

GUIDELINES FOR THE DESIGN OF AGRICULTURAL INVESTMENT PROJECTS  
PART III: Outline for a Project Preparation Report

Example:

Figure 1. Bar Chart for Project Design and Implementation  
THAILAND: Kaeng Sua Ten Agricultural Dam Project - Implementation Schedule

Action	1991	1992	1993	1994	1995	1996	1997
Royal Thai Government approval of preparation report	██████████						
World Bank 1/		P	A B E				
Dam Design:							
(a) Further investigations	██████████						
(b) Select consultants	██████████						
(c) Design and prequalification of tenders		██████████					
(d) Panel of experts 2/		↓	↓	↓	↓		
Construction:							
(i) Tender and adjudicate			██████████				
(ii) Preliminary works			██████████				
(iii) RCC dam				██████████	██████████	██████████	██████████
(iv) Mae Yom rehabilitation	██████████	██████████	██████████	██████████			
(v) Resettlement				██████████	██████████		
Project Benefits						██████████	██████████

1/ P = approval of RTG request for appraisal and use of PRF for dam design. A = appraisal. B = Board approval. E = Loan effective.

2/ ↓ signifies input by panel of experts on dam safety.

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Table 1. ACTIVITIES ACCORDING TO STAGES IN PROJECT PROCESSING

SUBJECT	RECONNAISSANCE 1	IDENTIFICATION 2	PREPARATION 3	DESIGN 4	CONSTRUCTION AND IMPLEMENTATION 5	MONITORING 6
A. Hydrology for major irrigation works	<p>Assemble &amp; collate data. Mean rain maps, mean &amp; minimum recorded flows as far as available. Hence identify main water sources. Note tendency for swamps &amp; floods.</p> <p>Round-figure estimates of: area each source will irrigate, power potential etc. Note recorded floods. Locate areas of swamps &amp; seasonal inundation.</p>	<p>As 1 plus visits to selected data stations; assess data quality. Note high flood levels, damage, extent and durations of recorded inundations.</p> <p>Review data; recommend any needed improved obs. network/processing. Regional envelopes &amp; frequency analysis of floods &amp; droughts. Estimate sediment runoff &amp; erosion. Preliminary basin water balance.</p>	<p>As 2, reworking data if necessary; check ratings, revise basin water balance, hydrological model for multipurpose projects. Generate critical sequences of flood &amp; drought.</p>	<p>Updating of 3 including detailed flood/drought analysis, flood routing, sedimentation, water treatment for municipal/ industry.</p>	<p>Capacity of river diversion etc. during construction.</p>	<p>Ongoing data collection for project and national hydrology, future refining of estimates.</p>
B. Hydrogeology for irrigation	<p>Assemble &amp; collate data on existing groundwater use. Identify regions having groundwater potential.</p> <p>On basis of air photographs &amp; topo maps identify areas worth further study.</p>	<p>As 1 plus visits to selected sites to prepare prefeasibility study.</p> <p>Review well logs and existing pumping rates. Sample &amp; test water chemicals. Outline karstic and sedimentary formations on map.</p>	<p>As 2 plus drilling test wells, pump tests, geophysical surveys, simple model of aquifer recharge, storage, transmissivity, yield.</p>	<p>As 3 refining aquifer model &amp; yield estimates, design of wells, screens and pumps; specify drilling methods.</p>	<p>Supervise well construction and production tests. Revise aquifer yield estimates.</p>	<p>Well outputs, well drawdown, water table or piezometric level. Update model.</p>
C. Topography for Irrigation Scheme Design	<p>1: 250,000 maps, 50m contour intl. Main watersheds rivers, roads, towns.</p>	<p>Catchment area maps at 1:50,000, 10m contour intl. or largest scale available. Identify additional mapping needs. Maps: 1:10,000, 2 m c.i. of sites of major canals, structures reservoirs.</p>	<p>As 2 plus maps: 1:10,000, 1m contour intl. in irrigable areas: 1:2,000, 1 contour intl. for major canals and structures.</p>	<p>As 3 plus maps of larger scales for selected structures. Bench marks for setting out.</p>	<p>Setting out diagrams based on bench marks from 4.</p>	

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SUBJECT	RECONNAISSANCE 1	IDENTIFICATION 2	PREPARATION 3	DESIGN 4	CONSTRUCTION AND IMPLEMENTATION 5	MONITORING 6
D. Geology and soil Mechanics for major irrigation works	On basis of air photographs & topo maps & seismic records, assess areas suitable for dams, canals, structures etc.	As 1 plus visits to selected sites. Field classification of soils and formations at a few key sites.  Visit possible sites for structures, set preliminary criteria for dam and canal design, foundations, slope stability. Prepare program for 3.	Drilling investigations for dams, structures, borrow areas. Test soil strength & permeability of selected samples. Revise design criteria. Check reservoir watertightness.	Analysis of slope stability, foundations, percolation, seismicity, concrete aggregate.	Monitor strata and materials encountered and modify designs if necessary.	
E. Irrigation Engineering Designs	Outline main water sources, irrigable land and other demand areas. Outline areas of swamp or periodic inundation.  Link present or potential demands with possible sources. Hence identify possible schemes. Identify areas for swamp reclamation, flood control.	As 1 plus visits to selected sites.  Outline designs and alignments of major works. Define basin plan for optimum water use and/or inter-basin transfer.	Water management & irrig. efficiencies, canal capacities. Reservoir operation (with hydrol. models), sizes of dams, reservoirs, structures. Feasibility level designs based on sufficient surveys and investigations to ensure that no significant changes are expected.	Detailed designs, construction drawings, bills of quantities. Specifications & contract documents.	Analyse tenders, supervise constructions, prepare as-built drawings & report. Operation and maintenance manual.	Records of construction progress. Check performance and condition of structures.
F. Costs of irrigation systems	Classify project as low cost, medium or large according to current criteria.	Approx. costs (including operation & maintenance) of engineering works, supervision, layout, on farm development & any needed compensation. Quantities and costs would often be estimated by comparison with other projects, perhaps on a per ha basis for irrigation work.	Major quantities accurate to, say, 20%. For repetitive features, type designs are prepared. Foreign/local costs & programme of expenditure for engineering, land preparation, agricl, compensation etc as 2.	Detailed costs and schedule of prices, including compensation & way leave.	Compare actual costs with estimates.	Records of capital and operating expenditure.

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SUBJECT	RECONNAISSANCE 1	IDENTIFICATION 2	PREPARATION 3	DESIGN 4	CONSTRUCTION AND IMPLEMENTATION 5	MONITORING 6
G. Benefits of irrigation	Qualitative (see under Master Planning)	Aprox. benefits from agricultural development, industry, municipality, hydropower, etc.	Itemized crop income increases; other benefits quantified where possible.			Farm and household income of irrigators.
H. Irrigation Master Planning (additional to A-G above)	Assemble information on population, food needs, water needs, infrastructure. Hence qualitative assesment of needs & potential for development and adequacy of water resources. Note existing regional plans for food production, settlement industry etc., hence derive water demand, areas and list of possible projects. Quantify approx. total water demand and resources.	As 1 plus visits and assessment of socio-political background, and any non-technical constraints to development. Assign projects for:  a) local study/ construction b) provincial study c) HQ/international development.  Population forecasts, needs for industry power, towns. Assess environment & infrastructure. See also E above.	Refine master plans. Liaise with other agencies with plans in area, or affected by water projects. Assess labour supply & demand. Refine study of infrastructure, environment effects, institutions. See also E above.	Liaison with other agencies concerned with related aspects such as roads, settlement, volcanism, earthquakes etc.	Implementation of related aspects by other agencies.	Feedback to refine master plan.
I. Land Classification (general)	Review of following data: LANDSAT/SPOT imagery 1:1 million or larger; air photography 1:120,000 or larger; soil maps 1:250,000, or 1:50,000 land use maps. Review reports and maps of soil survey institutions, universities, consultants etc. Hence identify principal land systems.	As 1, plus maps up to 1:25,000 and air photographs up to 1:25,000. Photo-interpretation and field checks of soil and land capability with observations 1 per 200ha to 1 per 500ha, plus soil samples for chemical analysis. Hence better differentiation of land systems.	As 2 plus recent air photos 1:10,000 etc. Identify and quantify soils and land forms. Define crop-specific land utilization types. Observations 1 per 50ha or 1 per 25 ha. Study erosion, fertility, toxicity.	As 3 with larger scale and more detail. Site-specific tests of selected small areas at 1 or 2 obs/ha.	Implementation of services, training and organisation of farmers.	Fertility, soil conditions, drainage.

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SUBJECT	RECONNAISSANCE 1	IDENTIFICATION 2	PREPARATION 3	DESIGN 4	CONSTRUCTION AND IMPLEMENTATION 5	MONITORING 6
J. Environmental Impact	<p>Preliminary screening of project ideas according to whether:</p> <ul style="list-style-type: none"> <li>- potentially serious negative environmental impact;</li> <li>- minor negative environmental impact;</li> <li>- environmentally benign;</li> </ul> <p>to the extent that available information permits.</p>	<p>Initial assessment of possible environmental impacts of alternative project concepts. Adjust concepts where possible to mitigate negative impacts. Define scope of further environmental investigations, including full environmental assessment if this can be decided at this stage. Prepare terms-of-reference and identify sources of funding. Initiate investigations as appropriate.</p>	<p>Review environmental data gathered. If not already done, decide whether formal EA is needed; if so, prepare TOR/identify funding.</p>	<p>Ensure completion of EA is compatible with intended project appraisal date. If no EA is needed, update and finalize mitigation plan for final project design. Specify indicators, organization and responsibilities for environmental monitoring.</p>	<p>Install monitoring system, operate and maintain capability; upgrade mitigation measures as needed in response to monitoring feedback.</p>	<p>Measure key environmental indicators, as previously specified.</p>
K. Institutions	<p>Literature search to identify administrative structure of country. Discussions with persons who know the country/similar projects in that country. Information from trade organizations etc. Describe overall institutional strength. (Ability, capacity and funding).</p>	<p>As 1, but with some quantification; relate to possible project/s being identified. Suggestions for strengthening. Define institutions' goals and objectives, legislation. Assess need for institutions specialist at preparation stage.</p>	<p>Expansion of 1 and 2. Assemble full details of concerned departments/companies with staff numbers, organizational charts and, at project level, details of qualifications and experience of staff. Quantify staff: client ratios, facilities, capital versus operating budgets. Assess morale. Analyse performance of any similar projects.</p>	<p>Final arrangement of any organization initiatives/changes needed for project. Design performance assessment surveys.</p>	<p>Implement any organizational changes necessary; establish "project office" if needed; carry out periodical assessment surveys (project office). Fine tune institutional arrangements as needed.</p>	<p>Analyse and evaluate performance via surveys; provide feedback to implementation.</p>

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SUBJECT	RECONNAISSANCE 1	IDENTIFICATION 2	PREPARATION 3	DESIGN 4	CONSTRUCTION AND IMPLEMENTATION 5	MONITORING 6
L. Agriculture, Marketing, Extension etc.	<p>List local crops. General policies for irrigated crops, rain-fed crops, food vs. industrial crops, livestock, forestry, aquaculture.</p> <p>General assumptions on crop or tree yields, cropping intensity, fish, aquaculture yields: approx crop/fish water use.</p>	<p>As 1 plus note on constraints on agricultural growth due to lack of seeds, water, O&amp;M, extension, finance, etc.</p> <p>Recommendations on technical strategy: crop strains, patterns, intensity; fertilizers; crop protection; water application; farming practices; extension and other services.</p>	<p>As 2 plus estimates of yields with and without project, and consumptive use. Farm models and more detailed agronomic recommendations. Study needs for manpower, markets, storage, credit, technical support.</p>	<p>Detailed design of extension, agric. input, credit and marketing services, storage etc.</p>		<p>Actual crop yields, cropping patterns and intensity.</p>
M. Economic & Financial Analysis		<p>Ranking of alternatives according to economic returns - using simple rapid criteria, possibly computer programmed.</p>	<p>Economic &amp; financial returns, financial schedules, subsidies, credits &amp; repayment. Sensitivity study.</p>	<p>Financial requirements, loans and disbursements</p>	<p>Baseline monitoring and evaluation survey.</p>	<p>Repayments, farm and household incomes.</p>

GUIDELINES FOR THE DESIGN OF AGRICULTURAL INVESTMENT PROJECTS  
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Table 2

Egypt  
New Land Agricultural Services  
Project Cost Summary

Example:

	'000 LE			'000 US\$			% Foreign Exchange	% Total Base Costs
	Local	Foreign	Total	Local	Foreign	Total		
A. Water Management	4391.3	2612.4	7003.6	1657.1	985.8	2642.9	37.3	13.7
B. Agriculture and Irrigation Extension								
1. Extension Office	2781.5	1379.3	4160.9	1049.6	520.5	1570.1	33.2	8.1
2. Area Extension Centres	1029.1	1231.3	2260.4	388.3	464.6	853.0	54.5	4.4
3. Extension Sub-Centres	1809.5	2345.5	4155.1	682.8	885.1	1568.0	56.4	8.1
Sub-Total	5620.2	4956.1	10576.3	2120.8	1870.2	3991.1	46.9	20.7
C. Cooperatives Development	1246.4	1123.3	2369.7	470.3	423.9	894.2	47.4	4.6
D. Applied Research	980.7	1886.7	2867.4	370.1	711.9	1082.0	65.8	5.6
E. Agricultural Development	17344.6	8172.6	25517.2	6545.1	3084.0	9629.1	32.0	49.9
F. Project Management	1447.8	1315.3	2763.1	546.3	496.3	1042.7	47.6	5.4
Total BASELINE COSTS	31031.0	20066.4	51097.4	11709.8	7572.2	19282.0	39.3	100.0
Physical Contingencies	3103.1	2006.6	5109.7	1171.0	757.2	1928.2	39.3	10.0
Price Contingencies	7923.6	4595.9	12519.5	2990.0	1734.3	4724.3	36.7	24.5
Total PROJECTS COSTS	42057.6	26669.0	68726.6	15870.8	10063.8	25934.6	38.8	134.5

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Table 3

Egypt  
New Land Agricultural Services  
('000 LE)  
Project Components by Year

Example:

	Base Costs					Total	
	01	02	03	04	05	LE'000	US\$'000
A. Water Management	2534.6	928.3	1446.3	1286.3	807.9	7003.6	2642.9
B. Agriculture and Irrigation Extension							
1. Extension Office	1421.5	641.1	616.2	747.7	734.2	4160.9	1570.1
2. Area Extension Centres	695.4	403.5	293.5	574.5	293.5	2260.4	853.0
3. Extension Sub-Centres	1084.6	658.5	832.0	670.0	910.0	4155.1	1568.0
Sub-total	3201.4	1703.1	1741.7	1992.2	1937.7	10576.3	3991.1
C. Cooperatives Development	576.2	558.7	412.9	423.4	398.4	2369.7	894.2
D. Applied Research	750.1	680.4	693.9	418.9	323.9	2867.4	1082.0
E. Agricultural Development	0.0	4075.0	5333.3	7403.0	8705.9	25517.2	9629.1
F. Project Management	1165.3	376.4	380.9	411.4	428.9	2763.1	1042.7
Total BASELINE COSTS	8227.6	8322.1	10009.2	11935.4	12602.9	51097.4	19282.0
Physical Contingencies	822.8	832.2	1000.9	1193.5	1260.3	5109.7	1928.2
Price Contingencies	583.8	1435.7	2354.7	3593.5	4551.9	12519.5	4724.3
Total PROJECT COSTS	9634.1	10590.0	13364.8	16722.5	18415.2	68726.6	25934.6
Taxes	718.4	93.3	86.3	158.0	83.5	1139.6	430.0
Foreign Exchange	5097.4	4363.2	5123.4	6017.1	6067.9	26669.0	10063.8



GUIDELINES FOR THE DESIGN OF AGRICULTURAL INVESTMENT PROJECTS  
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Table 4

Egypt  
New Land Agricultural Services

Example:

Summary Accounts Cost Summary

	'000 LE			'000 US\$			% Foreign Exchange	% Total Base Costs
	Local	Foreign	Total	Local	Foreign	Total		
<b>I. INVESTMENT COSTS</b>								
A. Civil works	1127.8	902.7	2030.5	425.6	340.7	766.2	44.5	4.0
B. Equipment								
1. Office equipment	419.5	442.2	861.7	158.3	166.9	325.2	51.3	1.7
2. Other equipment	374.0	1496.0	1870.0	141.1	564.5	705.7	80.0	3.7
Sub-Total	793.5	1938.2	2731.7	299.4	731.4	1030.8	71.0	5.3
C. Vehicles	793.3	2379.7	3173.0	299.3	898.0	1197.4	75.0	6.2
D. Survey and studies	790.0	0.0	790.0	298.1	0.0	298.1	0.0	1.5
E. Technical assistance	173.4	1560.6	1734.0	65.4	588.9	654.3	90.0	3.4
F. Farm inputs	18801.2	8172.6	26973.8	7094.8	3084.0	10178.8	30.3	52.8
<b>Total INVESTMENT COSTS</b>	<b>22479.1</b>	<b>14953.9</b>	<b>37433.0</b>	<b>8482.7</b>	<b>5643.0</b>	<b>14125.7</b>	<b>39.9</b>	<b>73.3</b>
<b>II. RECURRENT COSTS</b>								
A. Personnel	2650.3	2650.3	5300.6	1000.1	1000.1	2000.2	50.0	10.4
B. Office expenses	550.5	235.9	786.4	207.7	89.0	296.8	30.0	1.5
C. O&M vehicles	2508.8	1075.2	3584.0	946.7	405.7	1352.5	30.0	7.0
D. Communications materials	680.0	1.0	681.1	256.6	0.4	257.0	0.2	1.3
E. Staff training	1429.7	0.0	1429.7	539.5	0.0	539.5	0.0	2.8
F. Overseas training	0.0	534.5	534.5	0.0	201.7	201.7	100.0	1.0
G. Farmer training	204.8	87.7	292.5	77.3	33.1	110.4	30.0	0.6
H. Experimental farm operations	527.8	527.7	1055.5	199.2	199.2	398.3	50.0	2.1
<b>Total RECURRENT COSTS</b>	<b>8551.8</b>	<b>5112.5</b>	<b>13664.3</b>	<b>3227.1</b>	<b>1929.2</b>	<b>5156.3</b>	<b>37.4</b>	<b>26.7</b>
<b>Total BASELINE COSTS</b>	<b>31031.0</b>	<b>20066.4</b>	<b>51097.4</b>	<b>11709.8</b>	<b>7572.2</b>	<b>19282.0</b>	<b>39.3</b>	<b>100.0</b>
Physical Contingencies	3103.1	2006.6	5109.7	1171.0	757.2	1928.2	39.3	10.0
Price Contingencies	7923.6	4595.9	12519.5	2990.0	1734.3	4724.3	36.7	24.5
<b>Total PROJECTS COSTS</b>	<b>42057.6</b>	<b>26669.0</b>	<b>68726.6</b>	<b>15870.8</b>	<b>10063.8</b>	<b>25934.6</b>	<b>38.8</b>	<b>134.5</b>

GUIDELINES FOR THE DESIGN OF AGRICULTURAL INVESTMENT PROJECTS  
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Table 5

Egypt  
New Land Agricultural Services  
1000 LE

Example:

Summary Accounts by Year

	Base Costs					Total	Foreign Exchange	
	01	02	03	04	05		%	Amount
<b>I. INVESTMENT COSTS</b>								
A. Civil works	1764.0	155.5	111.0	0.0	0.0	2030.5	44.5	902.7
B. Equipment								
1. Office equipment	720.2	45.0	23.0	30.5	43.0	861.7	51.3	442.2
2. Other equipment	745.0	375.0	375.0	375.0	0.0	1870.0	80.0	1496.0
Sub-total	1465.2	420.0	398.0	405.5	43.0	2731.7	71.0	1938.2
C. Vehicles	2153.0	149.0	135.0	441.0	295.0	3173.0	75.0	2379.7
D. Survey and studies	790.0	0.0	0.0	0.0	0.0	790.0	0.0	0.0
E. Technical assistance	424.8	614.8	464.8	164.8	64.8	1734.0	90.0	1560.6
F. Farm inputs	0.0	4075.0	5853.3	7923.0	9122.5	26973.8	30.3	8172.6
<b>Total INVESTMENT COSTS</b>	<b>6597.0</b>	<b>5414.3</b>	<b>6962.1</b>	<b>8934.3</b>	<b>9525.3</b>	<b>37433.0</b>	<b>39.9</b>	<b>14953.9</b>
<b>II. RECURRENT COSTS</b>								
G. Personnel	615.4	1211.8	1157.8	1157.8	1157.8	5300.6	50.0	2650.3
H. Office expenses	110.7	161.3	170.8	171.8	171.8	786.4	30.0	235.9
I. O&M vehicles	379.5	753.2	811.7	819.7	819.7	3584.0	30.0	1075.2
J. Communications materials	103.2	129.1	149.2	149.7	149.7	681.1	0.2	1.0
K. Staff training	123.2	216.8	270.5	374.5	444.5	1429.7	0.0	0.0
L. Overseas training	0.0	91.0	120.0	158.5	165.0	534.5	100.0	534.5
M. Farmer training	27.0	58.5	81.0	63.0	63.0	292.5	30.0	87.7
N. Experimental farm operations	271.5	286.0	286.0	106.0	106.0	1055.5	50.0	527.7
<b>Total RECURRENT COSTS</b>	<b>1630.6</b>	<b>2907.8</b>	<b>3047.1</b>	<b>3001.1</b>	<b>3077.6</b>	<b>13664.3</b>	<b>37.4</b>	<b>5112.5</b>
<b>Total BASELINE COSTS</b>	<b>8227.6</b>	<b>8322.1</b>	<b>10009.2</b>	<b>11935.4</b>	<b>12602.9</b>	<b>51097.4</b>	<b>39.3</b>	<b>20066.4</b>
Physical Contingencies	822.8	832.2	1000.9	1193.5	1260.3	5109.7	39.3	2006.6
Price Contingencies	583.8	1435.7	2354.7	3593.5	4551.9	12519.5	36.7	4595.9
<b>Total PROJECT COSTS</b>	<b>9634.1</b>	<b>10590.0</b>	<b>13364.8</b>	<b>16722.5</b>	<b>18415.2</b>	<b>68726.6</b>	<b>38.8</b>	<b>26669.0</b>
Taxes	718.4	93.3	86.3	158.0	83.5	1139.6	0.0	0.0
Foreign Exchange	5097.4	4363.2	5123.4	6017.1	6067.9	26669.0	100.0	26669.0

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Table 6

Egypt  
New Land Agricultural Services  
Summary Account by Project Component  
'000 LE

Example:

	Water Management	Extension Office	Area		Cooperatives Development	Applied Research	Agricultural Development	Project Management	Total	Contingencies		Contingencies	
			Extension Centres	Extension Sub Centres						%	Amount	%	Amount
<b>I. INVESTMENT COSTS</b>													
A. Civil works	340.0	225.0	177.5	740.0	45.0	100.0	0.0	403.0	2030.5	10.0	203.0	8.8	178.1
B. Equipment													
1. Office equipment	77.5	230.0	28.5	120.0	12.0	74.0	0.0	319.7	861.7	10.0	86.2	10.3	89.0
2. Other equipment	1780.0	0.0	90.0	0.0	0.0	0.0	0.0	0.0	1870.0	10.0	187.0	17.0	318.7
Sub-total	1857.5	230.0	118.5	120.0	12.0	74.0	0.0	319.7	2731.7	10.0	273.2	14.9	407.7
C. Vehicles	324.0	585.0	562.0	525.0	700.0	214.0	0.0	263.0	3173.0	10.0	317.3	14.2	449.5
D. Survey and studies	790.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	790.0	10.0	79.0	7.1	56.1
E. Technical assistance	0.0	444.0	0.0	0.0	0.0	1290.0	0.0	0.0	1734.0	10.0	173.4	18.4	318.6
F. Farm inputs	1456.6	0.0	0.0	0.0	0.0	0.0	25517.2	0.0	26973.8	10.0	2697.4	28.8	7760.3
<b>Total INVESTMENT COSTS</b>	<b>4768.1</b>	<b>1484.0</b>	<b>858.0</b>	<b>1385.0</b>	<b>757.0</b>	<b>1678.0</b>	<b>25517.2</b>	<b>985.7</b>	<b>37433.0</b>	<b>10.0</b>	<b>3743.3</b>	<b>24.5</b>	<b>9170.2</b>
<b>II. RECURRENT COSTS</b>													
A. Personnel	597.3	671.9	526.2	1522.6	480.7	532.8	0.0	969.1	5300.6	10.0	530.1	24.4	1291.8
B. Office expenses	138.0	55.4	36.3	42.2	6.5	150.0	0.0	358.0	786.4	10.0	78.6	24.1	189.6
C. O&M vehicles	370.2	628.0	324.4	633.7	1083.7	268.1	0.0	275.7	3584.0	10.0	358.4	24.9	890.7
D. Communications materials	0.0	677.6	0.0	0.0	0.0	0.0	0.0	3.5	681.1	10.0	68.1	24.1	163.9
E. Staff training	590.0	643.9	0.0	0.0	41.7	0.0	0.0	154.0	1429.7	10.0	143.0	26.8	383.1
F. Overseas training	0.0	0.0	0.0	517.5	0.0	0.0	0.0	17.0	534.5	10.0	53.4	28.3	151.2
G. Farmer training	0.0	0.0	0.0	54.0	0.0	238.5	0.0	0.0	292.5	10.0	29.2	24.9	72.8
H. Experimental farm operating costs	540.0	0.0	515.5	0.0	0.0	0.0	0.0	0.0	1055.5	10.0	105.5	19.5	206.1
<b>Total RECURRENT COSTS</b>	<b>2235.5</b>	<b>2676.9</b>	<b>1402.4</b>	<b>2770.1</b>	<b>1612.7</b>	<b>1189.4</b>	<b>0.0</b>	<b>1777.3</b>	<b>13664.3</b>	<b>10.0</b>	<b>1366.4</b>	<b>24.5</b>	<b>3349.3</b>
<b>Total BASELINE COSTS</b>	<b>7003.6</b>	<b>4160.9</b>	<b>2260.4</b>	<b>4155.1</b>	<b>2369.7</b>	<b>2867.4</b>	<b>25517.2</b>	<b>2763.1</b>	<b>51097.4</b>	<b>10.0</b>	<b>5109.7</b>	<b>24.5</b>	<b>12519.5</b>
Physical Contingencies	700.4	416.1	226.0	415.5	237.0	286.7	2551.7	276.3	5109.7				
Price Contingencies	1359.3	846.8	467.0	916.7	505.8	577.0	7330.9	516.0	12519.5	9.1	1138.1		
<b>Total PROJECT COSTS</b>	<b>9063.4</b>	<b>5423.7</b>	<b>2953.4</b>	<b>5487.3</b>	<b>3112.5</b>	<b>3731.1</b>	<b>35399.8</b>	<b>3555.5</b>	<b>68726.6</b>	<b>9.1</b>	<b>6247.9</b>	<b>18.2</b>	<b>12519.5</b>
Taxes	312.8	189.1	129.8	147.0	135.2	64.6	0.0	161.2	1139.6	9.1	103.6		
Foreign Exchange	3317.0	1739.1	1599.3	3106.8	1455.6	2438.9	11341.6	1670.6	26669.0	9.1	2424.5		

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Table 7

Example: Evolution of Area, Output and Inputs for Individual Crops Over Time

		Egypt New Land Agricultural Services Project TABLE 1.1 Model III Farm Model PRODUCTION AND INPUTS										
		Crop year										
		Without	With Project									
		1 to 10	1	2	3	4	5	6	7	8	9 to 10	
		Unit										
Cropping Intensity	Percent	-	80.0	80.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	
Cropping Pattern												
Existing Technology												
Wheat	Fd.	-	1.7	1.7	-	-	-	-	-	-	-	
Fababeans	Fd.	-	2.0	2.0	-	-	-	-	-	-	-	
Berseem	Fd.	-	1.1	1.1	-	-	-	-	-	-	-	
Sub-Total Existing Technology Area		-	4.8	4.8	-	-	-	-	-	-	-	
New Technology												
Wheat	Fd.	-	-	-	1.7	1.7	1.7	1.7	1.7	1.7	1.7	
Fababeans	Fd.	-	-	-	1.9	1.9	1.9	1.9	1.9	1.9	1.9	
Berseem	Fd.	-	-	-	0.6	0.6	0.6	0.6	0.6	0.6	0.6	
Sub-Total New Technology Area		-	-	-	4.2	4.2	4.2	4.2	4.2	4.2	4.2	
Cropped Area		-	4.8	4.8	4.2	4.2	4.2	4.2	4.2	4.2	4.2	
Main Production												
Wheat	tons	-	1.4	1.5	1.6	1.8	2.0	2.2	2.4	2.6	2.8	
Fababeans	tons	-	0.8	0.9	1.1	1.4	1.6	1.8	2.1	2.3	2.5	
Forage-Berseem green	ton	-	12.1	13.8	9.0	10.5	12.0	13.5	15.0	16.5	18.0	
By Products												
Forage-Wheat straw	ton	-	4.8	5.1	6.0	6.9	7.8	8.7	9.6	10.5	11.4	
Faba/pods	tons	-	0.3	0.3	0.4	0.4	0.5	0.6	0.7	0.7	0.8	
Waste And Loss												
Wheat	tons	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
Fababeans	tons	-	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	
Sales												
Wheat	tons	-	1.3	1.3	1.5	1.7	1.9	2.1	2.2	2.4	2.6	
Fababeans	tons	-	0.8	0.9	1.0	1.3	1.5	1.7	1.9	2.2	2.4	
Forage-Berseem green	ton	-	12.1	13.8	9.0	10.5	12.0	13.5	15.0	16.5	18.0	
Forage-Wheat straw	ton	-	4.8	5.1	6.0	6.9	7.8	8.7	9.6	10.5	11.4	
Faba/pods	tons	-	0.3	0.3	0.4	0.4	0.5	0.6	0.7	0.7	0.8	
Operating Inputs												
Wheat/seeds	kg/fd	-	127.5	127.5	121.5	115.4	109.3	103.3	97.2	91.1	85.0	
Superphos (15%)	kg/fd	-	700.0	723.4	636.2	714.3	792.3	870.6	948.8	1,026.9	1,105.0	
Manure	m <sup>3</sup>	-	3.4	4.0	5.8	7.5	9.3	11.1	12.8	14.6	16.3	
Harvesting	LE/fed	-	-	-	3.0	5.9	8.8	11.7	14.6	17.5	20.4	
Transport	LE/fed	-	17.9	19.8	24.3	29.2	34.0	38.9	43.7	48.6	53.4	
Fababeans/seed	kg/fd	-	200.0	200.0	184.6	179.2	173.8	168.3	162.9	157.5	152.0	
Fungicide/pesticide	LE/fed	-	-	-	13.6	27.2	40.8	54.3	67.9	81.5	95.0	
Soil preparation	LE/fed	-	102.3	102.3	82.5	82.5	82.5	82.5	82.5	82.5	82.5	
Berseem/seed	kg/fd	-	22.0	22.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
Labor												
January	m/days	-	9.1	9.5	7.6	6.7	5.8	4.9	4.0	3.1	2.2	
February	m/days	-	10.2	10.6	9.5	9.1	8.8	8.4	8.1	7.7	7.3	
March	m/days	-	14.4	14.9	12.4	11.7	11.0	10.3	9.6	8.9	8.2	
April	m/days	-	28.4	29.4	24.7	22.6	20.5	18.4	16.3	14.2	12.0	
May	m/days	-	23.0	23.8	20.9	18.3	15.7	13.1	10.5	7.9	5.3	
June	m/days	-	5.1	5.3	4.8	4.3	3.8	3.3	2.8	2.3	1.7	
September	m/days	-	8.2	8.5	6.5	5.9	5.2	4.5	3.9	3.2	2.5	
October	m/days	-	18.2	18.9	16.0	14.3	12.6	10.9	9.2	7.5	5.8	
November	m/days	-	19.6	20.3	18.6	18.7	18.8	18.9	19.0	19.1	19.2	
December	m/days	-	16.2	16.8	14.3	12.9	11.4	10.0	8.5	7.1	5.6	

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Table 8

Example: Build-Up of Farm Cashflow Table

		Egypt New Land Agricultural Services Project TABLE 1.2 Model III Farm Model FINANCIAL BUDGET (In LE)									
		Crop year									
		Incremental									
		1	2	3	4	5	6	7	8	9	10
<b>Main Production</b>											
Wheat		633.8	660.2	747.0	833.7	920.5	1,007.3	1,094.0	1,180.8	1,267.6	1,267.6
Fababeans		490.4	551.7	665.6	807.0	948.4	1,089.9	1,231.3	1,372.7	1,514.2	1,514.2
Forage-Berseem green		302.5	343.8	225.0	262.5	300.0	337.5	375.0	412.5	450.0	450.0
<b>Sub-Total Main Production</b>		1,426.7	1,555.7	1,637.5	1,903.2	2,168.9	2,434.6	2,700.3	2,966.0	3,231.7	3,231.7
<b>By Products</b>											
Forage-wheat straw		190.4	204.0	240.0	275.9	311.9	347.8	383.8	419.7	455.6	455.6
Faba/pods		18.0	20.0	24.5	29.9	35.3	40.8	46.2	51.6	57.0	57.0
<b>Sub-Total By Products</b>		208.4	224.0	264.4	305.8	347.2	388.5	429.9	471.3	512.6	512.6
<b>Gross Value Of Production</b>		1,635.1	1,779.7	1,901.9	2,209.0	2,516.0	2,823.1	3,130.1	3,437.2	3,744.3	3,744.3
<b>Waste And Loss</b>											
Wheat		63.4	60.6	64.1	66.5	68.0	68.4	67.8	66.1	63.4	63.4
Fababeans		49.1	50.6	57.1	64.4	70.0	70.0	76.3	76.9	75.8	75.8
<b>Sub-Total Waste And Loss</b>		112.5	111.1	121.1	130.9	138.0	142.5	144.0	142.9	139.1	139.1
<b>Net Value Of Production</b>		1,522.7	1,668.6	1,780.8	2,078.1	2,378.1	2,680.8	2,986.2	3,294.3	3,605.2	3,605.2
<b>Other Inflows</b>											
Off-farm income		-240.0	-240.0	-240.0	-240.0	-240.0	-240.0	-240.0	-240.0	-240.0	-240.0
<b>INFLOWS</b>		1,282.7	1,428.6	1,540.8	1,838.1	2,138.1	2,440.8	2,746.2	3,054.3	3,365.2	3,365.2
<b>Production Cost</b>											
<b>Operating</b>											
<b>Inputs</b>											
Wheat/seeds		76.5	76.5	72.9	69.3	65.6	62.0	58.3	54.7	51.0	51.0
Superphos (15%)		94.2	97.3	85.6	96.1	106.6	117.1	127.6	138.2	148.7	148.7
Manure		40.8	47.6	68.8	89.9	111.1	132.2	153.4	174.5	195.6	195.6
Harvesting		-	-	3.0	5.9	8.8	11.7	14.6	17.5	20.4	20.4
Transport		17.9	19.8	24.3	29.2	34.0	38.9	43.7	48.6	53.4	53.4
Fababeans/seed		122.0	122.0	112.5	109.3	106.0	102.7	99.4	96.1	92.8	92.8
Fungicide/pesticide		-	-	13.6	27.2	40.8	54.3	67.9	81.5	95.0	95.0
Soil preparation		102.3	102.3	82.5	82.5	82.5	82.5	82.5	82.5	82.5	82.5
Berseem/seed		24.2	24.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2
<b>Sub-Total Inputs</b>		477.9	489.7	476.2	522.3	568.3	614.4	660.4	706.4	752.5	752.5
<b>Hired Labor</b>											
April		56.4	62.1	34.0	21.3	8.7	-	-	-	-	-
May		34.0	28.6	11.2	-	-	-	-	-	-	-
November		3.0	6.3	-	-	-	-	0.5	1.0	1.0	
<b>Sub-Total Hired Labor</b>		93.4	97.0	45.1	21.3	8.7	-	0.5	1.0	1.0	
<b>Sub-Total Operating</b>		561.3	586.6	521.3	543.6	576.9	614.4	660.4	706.9	753.5	753.5
<b>CASH FLOW BEFORE FINANCING</b>		721.4	842.0	1,019.5	1,294.6	1,561.2	1,826.5	2,085.8	2,347.4	2,611.7	2,611.7
<b>Sources Of Finance</b>											
Disbursements On Short Term Loan		289.4	298.5	305.2	346.3	367.9	438.6	493.7	571.9	605.2	605.2
<b>Sub-Total Sources Of Finance</b>		289.4	298.5	305.2	346.3	367.9	438.6	493.7	571.9	605.2	605.2
<b>Loan Repayments</b>											
Short Term Principal		289.4	298.5	305.2	346.3	367.9	438.6	493.7	571.9	605.2	605.2
Short Term Interest		17.4	18.0	18.4	20.8	22.1	26.4	29.7	34.4	36.4	36.4
<b>Sub-Total Loan Repayments</b>		306.8	316.4	323.5	367.1	390.0	465.0	523.3	606.2	641.5	641.5
<b>NET FINANCING</b>		-17.4	-18.0	-18.4	-20.8	-22.1	-26.4	-29.7	-34.4	-36.4	-36.4
<b>FARM FAMILY BENEFITS AFTER FINANCING</b>		704.1	824.1	1,001.2	1,273.8	1,539.1	1,800.1	2,056.2	2,313.1	2,575.4	2,575.4
<b>Returns per Family-Day of Labor</b>		5.1	5.9	7.9	10.6	13.8	17.6	22.5	28.8	37.0	37.0

GUIDELINES FOR THE DESIGN OF AGRICULTURAL INVESTMENT PROJECTS  
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Table 9  
Example: Crop Budgets

Egypt  
Agricultural Services Project  
Wheat / Sugar-Beet Crop Model  
YIELDS AND INPUTS  
(PER Fd.)

	Unit	Crop year							Crop year							Crop year							
		Existing Technology							New Technology							Incremental							
		1	2	3	4	5	6	7 to 20	1	2	3	4	5	6	7 to 20	1	2	3	4	5	6	7 to 20	
Yield	tons	0.8	1	1.6	1.6	1.6	1.6	1.6	0.8	1.2	2	2.5	2.5	2.5	2.5	-	0.2	0.4	0.9	0.9	0.9	0.9	0.9
By Products																							
Forage-Wheat straw	ton	2.8	3	3.2	3.4	3.6	3.8	4	2.8	3.5	4.1	4.8	5.4	6.1	6.7	-	0.5	0.9	1.4	1.8	2.3	2.7	2.7
Operating Inputs																							
Wheat/seeds	kg/fd	75	75	75	75	75	75	75	75	70.9	66.7	62.5	58.4	54.2	50	-	-4.2	-0.4	-12.5	-16.7	-20.9	-25	-25
Amm. Nitrate (31%)	kg/fd	100	108.4	116.7	125	133.4	141.7	150	100	116.7	133.4	150	166.7	183.4	200	-	8.4	16.7	25	33.4	41.7	50	50
Potash sulf	kg/fd	30	33.4	36.7	40	43.4	46.7	50	30	36.7	43.4	50	56.7	63.4	70	-	3.4	6.7	10	13.4	16.7	20	20
Manure	m3	2	2.4	2.7	3	3.4	3.7	4	2	2.7	3.4	4	4.7	5.4	6	-	0.4	0.7	1	1.4	1.7	2	2
Pesticides	value	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.3	0.3	0.3	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Harvest/bags	No.	5	5.5	6	6.5	7	7.5	8	5	6.2	7.4	8.5	9.7	10.9	12	-	0.7	1.4	2	2.7	3.4	4	4
Planting	value	5	4.2	3.4	2.5	1.7	0.9	0	5	6.7	8.4	10	11.7	13.4	15	-	2.5	5	7.5	10	12.5	15	15
Harrowing	value	1	0.9	0.7	0.5	0.4	0.2	0	1	1.7	2.4	3	3.7	4.4	5	-	0.9	1.7	2.5	3.4	4.2	5	5
Harvesting	value	10	8.4	6.7	5	3.4	1.7	0	10	10.4	10.7	11	11.4	11.7	12	-	2	4	6	8	10	12	12
Transport	value	7	7.5	8	8.5	9	9.5	10	7	8.9	10.7	12.5	14.4	16.2	18	-	1.4	2.7	4	5.4	6.7	8	8
Labor																							
February	m/days	3	3.1	3.2	3.3	3.4	3.5	3.6	3	3	3	3	3	3	3	-	-0.1	-0.2	-0.3	-0.4	-0.5	-0.6	-0.6
March	m/days	3	3.1	3.2	3.3	3.4	3.5	3.6	3	3	3	3	3	3	3	-	-0.1	-0.2	-0.3	-0.4	-0.5	-0.6	-0.6
April	m/days	3	3.1	3.2	3.3	3.4	3.5	3.6	3	3	3	3	3	3	3	-	-0.1	-0.2	-0.3	-0.4	-0.5	-0.6	-0.6
May	m/days	10	10.4	10.7	11	11.4	11.7	12	10	8.7	7.4	6	4.7	3.4	2	-	-1.7	-3.4	-5	-6.7	-8.4	-10	-10
June	m/days	3	3.1	3.2	3.3	3.4	3.5	3.6	3	2.7	2.4	2	1.7	1.4	1	-	-0.5	-0.9	-1.3	-1.8	-2.2	-2.6	-2.6
October	m/days	3	3.1	3.2	3.3	3.4	3.5	3.6	3	2.7	2.4	2	1.7	1.4	1	-	-0.5	-0.9	-1.3	-1.8	-2.2	-2.6	-2.6
November	m/days	2	2.1	2.2	2.2	2.3	2.4	2.4	2	2	2	2	2	2	2	-	-0.1	-0.2	-0.2	-0.3	-0.4	-0.4	-0.4
December	m/days	3	3.1	3.2	3.3	3.4	3.5	3.6	3	2.9	2.7	2.5	2.4	2.2	2	-	-0.1	-0.6	-0.8	-1.1	-1.4	-1.6	-1.6

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Table 10

Example: Livestock Herd Projection

ARGENTINA - SERVICIOS AGRICOLAS  
SENASA - 1980

HERD DEVELOPMENT COMPOSITION TOTALS --- (WITHOUT PROJECT)

Scale in years	0	1	2	3	4	5	6	7	8	9	10
NUMBER OF MALE ANIMALS WHOLE YEAR	24	24	24	24	24	24	24	24	24	24	24
NUMBER OF FEMALE ANIMALS WHOLE YEAR	100	100	100	100	100	100	100	100	100	100	100
NUMBER BREEDING FEMALES WHOLE YEAR	59	59	59	59	59	59	59	59	59	59	59
TOTAL NUMBER OF ANIMALS WHOLE YEAR	124	124	124	124	124	124	124	124	124	124	124
NUMBER OF ANIMAL UNITS WHOLE YEAR	106	106	106	106	106	106	106	106	106	106	106
GROWTH RATE OF THE HERD WHOLE YEAR %	0	+0	+0	0	+0	0	+0	0	+0	0	0
NUMBER OF MORTALITIES WHOLE YEAR	8	8	8	8	8	8	8	8	8	8	8
HERD MORTALITY RATE WHOLE YEAR %	6	6	6	6	6	6	6	6	6	6	6
NUMBER OF CULLING-SALES WHOLE YEAR	36	36	36	36	36	36	36	36	36	36	36
OFF-TAKE RATE WHOLE YEAR %	29	29	29	29	29	29	29	29	29	29	29
MILK PRODUCTION QUANTITY WHOLE YEAR (LITERS)	108300	108426	108426	108426	108426	108426	108426	108426	108426	108426	108426

HERD DEVELOPMENT COMPOSITION TOTALS --- (WITH PROJECT)

Scale in years	1	2	3	4	5	6	7	8	9	10
NUMBER OF MALE ANIMALS WHOLE YEAR	24	25	26	26	30	30	30	30	30	30
NUMBER OF FEMALE ANIMALS WHOLE YEAR	100	110	112	119	123	123	123	123	123	123
NUMBER BREEDING FEMALES WHOLE YEAR	59	69	70	70	70	70	70	70	70	70
TOTAL NUMBER OF ANIMALS WHOLE YEAR	124	135	140	149	153	154	154	154	154	154
NUMBER OF ANIMAL UNITS WHOLE YEAR	112	127	138	145	157	157	157	157	157	157
GROWTH RATE OF THE HERD WHOLE YEAR %	8	4	7	7	0	0	+0	0	+0	0
NUMBER OF MORTALITIES WHOLE YEAR	7	7	6	7	7	7	7	7	7	7
HERD MORTALITY RATE WHOLE YEAR %	6	5	4	4	4	4	4	4	4	4
NUMBER OF CULLING-SALES WHOLE YEAR	27	36	40	45	49	49	49	49	49	49
OFF-TAKE RATE WHOLE YEAR %	22	27	28	30	32	32	32	32	32	32
MILK PRODUCTION QUANTITY WHOLE YEAR	109546	110748	112074	113095	113816	113495	113498	113497	113497	113497

**Table 11**

**Example: Sierra Leone - Calculation of Import Parity Price**

	Projection 1995	Projection 2000
..... US\$/Mt .....		
Rice (Thai), white, milled, 5% broken FOB, Bangkok in 1985 constant terms <sup>a/</sup>	168	166
Rice (Thai), white, milled, 5% broken FOB, Bangkok in 1990 constant terms <sup>b/</sup>	243	240
Allowance for adjusted quality (15%)	(36)	(36)
Ocean freight and insurance	60	60
<b>CIF Freetown</b>	<b>267</b>	<b>264</b>
..... LE '000/Mt .....		
CIF Freetown (LE 6,250 = US\$1)	42.7	42.2
Handling and port charges <sup>c/</sup>	2.4	2.4
Landed cost of rice at Freetown	45.1	44.6
Transport Moyamba-Freetown <sup>c/</sup>	(4.0)	(4.0)
Price of rice at Moyamba market	41.1	40.6
Moyamba price paddy equivalent (65% yield)	26.7	26.4
Value of by-products less milling charges <sup>c/</sup>	0.3	0.3
Transport farm to Moyamba <sup>c/</sup>	(2.1)	(2.1)
Farmgate economic price for paddy	24.9	24.6
Farmgate financial price for paddy <sup>d/</sup>	40.0	40.0

<sup>a/</sup> Prices in 1985 constant dollars, derived from world Bank, Commodity Price Projections, February 1990.

<sup>b/</sup> Adjusted by MUV Index of 1.4439 for 1990 (1985 = 1.00).

<sup>c/</sup> Financial values have been converted to economic values using a SCF of 0.9.

<sup>d/</sup> Derived from farm survey data.



Table 12

Example: Egypt: Calculation of Export Parity Price for Cotton

	Projection	
	1995	2000
	..... US\$/Mt.....	
Projected price of middling grade, CIF Europe in 1985 constant terms <sup>a/</sup>	1,110	1,210
Price in 1991 constant terms	1,650	1,799
Ocean freight and insurance	(35)	(35)
FOB Port Alexandria	1,615	1,764
FOB Port Alexandria (Le3.30=US\$1.0)	5,331	5,822
	..... Le/Mt .....	
Quality Premium (10% for long staple)	533	582
Net value of cotton seed	107	116
FOB value	5,971	6,520
Port charges and handling	(100)	(100)
Exporter's charges (2% of FOB value)	(119)	(130)
Transport: Port - wholesaler	(50)	(50)
Wholesale market price	5,702	6,240
Ginning cost	(150)	(150)
Transport: Farm - wholesaler	(15)	(15)
Economic Farmgate Price	5,537	6,075
Financial Farmgate Price <sup>b/</sup>	1,590	1,590

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<sup>a/</sup> From World Bank Commodity Price Projections, October 1991.

<sup>b/</sup> Mission estimate based on field investigations.

GUIDELINES FOR THE DESIGN OF AGRICULTURAL INVESTMENT PROJECTS  
PART III: Outline for a Project Preparation Report

Table 13

Example: Cost and Benefit Streams for Economic Analysis

MADAGASCAR														
-----														
Middle-West Region Development Project														
-----														
Economic Analysis														
-----														
million FMG														
-----														
	1	2	3	4	5	6	7-09	10	11	12	13-14	15	16-19	20
-----														
<b>Costs</b>														
-----														
Investment	2357	3060	2309	2398	2074	-	-	-	-	-	-	-	-	-
Recurrent	538	504	612	635	659	659	659	659	659	659	659	659	659	659
Replacement	-	-	-	-	-	-	-	591	495	115	271	899	-	591
Farm Level Investment	-	50	590	1130	1620	1960	1960	1960	1960	1960	1960	1960	1960	1960
<b>Total Costs</b>	<b>2895</b>	<b>3694</b>	<b>3601</b>	<b>4163</b>	<b>5153</b>	<b>2619</b>	<b>2619</b>	<b>3210</b>	<b>3114</b>	<b>2734</b>	<b>2890</b>	<b>3510</b>	<b>2619</b>	<b>3210</b>
-----														
<b>Benefits</b>														
-----														
Rice	-	-	539	1078	1617	2156	2156	2156	2156	2156	2156	2156	2156	2156
Maize	-	-	101	202	303	404	404	404	404	404	404	404	404	404
Cassava	-	-	120	240	360	480	480	480	480	480	480	480	480	480
Vegetables	-	-	278	555	833	1110	1110	1110	1110	1110	1110	1110	1110	1110
Pork	-	-	290	580	870	1160	1450	1450	1450	1450	1450	1450	1450	1450
<b>Total Benefits</b>	<b>-</b>	<b>-</b>	<b>1328</b>	<b>2655</b>	<b>3983</b>	<b>5310</b>	<b>5600</b>	<b>5600</b>	<b>5600</b>	<b>5600</b>	<b>5600</b>	<b>5600</b>	<b>5600</b>	<b>5600</b>
-----														
<b>Net Benefits</b>														
-----														
<b>Net Benefits</b>	<b>-2895</b>	<b>-3694</b>	<b>-2273</b>	<b>-1508</b>	<b>-1170</b>	<b>2691</b>	<b>2981</b>	<b>2390</b>	<b>2486</b>	<b>2866</b>	<b>2710</b>	<b>2090</b>	<b>2981</b>	<b>2390</b>
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GUIDELINES FOR THE DESIGN OF AGRICULTURAL INVESTMENT PROJECTS  
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Table 14

Example: Sensitivity Analysis and Switching Value Calculation

MADAGASCAR															
Middle-West Region Development Project.															
Economic Analysis															
million FMS															
Present Value of Net Streams at a Discount Rate of 12.0%							Internal Rates of Returns of Net Streams								
	BTOT 1/	UP 10%	UP 20%	UP 50%	DOWN 10%	DOWN 20%	DOWN 50%		BTOT 1/	UP 10%	UP 20%	UP 50%	DOWN 10%	DOWN 20%	DOWN 50%
CTOT 2/	1900.2	4530.9	7177.7	15094.1	-738.6	-3377.4	-11293.8	BTOT 2/	14.640	18.025	21.168	29.646	10.914	6.660	NONE
UP 10%	-548.6	2090.2	4729.0	12645.3	3187.4	-5826.2	-15742.5	UP 10%	11.271	14.640	17.728	25.937	7.487	3.016	NONE
UP 20%	-2997.4	-358.6	2280.2	10196.5	-5636.2	-8274.9	-16191.3	UP 20%	8.155	11.565	14.640	22.669	4.223	-0.648	NONE
UP 50%	-10343.7	-7794.9	-5666.1	2850.2	-12982.5	-15621.2	-23537.6	UP 50%	-0.648	3.345	8.660	14.640	-6.030	-16.550	NONE
DOWN 10%	4348.9	6987.7	9826.5	17542.8	1710.1	-928.6	-8845.8	DOWN 10%	18.385	21.840	25.083	33.930	14.640	10.473	-11.663
DOWN 20%	6797.7	9436.5	12075.3	19991.6	4158.9	1520.1	-6396.2	DOWN 20%	22.669	26.254	29.646	38.982	18.830	14.640	-3.759
DOWN 50%	14144.0	16782.8	19421.6	27337.9	11505.2	8866.4	950.1	DOWN 50%	41.878	46.336	50.604	62.489	37.197	32.265	14.640
	BTOT 1/	LAG 1	LAG 2	LAG 3					BTOT 1/	LAG 1	LAG 2	LAG 3			
CTOT 2/	1900.2	-927.1	-3651.5	-5705.3				CTOT 2/	14.640	10.962	8.709	7.199			
UP 10%	-548.6	-3375.9	-5900.2	-8154.1				UP 10%	11.271	8.389	6.636	5.469			
UP 20%	-2997.4	-5824.6	-8349.0	-10602.9				UP 20%	8.155	6.009	4.725	3.880			
UP 50%	-10343.7	-13170.9	-15695.3	-17949.2				UP 50%	-0.648	-0.447	-0.342	-0.277			
DOWN 10%	4348.9	1521.7	1092.7	3256.6				DOWN 10%	18.385	13.797	10.991	9.194			
DOWN 20%	6797.7	3970.4	1446.1	897.8				DOWN 20%	22.669	16.988	13.547	11.236			
DOWN 50%	14144.0	11316.7	8792.4	6538.5				DOWN 50%	41.878	30.502	24.074	19.924			
LAG 1 3/		1696.6	-827.8	-3081.7				LAG 1 3/		14.640	10.962	8.709			
LAG 2			1514.8	-739.1				LAG 2			14.640	10.942			
LAG 3				1352.5				LAG 3				14.640			

Switching Values at 12.0%			
Stream	Appraisal Value	Switching Value	Percentage Change
BTOT 1/	26387.8	24487.7	-7.20%
CTOT 2/	24487.7	26387.8	7.80%

Net Present Value at 000 12.0% = 1900.2  
Internal Rate of Return = 14.6%  
Coupon Equivalent Rate of Return = 13.2%

1/ BTOT = Total Benefits  
2/ CTOT = total Costs  
3/ LAG 1-2-3 = Logging Benefits and/or Costs 1-2-3 years