costs that FIRR falls from 209 percent to 185 percent and with both an increase in costs and reduction in benefits the FIRR is still 163 percent. The greatest impact comes from a delay in the benefit stream, with a one year delay reducing the FIRR to 95 percent.

478. As mentioned above, there is a concern that the miller involved in the project intervention may not be willing to commit themselves to a 20 year collaboration with contract farmers. In this situation we investigate what would happen in the benefit stream was cut short by the miller abrogating their responsibilities. There is no appreciable change in the FIRR when the project is reduced to even just a 5 year project, with the FIRR falling to 120 percent (down from 209 percent) if the project only lasted the 3 years of the AusAID funded intervention. As such, the risks for the project seem to be small and the project intervention should be funded.

Table 21 Financial Analysis for Small-Scale Irrigation and Vegetable Production and Marketing

Item	Unit	Unit Cost	Year										
			1	2	3	4	5	6	7	8	9	10-19	20
Without Project													
Average farm situation													
Area	Hectare		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Yield-WetSeasonPaddy	kg/hectare		1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556
-DrySeasonVegetables	kg/hectare		12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
Price-WetSeason	\$/kg		0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135
-DrySeason	\$/kg		0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
GrossIncome-WetSeasonPaddy	\$/hectare		210	210	210	210	210	210	210	210	210	210	210
-DrySeasonVegetables	\$/hectare		1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
Productioncosts-WetSeasonPaddy	\$/hectare		118	118	118	118	118	118	118	118	118	118	118
-DrySeasonVegetables	\$/hectare		840	840	840	840	840	840	840	840	840	840	840
NetincomeperFarmer	\$		526	526	526	526	526	526	526	526	526	526	526
NumberofFarmers	Farmers		200	200	200	200	200	200	200	200	200	200	200
TotalNetIncome	\$		105,256	105,256	105,256	105,256	105,256	105,256	105,256	105,256	105,256	105,256	105,256
NumberofFarmerGroups	Farmers/Group	25	8	8	8	8	8	8	8	8	8	8	8
With Project													
Investment costs													
IncreasingAgriculturalProductivity													
Small-ScaleIrrigationSchemeRehabilitation	\$/ha	\$150	15,000										
WaterUserGroupFormation	\$/Group	\$62.50	500										
WaterManagementTraining	\$/Farmer	\$20	4,000										
HorticultureExtensionTraining-FFS	\$/Farmer	\$20	4,000										
RiceAgronomyExtensionTraining-FSS	\$/Farmer	\$20	4,000										
IncreasingMarketingOpportunity													
MarketingGroupFormation	\$/Group	\$62.50	500										
PostHarvestandQualityControlTraining	\$/Farmer	\$20	4,000										
SmallBusinessManangementTraining	\$/Farmer	\$20	4,000										
FacilitatingMarketLinkages	\$/Trader	\$100	\$800	\$800									
Sub-total Investment Costs			36,800	800									
Recurrent Costs													
Small-ScaleIrrigationMaintenance	\$/ha	\$25		2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500
RefresherTrainingofextensionworkers	\$						500					500	
HorticultureExtensionTraining-FFS	\$	10					2,000					2,000	
RiceAgronomyExtensionTraining-FSS	\$	10					2,000					2,000	
PostHarvestandQualityControlTraining	\$	10					2,000					2,000	
SmallBusinessManangementTraining	\$	10					2,000					2,000	
Sub-total Recurrent Costs			\$	0	2,500	2,500	2,500	11,000	2,500	2,500	2,500	2,500	2,500
Benefits													
Area	Hectare		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Yield-WetSeasonPaddy	kg/hectare		1,556	1,945	2,431	3,039	3,039	3,039	3,039	3,039	3,039	3,039	3,039
-DrySeasonVegetables	kg/hectare		12,000	15,000	18,750	23,438	23,438	23,438	23,438	23,438	23,438	23,438	23,438
YieldIncrease-WetSeasonPaddy	%		0%	25%	25%	25%	0%	0%	0%	0%	0%	0%	0%

Table 21 Financial Analysis for Small-Scale Irrigation and Vegetable Production and Marketing

Item	Unit	Unit Cost	Year										
			1	2	3	4	5	6	7	8	9	10-19	20
-DrySeasonVegetables	%		0%	25%	25%	25%	0%	0%	0%	0%	0%	0%	0%
Price-WetSeason	\$/kg		0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135
-DrySeason	\$/kg		0.15	0.15	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
GrossIncome-WetSeasonPaddy	\$/hectare		210	263	328	410	410	410	410	410	410	410	410
-DrySeasonVegetables	\$/hectare		1,800	2,250	3,000	3,750	3,750	3,750	3,750	3,750	3,750	3,750	3,750
Productioncosts-WetSeasonPaddy	\$/hectare		118	150	150	150	150	150	150	150	150	150	150
-DrySeasonVegetables	\$/hectare		840	1,155	1,575	2,133	2,133	2,133	2,133	2,133	2,133	2,133	2,133
NetincomeperFarmer	\$		526	604	802	939	939	939	939	939	939	939	939
NumberOfFarmers	Farmers		200	200	200	200	200	200	200	200	200	200	200
TotalNetIncome	\$		105,256	120,758	160,322	187,746	187,746	187,746	187,746	187,746	187,746	187,746	187,746
Incremental Costs and Benefits													
Investment Costs	\$		36,800	800	0	0	0	0	0	0	0	0	0
Recurrent Costs	\$		0	2,500	2,500	2,500	11,000	2,500	2,500	2,500	2,500	11,000	2,500
Net Benefits													
Farmers	\$/farmer		\$-	\$78	\$275	\$412	\$412	\$412	\$412	\$412	\$412	\$412	\$412
	\$		\$-	\$15,502	\$55,066	\$82,490	\$82,490	\$82,490	\$82,490	\$82,490	\$82,490	\$82,490	\$82,490
Total Benefits	\$		\$-	\$15,579	\$55,341	\$82,903	\$82,903	\$82,903	\$82,903	\$82,903	\$82,903	\$82,903	\$82,903
Incremental Cash Flow	\$		-36,800	12,279	52,841	80,403	71,903	80,403	80,403	80,403	80,403	71,903	80,403
NPV@12%discount=\$		\$412,879											
IRR=		104%											

Table 22 Sensitivity Analysis for Small-Scale Irrigation and Vegetable Production and Marketing

Scenarios	NPV (12%)	FIRR
Base case	\$412,879	104%
10% cost increase	\$406,974	97%
10% benefit decrease	\$365,686	96%
10% cost increase +10% benefit decrease	\$359,781	89%
1 year lag in benefits	\$354,642	69%
Only 3 Year Project	\$14,543	38%
Only 5 Year Project	\$106,440	93%
10 Year Project	\$268,162	104%

Table 23 Financial Analysis for Produce, Collection, Grading and Packing Center

Item	Unit	Year									
		1	2	3	4	5	6	7	8	9-19	20
Without Project											
Income											
Output	kg/farmer	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Gross revenue	\$/kg	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Cost of production (excl land)	\$/kg	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Net revenue per kg	\$/kg	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Gross income per farmer	\$/farmer	900	900	900	900	900	900	900	900	900	900
Net revenue per farmer	\$/farmer	480	480	480	480	480	480	480	480	480	480
Number of farmers		150	150	150	150	150	150	150	150	150	150
Group net income	\$	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000
Cash Flow	\$	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000
With Project											
Capital Investment											
Packing shed (\$10,000)	\$	10,000									
Develop harvest protocols (\$2,500)	\$	2,500									
Training in horticultural production	\$	2,500	2,000	500							
Develop and test low-cost packaging	\$	2,200	1,000	1,000							
Develop market linkages with wholesalers	\$		2,500								
Sub-total Capital Investment	\$	17,200	5,500	1,500							
Recurrent Costs											
Operating costs (electricity, water, etc)	\$		400	400	400	400	400	400	400	400	400
Labor	\$										
Management, accounting, etc		200	400	400	400	400	400	400	400	400	400
Packhouse (10 persons @ \$2/day x 100 days)			2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Packaging (1st grade, \$/20kg-container)	\$2		180	225	281	352	352	352	352	352	352
Maintenance	2.50%		75	76	77	79	79	79	79	79	79
Subtotal Recurrent Costs		200	3,055	3,101	3,158	3,230	3,230	3,230	3,230	3,230	3,230
Income (Net revenue)	\$										
Output	kg/farmer	6,000	6,000	7,500	9,375	11,719	11,719	11,719	11,719	11,719	11,719
1st grade	30%		1,800	2,250	2,813	3,516	3,516	3,516	3,516	3,516	3,516
2nd grade	70%		4,200	5,250	6,563	8,203	8,203	8,203	8,203	8,203	8,203
Gross revenue	\$/kg	0.15									
1st grade (20% premium 1st year, 40% thereafter)	40%		0.18	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
2nd grade (0% premium)	0%		0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Cost of production (excl land)	\$/kg	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Net revenue per kg	\$/kg	0.08	0.10	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Net revenue per farmer	\$/farmer	480	534	735	919	1,148	1,148	1,148	1,148	1,148	1,148
Number of farmers		150	150	150	150	150	150	150	150	150	150
Group net income	\$	72,000	80,100	110,250	137,813	172,266	172,266	172,266	172,266	172,266	172,266

Table 23 Financial Analysis for Produce, Collection, Grading and Packing Center

Item	Unit	Year									
		1	2	3	4	5	6	7	8	9-19	20
Project Impact											
Incremental Capital Investment	\$	17,200	5,500	1,500	0	0	0	0	0	0	0
Incremental Recurrent Costs	\$	200	3,055	3,101	3,158	3,230	3,230	3,230	3,230	3,230	3,230
Incremental Net Income	\$	-	8,100	38,250	65,813	100,266	100,266	100,266	100,266	100,266	100,266
Incremental cash flow	\$	-17,400	-454	33,649	62,654	97,035	97,035	97,035	97,035	97,035	97,035
NPV @ 12% discount = \$		\$477,940									
FIRR=		130%									

Table 24 Sensitivity Analysis for Produce, Collection, Grading and Packing Center

Scenarios	NPV (12%)	FIRR
Base case	\$477,940	130%
10% cost increase	\$473,744.86	122%
10% benefit decrease	\$425,950.83	121%
10% cost increase +10% benefit decrease	\$421,755.40	113%
1 year lag in benefits	\$412,956.75	84%

Table 25 Financial Analysis for Contract Farming System for Paddy

Item	Unit	Unit Cost	Year								
			1	2	3	4	5	6	7	8-19	20
Without Project											
Average farm situation											
Area	Hectare		1	1	1	1	1	1	1	1	1
Yield-WetSeason	kg/hectare		2,195	2,195	2,195	2,195	2,195	2,195	2,195	2,195	2,195
-DrySeason	kg/hectare		3,073	3,073	3,073	3,073	3,073	3,073	3,073	3,073	3,073
Price-WetSeason	\$/kg		0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135
-DrySeason	\$/kg		0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125
GrossIncome	\$/hectare		680	680	680	680	680	680	680	680	680
Productioncosts	\$/hectare		400	400	400	400	400	400	400	400	400
NetincomeperFarmer	\$/hectare		280	280	280	280	280	280	280	280	280
NumberofFarmers	Farmers		2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500
TotalNetIncome	\$		701,125	701,125	701,125	701,125	701,125	701,125	701,125	701,125	701,125
Trader											
PurchaseofPaddy-WetSeason	\$/tonne	\$135.00	\$740,813	\$740,813	\$740,813	\$740,813	\$740,813	\$740,813	\$740,813	\$740,813	\$ 740,813
-DrySeason	\$/tonne	\$125.00	\$960,313	\$960,313	\$960,313	\$960,313	\$960,313	\$960,313	\$960,313	\$960,313	\$ 960,313
Costofcollectionandmarketing	\$/tonne										
Transport	\$/tonne	\$3.63	\$47,741	\$47,741	\$47,741	\$47,741	\$47,741	\$47,741	\$47,741	\$47,741	\$ 47,741
Labor	\$/tonne	\$0.80	\$10,582	\$10,582	\$10,582	\$10,582	\$10,582	\$10,582	\$10,582	\$10,582	\$ 10,582
Fees	\$/tonne	\$0.25	\$3,328	\$3,328	\$3,328	\$3,328	\$3,328	\$3,328	\$3,328	\$3,328	\$ 3,328
Others	\$/tonne	\$1.65	\$21,793	\$21,793	\$21,793	\$21,793	\$21,793	\$21,793	\$21,793	\$21,793	\$ 21,793
Profit	\$/tonne	\$2.46	\$32,361	\$32,361	\$32,361	\$32,361	\$32,361	\$32,361	\$32,361	\$32,361	\$ 32,361
SellingpricetoProcessor-WetSeason	\$/tonne	\$143.79	\$789,065	\$789,065	\$789,065	\$789,065	\$789,065	\$789,065	\$789,065	\$789,065	\$ 789,065
-DrySeason	\$/tonne	\$133.79	\$1,027,866	\$1,027,866	\$1,027,866	\$1,027,866	\$1,027,866	\$1,027,866	\$1,027,866	\$1,027,866	\$ 1,027,866
Miller											
AnnualpurchasesbyMiller	Tonnes		13170	13170	13170	13170	13170	13170	13170	13170	13170
Lossesafterpurchase	Tonnes	10%	1317	1317	1317	1317	1317	1317	1317	1317	1317
Costofpurchase	\$		\$1,816,931	\$1,816,931	\$1,816,931	\$1,816,931	\$1,816,931	\$1,816,931	\$1,816,931	\$1,816,931	\$ 1,816,931
MillingCost-Fuel	\$/tonne	\$8.28	\$98,172	\$98,172	\$98,172	\$98,172	\$98,172	\$98,172	\$98,172	\$98,172	\$ 98,172
-Labor	\$/tonne	\$0.47	\$5,624	\$5,624	\$5,624	\$5,624	\$5,624	\$5,624	\$5,624	\$5,624	\$ 5,624
-SacksandBags	\$/tonne	\$2.27	\$26,951	\$26,951	\$26,951	\$26,951	\$26,951	\$26,951	\$26,951	\$26,951	\$ 26,951
-Tax	\$/tonne	\$0.11	\$1,328	\$1,328	\$1,328	\$1,328	\$1,328	\$1,328	\$1,328	\$1,328	\$ 1,328
-Other	\$/tonne	\$0.05	\$634	\$634	\$634	\$634	\$634	\$634	\$634	\$634	\$ 634
60% Sales-WetSeasonRice	\$/tonne	\$300	\$888,975	\$888,975	\$888,975	\$888,975	\$888,975	\$888,975	\$888,975	\$888,975	\$ 888,975
60% -DrySeasonRice	\$/tonne	\$223	\$925,357	\$925,357	\$925,357	\$925,357	\$925,357	\$925,357	\$925,357	\$925,357	\$ 925,357
7% -BrokenRice	\$/tonne	\$156	\$129,642	\$129,642	\$129,642	\$129,642	\$129,642	\$129,642	\$129,642	\$129,642	\$ 129,642
12% -Bran	\$/tonne	\$142	\$201,975	\$201,975	\$201,975	\$201,975	\$201,975	\$201,975	\$201,975	\$201,975	\$ 201,975
21% -Husk	\$/tonne	\$4.13	\$10,268	\$10,268	\$10,268	\$10,268	\$10,268	\$10,268	\$10,268	\$10,268	\$ 10,268
TotalNetIncome	\$/tonne		\$206,577	\$206,577	\$206,577	\$206,577	\$206,577	\$206,577	\$206,577	\$206,577	\$ 206,577

Table 25 Financial Analysis for Contract Farming System for Paddy

Item	Unit	Unit Cost	Year								
			1	2	3	4	5	6	7	8-19	20
With Project											
Investment costs											
Identification of rice production areas	\$/farmer	\$5	12,500								
Assistance in drafting contracts	\$	\$4	10,000								
Development of harvesting & post-harvesting protocols	\$/farmer	\$4	10,000								
Development of advisory & training services	\$/farmer	\$4	10,000								
Training of FFSE extension workers											
FSSE extension workers- 1 per 25 farmers	no.		100	100	100						
Training costs/extension worker	\$/Worker		500	500	500						
Total training costs	\$		50,000	50,000	50,000						
Training & capacity building for company	\$		\$5,000	\$5,000	\$5,000						
Construction of depots (1 per 500 farmers @ \$10,000 each)	\$			25,000	25,000						
Sub-total Investment Costs			98,100	80,600	80,600						
Recurrent Costs											
Contract signing/maintenance with farmers	\$/farmer	\$2		5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Refresher training of extension workers	\$					500	500	500	500	500	500
Salaries/Cost of extension workers	\$/Wprker	600	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Farmer Field Schools	\$/farmer	20	50,000					50,000			
Paddy Quality Control-Drying and Grading	\$/tonne	3	\$39,510	\$49,388	\$61,734	\$77,168	\$77,168	\$77,168	\$77,168	\$77,168	\$77,168
Sub-total Recurrent Costs			\$149,510	\$114,388	\$126,734	\$142,668	\$142,668	\$192,668	\$142,668	\$142,668	\$142,668
Benefits											
Farmers											
Output-Wet Season Paddy	kg/hectare		2,195	2,744	3,430	4,287	4,287	4,287	4,287	4,287	4,287
-Dry Season Paddy	kg/hectare		3,073	3,841	4,802	6,002	6,002	6,002	6,002	6,002	6,002
-Yield Improvements	%		0	25%	25%	25%	0	0	0	0	0
Price-Wet Season Paddy with Contract	\$/tonne		\$137.46	\$137.46	\$137.46	\$137.46	\$137.46	\$137.46	\$137.46	\$137.46	\$137.46
Price-Dry Season Paddy with Contract	\$/tonne		\$127.46	\$127.46	\$127.46	\$127.46	\$127.46	\$127.46	\$127.46	\$127.46	\$127.46
Gross Income	\$/hectare		693	867	1,083	1,354	1,354	1,354	1,354	1,354	1,354
Production costs	\$/hectare		400	500	600	600	600	600	600	600	600
Net income	\$/hectare		293	367	483	754	754	754	754	754	754
Transportation and Collection Costs	\$/tonne	\$6.34	\$83,445	\$104,306	\$130,382	\$162,978	\$162,978	\$162,978	\$162,978	\$162,978	\$162,978
Miller											
Annual purchases by Miller	Tonnes		13,170	16,463	20,578	25,723	25,723	25,723	25,723	25,723	25,723
Losses	%		10%	10%	9.0%	8.5%	8.0%	7.5%	7.5%	7.5%	7.5%
Losses after purchase	Tonnes		1317	1646	1852	2186	2058	1929	1929	1929	1929
Cost of purchase	\$		\$1,816,931	\$2,271,163	\$2,838,954	\$3,548,693	\$3,548,693	\$3,548,693	\$3,548,693	\$3,548,693	\$3,548,693
Milling Cost-Fuel	\$/tonne	\$8.28	\$98,172	\$122,716	\$155,099	\$194,939	\$196,004	\$197,069	\$197,069	\$197,069	\$197,069
-Labor	\$/tonne	\$0.47	\$5,624	\$7,030	\$8,886	\$11,168	\$11,229	\$11,290	\$11,290	\$11,290	\$11,290
-Sacks and Bags	\$/tonne	\$2.27	\$26,951	\$33,688	\$42,578	\$53,516	\$53,808	\$54,100	\$54,100	\$54,100	\$54,100

Table 25 Financial Analysis for Contract Farming System for Paddy

Item		Unit	Unit Cost	Year									
				1	2	3	4	5	6	7	8-19	20	
	-Tax	\$/tonne	\$0.11	\$1,328	\$1,659	\$2,097	\$2,636	\$2,650	\$2,665	\$2,665	\$2,665	\$	2,665
	-Other	\$/tonne	\$0.05	\$634	\$793	\$1,002	\$1,259	\$1,266	\$1,273	\$1,273	\$1,273	\$	1,273
64%	Sales-WetSeasonRice	\$/tonne	\$300	\$948,240	\$1,185,300	\$1,498,088	\$1,882,898	\$1,893,188	\$1,903,477	\$1,903,477	\$1,903,477	\$	1,903,477
64%	-DrySeasonRice	\$/tonne	\$223	\$987,047	\$1,233,809	\$1,559,398	\$1,959,957	\$1,970,667	\$1,981,378	\$1,981,378	\$1,981,378	\$	1,981,378
3%	-BrokenRice	\$/tonne	\$156	\$55,561	\$69,451	\$87,779	\$110,326	\$110,929	\$111,532	\$111,532	\$111,532	\$	111,532
12%	-Bran	\$/tonne	\$142	\$201,975	\$252,469	\$319,093	\$401,057	\$403,249	\$405,441	\$405,441	\$405,441	\$	405,441
21%	-Husk	\$/tonne	\$4.13	\$10,268	\$12,835	\$16,221	\$20,388	\$20,500	\$20,611	\$20,611	\$20,611	\$	20,611
TotalNetIncome		\$/tonne		\$253,451	\$316,814	\$431,962	\$562,417	\$584,882	\$607,347	\$607,347	\$607,347	\$	607,347
Incremental Costs and Benefits													
Investment Costs		\$		98,100	80,600	80,600	0	0	0	0	0	0	0
Recurrent Costs		\$		149,510	114,388	126,734	142,668	142,668	192,668	142,668	142,668	142,668	142,668
Net Benefits													
Farmers		\$/farmer		\$13	\$86	\$203	\$474	\$474	\$474	\$474	\$474	\$	474
		\$		\$32,361	\$215,733	\$507,447	\$1,184,590	\$1,184,590	\$1,184,590	\$1,184,590	\$1,184,590	\$	1,184,590
Miller		\$		\$46,874	\$110,237	\$225,385	\$355,840	\$378,305	\$400,770	\$400,770	\$400,770	\$	400,770
Total Benefits		\$		\$79,235	\$325,970	\$732,832	\$1,540,430	\$1,562,895	\$1,585,361	\$1,585,361	\$1,585,361	\$	1,585,361
Incremental Cash Flow		\$		-168,375	130,982	525,497	1,397,762	1,420,228	1,392,693	1,442,693	1,442,693	1,442,693	1,442,693
NPV@12%discount=\$			\$7,549,967										
IRR=			209%										

Table 26 Sensitivity Analysis for Contract Farming System for Paddy

Scenarios	NPV (12%)	FIRR
Base case	\$7,549,967	209%
10% cost increase	\$7,420,472	185%
10% benefit decrease	\$6,665,475	183%
10% cost increase +10% benefit decrease	\$6,535,981	163%
1 year lag in benefits	\$6,455,557	95%
Only 3 Year Project	\$328,123	120%
Only 5 Year Project	\$2,022,301	202%
10 Year Project	\$4,947,921	209%

16 Institutional Framework

16.1 General Principles

479. The proposed formulation of the ACAP poses some challenges for the institutional framework needed for effective implementation. The program is innovative and different from past agricultural program in one fundamental respect, namely its emphasis on value chain approach. Value chains by definition cut across sectors and in the particular case of agricultural value chains they link producers, traders, processors, input suppliers, and exporters. As such, the types of interventions envisaged in a program that promotes the development of value chains in rice-based farming systems has to look beyond the production dimensions, and consider marketing, processing, and trade dimensions as well.

480. The cross-sector nature of agricultural value chains has an immediate institutional implication: the need of involving not just the traditional agencies responsible for agricultural development (ie MAFF and MOWRAM), but also agencies related to rural development, industry, commerce, and women development (ie MRD, MOI, MOC, MWA). For example, to select an implementation agency under MAFF might send the wrong signal that the program emphasizes only production aspects.

481. The proposed institutional framework discussed in this section of the report is based on some general principles briefly discussed below. The proposed framework will require considerable discussion and revision during the Design phase of the program.

1. **Cross-Cutting Dimensions.** As already explained, rather than having an implementation agency that is under one specific ministry, it is recommended to have a unit that is responsible to a steering committee (headed by MAFF) but involving other relevant ministries and agencies (including representative of the private sector).
2. **Effective Coordination.** Coordination is vital in such a program. Coordination will be required at different levels: central, local, and between local and central. Coordination at the central level could be achieved by a Steering Committee that involves different central agencies and AusAID. Coordination at the local level could be achieved through use of program coordinating units who work closely with Provincial Committee (including provincial line agencies), Commune Councils, and private sector representatives. Coordination between local and central level could be achieved by a specialized unit, the Program Management Unit responsible for overall implementation of the program.
3. **Local Government.** As pointed out by several stakeholders, coordination is easier and more effective at the local level, particularly at the Commune Council level. The program envisages the formulation of Commune Marketing Plans that are similar to the planning process of the local government. Therefore, by following similar procedures, the program is able to strengthen local organization and avoid the creation of new institutional mechanisms.
4. **Specialized Skills.** The implementation will require a set of specialized skills, including value chain management, farming systems, water use management, postproduction technologies and processing, and social mobilization that in the current set up of line agencies are distributed among various departments of a number of ministries. This suggests that the choice of the implementation agency could not be any specific department in any specific ministry. Instead, a specialized unit will have to be established for the implementation of the program. In addition to the expertise of the

management units, specialized technical assistance services will be required to deal with some of the complexities that a new program like the one proposed here is likely to face.

5. **Keep M&E separate from Implementation.** Usually monitoring and evaluation is conducted by the same implementation agency. It is strongly recommended that M&E is done by an independent unit that is responsible not to the Program Management but to the Steering Committee.

16.2 Steering Committee

482. The Steering Committee for the Program will comprise representatives of:

1. MAFF (Chair)
2. MOWRAM
3. MRD
4. MOWRAM
5. MOC (Ministry of Commerce)
6. MOI (Ministry of Industry)
7. Chamber of Commerce of Phnom Penh
8. Chamber of Commerce of Battambang
9. AusAID (Secretary)

483. The Steering Committee will be chaired by MAFF and AusAID will provide the Secretary of the Steering Committee.

484. The responsibilities of the Steering Committee include:

1. Overall Guidance to the Program Management Unit
2. Coordination of ACAP activities with other programs by RGC and other donors
3. Approval of Yearly Working Plans
4. Overall Monitoring and Evaluation of Program Activities

485. Both the Program Management Unit and the Monitoring and Evaluation Unit report to the Steering Committee.

16.3 Monitoring and Evaluation Unit

486. The Monitoring and Evaluation Unit (MEU) will report to the Steering Committee and coordinate with the Program Management Unit. In order to preserve independence, the MEU will report directly to the Steering Committee rather than to the Program Management Unit.

487. The responsibilities of the MEU include:

1. Establish baselines for program implementation activities
2. Identification of indicators for monitoring and evaluation
3. Conduct monitoring activities and monitoring reports
4. Conduct impact evaluation studies

16.4 Program Management

488. The Program Management will include the Provincial Management Unit (PMU) at the central level and the Provincial Coordination Units (PCUs) at the provincial level.

16.4.1 Program Management Unit

489. The Program Management Unit (PMU) at the central level will be responsible for:

1. Overall implementation of the Program's activities
2. Aggregation of working plans from the Provincial Coordination Units
3. Coordination of activities at the provincial levels with central agencies and other programs by RGC and other donors
4. Provision of technical services to the provincial units
5. Overall financial managements and disbursement of funds to the provincial units
6. Final approval of provincial proposal plans
7. Organization of training and capacity building activities to support provincial activities
8. Coordination with Monitoring and Evaluation Unit activities
9. Contractual arrangements with service provider organizations (public, NGO, and private)

490. The PMU will consist of:

1. Program Director
2. Finance and Administration Director
3. Value Chain Development Specialist
4. Farming Systems Specialist
5. Postharvest and Agribusiness Specialist
6. Policy Advisor
7. Training and Capacity Building Director

491. The PMU will report to the Steering Committee. It will coordinate with Technical Assistance consultants recruited to provide specific technical services to support provincial units' activities.

492. The Director of the PMU will be recruited by the Steering Committee through competitive bidding and have a proven record of program management and expertise in commercial agricultural development.

16.4.2 Provincial Coordination Units

493. The Provincial Coordination Units (PCUs) will be responsible for:

1. Implementation of activities at the provincial level
2. Coordination with Provincial Committees (line agencies at the provincial level)
3. Aggregation of plans at the provincial level and Commune Councils level
4. Supervision of activities at the commune and provincial levels
5. Disbursement of funds at the provincial and commune levels

6. Coordination of technical assistance services to the Provincial Committees and Commune Councils
7. Coordination of training and capacity building activities at the provincial level
8. Pre-Selection of proposals for financing through matching grant scheme
9. Monitoring of implementation of selected proposals
10. Coordination with Monitoring and Evaluation Unit
11. Preparation of provincial annual plans
12. Financial and program reports at the provincial level

494. The PCU will report to the Program Management Unit. They will coordinate with the Provincial Committees and the Commune Councils.

495. The PCUs will consist of:

1. Provincial Coordinator
2. Finance and Administration Head
3. Training and Capacity Building Head
4. Farming System Specialist
5. Value Chain Specialist
6. Postharvest and Agribusiness Specialist
7. Area supervisors (each area comprising 5 communes)

16.5 The Provincial Committees

496. The Provincial Committees will include the representatives of the key line agencies and private sector organizations in each province including:

1. Provincial Department of Agriculture
2. Provincial Department of Water Resources
3. Provincial Department of Rural Development
4. Provincial Department of Women Affairs
5. Provincial Department of Commerce
6. Provincial Department of Industry
7. Chamber of Commerce (if existing)
8. Rice Milling Association (if existing)

497. The responsibilities of the Provincial Committee include:

1. Coordination of Program Activities in the province with other programs by RGC and other donors programs
2. Coordination with Provincial Rural Development Committee plans and activities
3. Pre-Selection of proposals submitted by Commune Councils and other stakeholders for financing through the matching grant schemes
4. Provide services to the communities and stakeholders involved in the Program consistently with the approved proposals and other ongoing activities by the respective organizations

498. The Provincial Committees will ensure the technical feasibility of the proposed activities of the Program and coordination with similar activities by other programs (by NGOs and donors) and RGC's activities in the province.

499. The Provincial Committee will work closely with the Provincial Coordination Units in order to ensure smooth implementation of the proposed activities in the province. The Provincial Committee will ensure coordination with local government plans and activities, including the plans of the Provincial Rural Development Committee and Commune Councils. The Provincial Committee will also ensure coordination with line agencies and implementation of RGC programs in the province.

16.6 The Commune Councils

500. The Commune Councils in the Program will be responsible for aggregating the proposals from farmers groups, cooperatives, and other stakeholders into Commune Marketing Plans. The Marketing Plans will then be submitted to the Provincial Committee for review and pre-selection of those proposals that could be funded by the Program through the matching grant scheme. The Commune Councils will receive extensive Technical Assistance to ensure capacity strengthening to prepare Commune Marketing Plans based on the proposals from stakeholders.

16.7 The Technical Assistance

501. Technical Assistance will be given upon request to:

1. The Program Management in order to provide specific technical services related to technology, supply chain management, market intelligence, certification, and enterprise development.
2. The Provincial Committees in order to provide advisory and technical services to evaluate proposals, planning, technologies, marketing, farmer and trade organization capacity strengthening.
3. The Commune Councils in order to provide capacity strengthening to evaluate proposals produce Commune Marketing Plans, marketing, and enterprise development.

16.8 Matching Grant Scheme

502. The Matching Grant³¹ Scheme proposed in the approach is a mechanism through which farmers and entrepreneurs with the technical assistance of the program can formulate proposals to (i) access research, extension, and business services, (ii) obtain investment funds for small irrigation schemes, collection centers, storage facilities, packhouses, village roads, drying equipment; (iii) participate in training, capacity strengthening, and technology and knowledge solutions; and (iv) obtain market intelligence and information needed to improve their management and business practices to increase value added in rice based farming systems. Farmers and entrepreneurs will share the costs of implementing their proposals, while the program will match their contribution with a grant. Awareness and capacity building activities will ensure that stakeholders know the details of the matching grant scheme and have the capacity to submit proposals.

³¹ The matching grant scheme implies that a certain percentage (x percent) of the investment in each proposal be funded by the proponents. The remaining part of the investment (100-x percent) will be funded by the program.

503. The program will assist stakeholders to specify and access demand-driven market-oriented services or investments ('semi-public goods') of their own choosing, which will help them to increase their profitability, income, productivity etc. by strengthening their trading and other linkages with each other and with other value chain stakeholders and thus to move the commercialization of the agricultural sector upwards to a higher general level.

504. Specific proposals for such services and/or investments will be made by qualifying stakeholders to the program, and will be accepted or rejected by decisions of the Screening Committee. For each proposal the Screening Committee Members will provide a written evaluation of the proposal using a Scoring Matrix, outlining the evaluation of each proposal against objective criteria developed by the PMU; see Table 27 for an example. These written evaluations and attached Scoring Matrix will be sent to the persons and organizations submitting the proposal.

505. The schematic representation of a matching grant scheme is illustrated in Figure 19. There are numerous details to be clarified during the design phase related to who will manage the funds, who will screen and select the proposals, how disbursement and implementation would occur, etc.

Table 27 Example Scoring Matrix for Proposal Evaluation – Technical Screening

Category	Sub-Category	Weighting (%)	Ranking (1-5)	Score
Sustainability	Economic			
	Natural Resource and Environment			
	Social			
	Sub-Total			
Value Chain Management	Action Plan for Improvements in Supply Chain Management			
	Action Plan for Improvements in Supply Chain Technology			
	Action Plan for Training and Capacity Building – Within Organization			
	Action Plan for Improvements in Quality			
	Action Plan for Reductions in Post Harvest Losses			
	Action Plan for Improving Sales and Marketing			
	Sub-Total			
Agribusiness Linkages Improvement	Linkages with Input Suppliers			
	Linkages with Farmers			
	Linkages with Traders			
	Linkages with Processors and Exporters			
	Linkages with Business Service Providers (Public and Private)			
	Action Plan for Training and Capacity Building – Linking Organizations			
	Sub-Total			
Investment	Technical Feasibility			
	Integration with Value Chain Management			
	Integration with Agribusiness Linkages			
	Economic Viability			
	Sub-Total			
Total				
Eligibility Requirements[†]		<input checked="" type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass	
RGC Requirements	Governance and Transparency		Fail	Pass
	Contribution to Employment		Fail	Pass
	Long Term Sales and Economic Viability		Fail	Pass
	Environmental Guidelines		Fail	Pass
AusAID Requirements	Social and Gender Guidelines		Fail	Pass
	Financial Soundness		Fail	Pass
	Environmental Guidelines		Fail	Pass

Ranking (1-5): 1=Lowest, 5=Highest; Score=Ranking x Weight

[†] **Eligibility Requirements:** Proposals must pass all of the eligibility requirements. Those proposals that do not pass will be automatically excluded irrespective of their performance in any other category or sub-category in the scoring matrix.

Note: This Scoring Matrix is only an example. The PMU along with the Screening Committee needs to develop a Scoring Matrix to use to evaluate proposals.

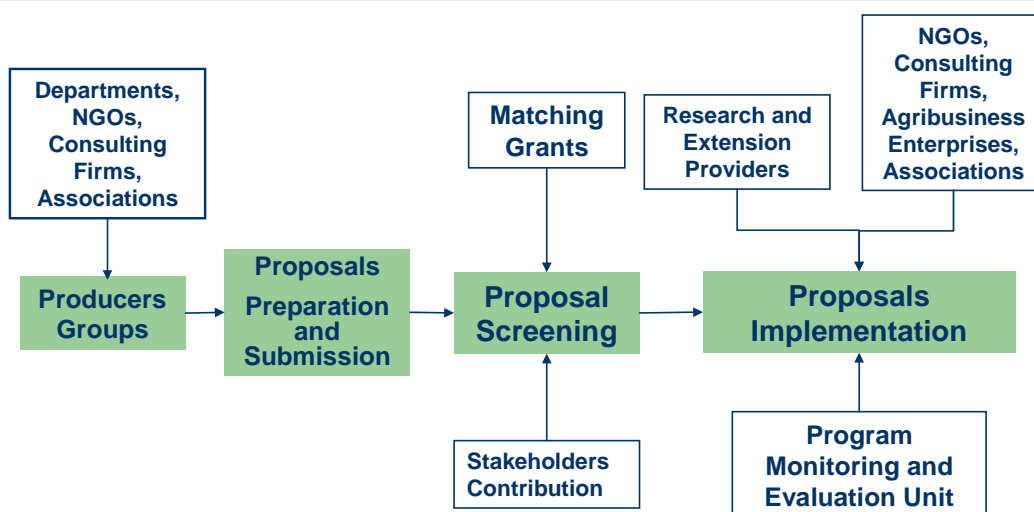


Figure 19 Matching Grant Scheme

506. A system of submission from stakeholders to the PMU through local government organizations (such as the Commune Councils), provincial committees, and feedbacks from provincial coordination units is illustrated. The Technical Assistance to the Commune Councils and the Provincial Committee is to ensure the preparation of effective Commune Marketing Plans and pre-screening of proposals (see Figure 20).

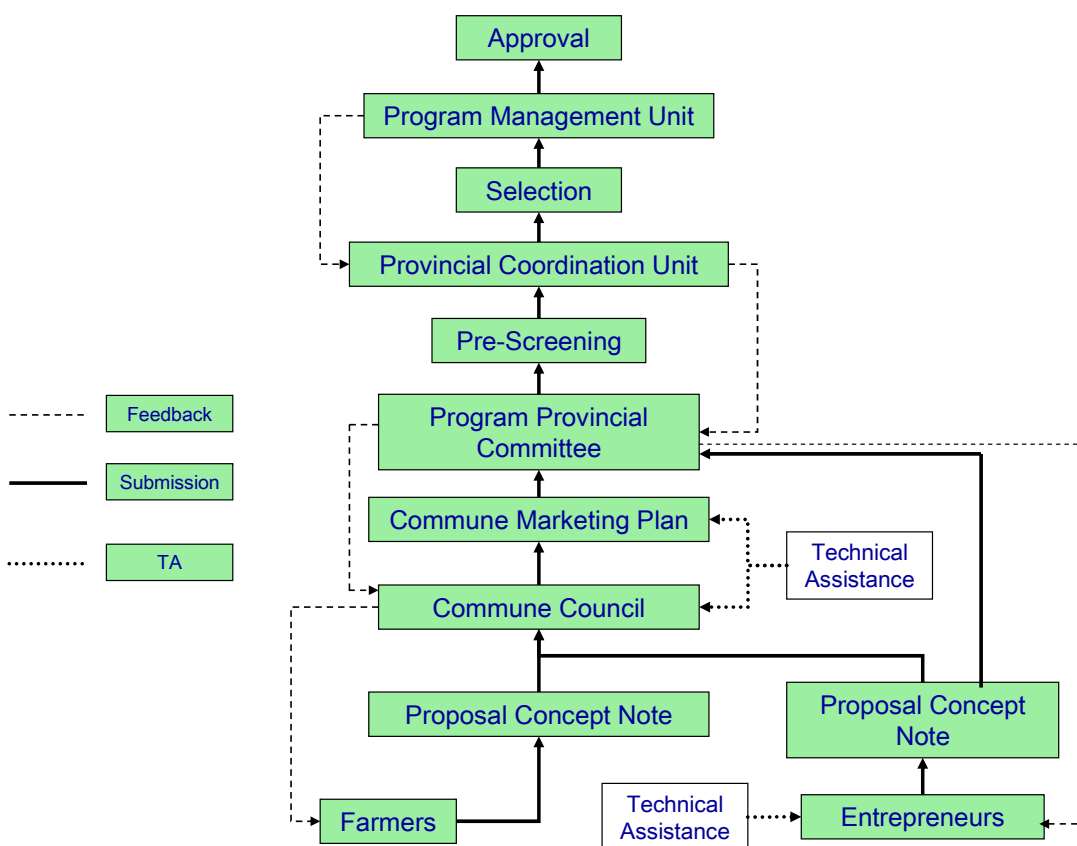


Figure 20 Process of Proposal Submission, Feedback, and Technical Assistance

16.9 Roles of Stakeholders

507. A number of stakeholders will be involved in the program implementation. Their roles are summarized in Table 28.

Table 28 Role of Different Stakeholders in the Program

Stakeholders	Roles
Farmers, Traders, Processors and their Associations	<ul style="list-style-type: none"> Engage in production, processing, and marketing Prepare, submit, and implement investment proposals Form groups and alliances for marketing, production, irrigation, processing Engage in capacity strengthening (production, planning, marketing, processing, postharvest)
NGOs and BDS	<ul style="list-style-type: none"> Facilitate formation of groups and alliances Provide business development services
Departments at Central and Local Level	<ul style="list-style-type: none"> Provide technical services Coordinate among agencies and programs Monitoring and Reporting
Research Organizations	<ul style="list-style-type: none"> Provide technical services Conduct on-farm and on-firm demonstrations
Consultants/ Advisors	<ul style="list-style-type: none"> Provide technical assistance and advisory services
Ministries (MAFF, MOWRAM, MRD, MOC, MOI, MWA)	<ul style="list-style-type: none"> Overall coordination of program activities with central agencies, donors, and provincial departments Overall monitoring, evaluation, and reporting
Local Government	<ul style="list-style-type: none"> Coordinate community plans with overall plans Coordinate program activities with other programs/projects
AusAID	<ul style="list-style-type: none"> Overall supervision Disbursement of funds Recruitment of Consultants/Advisors Overall monitoring and evaluation

17 Expected Impacts and Risks of the Proposed Program

17.1 Impacts on Poverty Reduction and Pro-Poor Development

508. The expected impact on poverty reduction and pro-poor development is expected to derive through four channels³²:

1. Employment generation, social mobilization and organization of smallholder farmers into larger groups, and additional income opportunities in a more dynamic rural economy arising from strengthening linkages in commercial agriculture.
2. Increases in agricultural productivity arising from increased value chain management.
3. Increases in value added of agricultural produce at the farm gate level
4. Reduction in post-harvest losses and increases in quality resulting in increased income.

509. Poverty reduction through employment generation is achieved through increase and diversification of employment opportunities both on the farm and in the post-production system. Increased employment opportunities for the poor derive from increased demand for agricultural products, particularly high valued crops in labor-intensive activities such as horticultural production and agroprocessing. Increased employment opportunities in the post-production system are related to activities such as additional movement of commodities, sorting, grading, packaging, processing and storing.

510. Poverty reduction via social mobilization is achieved through organization of small-size and dispersed farmer groups into larger and closely-linked farmer organizations such as larger farmer groups, cooperatives, producer associations and federations (ANZDEC, ACI et al. 2003; UNDP and FAO 2004).

511. One of the main features of the program is the linking of farmer groups with agro-enterprises and the market. The linkage will provide opportunities for both the farmer groups and the commercial agro-enterprises. The farmer groups will be able to see what other farmers have been able to achieve through improved organization and therefore will be motivated to undertake similar type of arrangements, as deemed suitable to their circumstances. The commercial agro-enterprises might see opportunities for further involving more farmers into their operations, either in production, marketing or processing (ANZDEC, ACI et al. 2003; UNDP and FAO 2004).

512. Groups to benefit most directly will be farmers and private sector entrepreneurs who are presently impeded by lack of value chain linkages and value chain management. There would be indirect benefits to suppliers of input goods and services particularly in regional areas. Indirect benefits also to rural labor force through increased employment opportunities.

³² See ANZDEC, ACI et al ANZDEC, ACI, et al. (2003). Nepal Commercial Agriculture Development Project: Final Report. Kathmandu, Nepal, ANZDEC, ACI and CMS for His Majesty's Government of Nepal (Ministry of Agriculture and Co-operatives) and the Asian Development Bank. and UNDP and FAO UNDP and FAO (2004). Agroindustry and the Transformation of Agricultural Products in Myanmar. Yangon, Myanmar, Government of the Union of Myanmar, United Nations Development Programme and Food and Agriculture Organization of the United Nations: 293. for a discussion on the impacts of agribusiness development on poverty reduction and pro-poor development.

513. There would be large potential flow-on benefits in income generation to a wide range of farmer producers who may be either suppliers of agro-processing businesses or directly participate as members of farmer cooperatives and agroenterprises. Most income effects would be expected in rural areas.

514. Employment effects are expected to be positive, especially for the poor in rural areas with increased opportunities as agroindustry workers, labor in agro-enterprises, and farm workers.

515. As value added post-production activities in agriculture is the main sector of the rural economy, it is expected that a more commercialized economy will increase income and growth of agriculture and the rural economy. Agricultural commercialization will then be an engine of growth of the rural economy, and generate demand for a variety of services and goods. Agricultural growth multipliers are estimated of the order of 3 to 4 in other economies with similar structure as Cambodia. That implies that for each percentage point of growth in the agricultural sector (both production and post-production), 3-4 additional percentage points of growth will be expected in the non-agricultural sector of the rural economy. This will be realized through demand linkages for services (e.g. transportation, accounting, marketing, input consultancy services) and commodities (e.g. equipment, household goods, construction, and inputs and spare parts) (ANZDEC, ACI et al. 2003; UNDP and FAO 2004).

516. Price stability in domestic markets is expected to improve due to expanded capacity for agro-processing as a significant alternative target for farmers producing commercial quantities and qualities of product. Trade effects are expected to be positive with increased exports and increased potential for import replacement.

17.2 Impacts on Social and Gender Development

517. The main theme of agricultural commercialization through value chains is to ensure the movement of commercial ventures in agriculture from a low level of commercialization to a higher level of commercialization. However, the conceptualization of the strategy recognizes that the majority of farmers are operating at subsistence level and many are at a very low level of commercialization. Moreover, the core issue for commercialization and agribusiness development is that the vulnerability of rural households is one of the main causes for the absence of a network of functional value chains (ANZDEC, ACI et al. 2003; UNDP and FAO 2004).

518. Most of the poor and vulnerable groups have few assets (e.g. land, finance, livestock) and little education. As a consequence, their main source of income is low-skill wage labor. However, employment opportunities are limited in rural areas, and the poor and vulnerable often resort to different coping mechanisms (including migration and indebtedness). Their capacity to organize and interact with other stakeholders in the value chains is limited. Their low education and social status usually prevents them from gaining access to markets (for labor), and to credit and programs that might improve their condition. The limited access to social services (health, education, water) aggravates the plight often arising from their exposure to different types of risk (e.g. disease, natural calamities, and accidents) (ANZDEC, ACI et al. 2003; UNDP and FAO 2004).

519. In order to analyze how the strategy addresses the problem of poverty and gender imbalance, it is useful to consider:

1. How the strategy will be able to expand opportunities for the poor and women to engage in value-adding activities,
2. Reduce vulnerability of disadvantaged groups arising from commercial agriculture development, and
3. Enhance capabilities of the poor, disadvantaged groups, and women to engage directly or benefit indirectly in agribusiness.

520. The following sections summarize the analysis along the three dimensions of opportunity, vulnerability and capability.

17.2.1 Improved Opportunity

521. The program envisages increased opportunities for income growth and employment generation for the poor, women and disadvantaged groups. The increased opportunities will be the effect of investment projects that facilitate the access to technology, markets, infrastructure and information. The investments are expected to expand production and marketing of a broad range of agricultural products thus resulting in the promotion of organizations that involve smallholder farmers production and employment of labor both on the farm (production activities) and off-farm (post-production activities).

17.2.2 Vulnerability Reduction

522. The program aims at moving the commercialization of the agriculture sector from the current low level to a higher level. At the higher level of commercialization and agribusiness activities, stakeholders are better organized as value chains and therefore better able to cope with challenges and risk arising from natural events and markets. The program highlights the importance for the smallholder farmers and the targeted groups of poor, women and disadvantaged people to form larger organizations able to connect to markets, access technology and make larger investments. The promotion of higher level of commercialization implies the greater use of contracts between farmer groups and processors, thus reducing the vagaries of markets and weather. The growth of agribusiness and agro-industry will also stimulate the growth of employment, both at the farm level and off-farm, stabilizing the flow of seasonal labor out of rural areas. Improved water use management and access to small irrigation system will contribute to reduce the risk in agricultural production.

17.2.3 Capability Development

523. The program recognizes that there is a considerable amount of work to do in order to increase capacity to move commercial agriculture stakeholders to a higher level. To a large extent, the program could be regarded as a series of projects that builds capabilities for stakeholders to form value chains and establish mutually profitable linkages among themselves. Capability development within the program takes place in all investment proposals. Awareness programs, leadership programs and organizational skills to benefit targeted groups should be part of the various modules proposed in the program design.

524. An analysis of the effects of various value chain investment proposals on poverty and gender suggests that the project might in fact play an important role in reducing

poverty and redressing gender imbalance. The two objectives will be achieved through an acceleration of broad-based agricultural growth in the country.

525. Broad-based agricultural growth in the country is a necessity. Given the predominance of small-scale farms in the country, it is quite difficult to envisage growth of the sector without a broad based involvement and sharing by smallholders. The commercial agriculture producers and entrepreneurs targeted by the program will be primarily smallholder farmers and small and medium enterprises. As long as the poor are well organized into larger commercial organizations their chances of getting out of poverty are higher and their chances of precipitating into abject poverty are lower.

526. The program is formulated under the awareness that many poor farmers and rural households will be able to benefit directly from growth of commercial activities primarily as wage earners, either as laborers on farms or as laborers in the post-production system. In some cases, poor households might be able to get out of poverty through sharecropping or through the starting of micro enterprises and provision of services related to commercial agriculture. Most of the investments considered in the component are very likely to be labor-intensive. In most cases, the capital is relatively small and oriented to improve infrastructure and increase access to knowledge, markets, information and improved skills.

527. The program envisages a dynamics of the commercialization process that sees the formation of value chain linkages as one step in a continuum of degrees of commercialization ranging from semi-subsistence to sophisticated commercialization. By providing a mechanism to move the groups from a low level of commercialization to a higher level, the program facilitates the dynamics of social change necessary to commercialization.

17.2.4 Risks

528. There are several risks to the successful implementation of this program. These are outlined below, along with some mitigation measures that could be undertaken by the project.

529. **The submitted proposals will not incorporate the poor.** Extensive consultation with stakeholders including farmers, traders, processors, organizations (public, private, and NGOs) will ensure that different concerns are addressed. Most of the proposals submitted by farmers will be by smallholder farmers belonging to three groups of farm households: the poor, below middle income, and middle income farm households.

530. **Enterprises and Organizations will choose not to take advantage of the matching grant scheme under the Components.** The PMU will engage in an extensive awareness building campaign, pointing out the advantages of the program to organizations, groups, and enterprises.

531. **Participants will not be seriously committed.** Participation in the project provides an opportunity to participants to develop networks and linkages with other stakeholders. These benefits depend on commitment to the capacity building activities which will be monitored through inputs (active participation), outputs (proposals), and outcomes (performance evaluations).

532. Training and Capacity Building will be poorly implemented. The PMU is responsible for the good implementation of the sub-component. The MEU will be responsible for monitoring the implementation. Reports of the MEU will be submitted to the Steering Committee of the Program, the PMU, and to AusAID.

533. The approval rate of proposals will be slow. The Selection Committees will have a time-bound plan for screening and evaluation of proposals.

534. Disbursement of funds will be delayed. The PMU is responsible for disbursement of funds after approval of the proposal and signing of the contract. The MEU will be responsible for monitoring the implementation. Reports of the MEU will be submitted to the Steering Committee of the Program, the PMU, and to AusAID.

535. Submitted proposals will not be of the required standard for selection. The PMU will engage in an extensive awareness building campaign for proposal submission. The PMU will assist prospective organizations in developing appropriate submissions through intensive TA interventions at the commune level to assist in the development of the Commune Marketing Plans as well as assistance to entrepreneurs to submit proposals.

536. Inappropriate proposals will be selected by the Selection Committees. The Province level Selection Committees will be independent from each other and final approval to each proposal must be given by the PMU. The Committees will have to evaluate and rank every submitted proposal against objective criteria developed by the PMU during project implementation. The proposals will be judged against a score card matrix (see Table 27). The written evaluations of every proposal will be given to every submitter, along with the PMU and to AusAID.

537. Stakeholders will not make the expected contribution and therefore there will not be demand for the funds. As already noted, the Program will conduct extensive awareness and capacity building activities and will design contribution on a sliding scale. As opposed to other initiatives (e.g. the GTZ private sector development program), this Program will (i) focus on only few provinces and value chains; (ii) provide both capacity building and investment funds; (iii) facilitate linkages with the market; and (iv) provide funds to help stakeholders establish economies of scale and become more attractive prospects to financial institutions. All these advantages are expected to increase demand for the matching grants. Field work and NGO experience (e.g. IDE) confirm that even poor stakeholders are responsive to this set of incentives and are ready to invest.

18 Recommendations for the Design Phase

538. The outcome of the Diagnostic Study is the indication of an approach to program formulation, its tentative components, outputs, inputs, activities, indicators, institutional framework, and expected impacts and risks. During the initial stage of the Design Phase, the Design Team, AusAID and RGC counterparts (including MAFF and MOWRAM) will review and finalize the proposed approach before embarking into the detailed design of the program.

539. The design will be conducted using participatory methods. The Design Team will interact closely with AusAID, MAFF, MOWRAM and other stakeholders at the central and provincial levels in order to identify specific program activities, define appropriate implementation arrangements, and collect data and information for the economic, financial, and impact analysis. Through a series of briefings and workshops, the Design Team will maintain a constant flow of information with AuSAID and the key government counterparts at the central and local level.

540. The design will involve the following:

1. Detailed description of outputs, inputs, and activities
2. Specific implementation arrangements including the institutional framework, the responsibilities, and reporting requirements
3. Monitoring and Evaluation performance system, including indicators and list of monitoring activities
4. Implementation Plan
5. Reporting
6. Flow of Funds
7. Procurement arrangements
8. Technical Assistance
9. Costing of all components
10. Economic and Financial analysis of the program
11. Impact analysis of the program
12. Logframe of proposed program

541. The design will require extensive consultations with stakeholders at central level and provincial level. To this purpose, the Design Team will need to conduct Planning Workshops and Design Workshops both in Phnom Penh and in the proposed provinces

542. A tentative schedule of the Design Phase is indicated in Table 29.

543. It is recommended to give sufficient time to the design of the program, not only to ensure sound technical, economic, and institutional feasibility of the proposed activities, but also to allow communications and feedbacks from the key parties involved (AusAID, central government, and local government).

544. The TOR of the Consultant's Team are provided in Appendix O.

Table 29 Tentative Schedule for the Design Phase

Week	Activity	Deliverable
1	Review of Diagnostic Study	Briefing from AusAID/MAFF/MOWRAM
2	Finalization of the Approach	Briefing to AusAID/MAFF/MOWRAM
3-4	Identification of Activities	Planning Workshop
5	Institutional Framework	
6	Monitoring and Evaluation System	Briefing to AusAID/MAFF/MOWRAM
7	Costing of the Program	
7	Economic and Financial Analysis	
8	Impact Analysis	Briefing to AusAID/MAFF/MOWRAM
9-10	Preparation of Draft Final Report	Draft Final Report
11-12	Review and Feedback	Final Workshop
13-14	Final Report	Final Report

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