THE ARAB REPUBLIC OF EGYPT

MINISTRY OF IRRIGATION

FINAL REPORT

ON

FEASIBILITY STUDY

FOR

THE SOUTH HOSAINIA VALLEY AGRICULTURAL DEVELOPMENT PROJECT

(ANNEXES)

VOLUME 6

MARCH 1981

JAPAN INTERNATIONAL COOPERATION AGENCY

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JAPAN INTERNATIONAL COOPERATION AGENCY

GENERAL PLANNING MAP

LEGEND

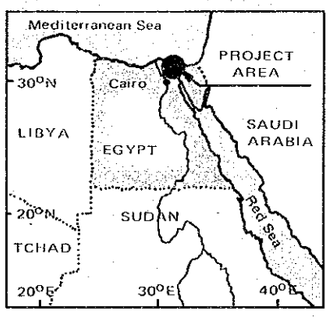
- DIVERSION FACILITY
- IRRIGATION CANAL
- DRAINAGE CANAL
- FEEDER ROAD
- VILLAGE ROAD
- SMALL VILLAGE
- SERVICE VILLAGE
- CENTRAL VILLAGE
- (P) PUMPING STATION FOR DRAINAGE
- (Pr)(Pb) PUMPING STATION FOR IRRIGATION
- LIVE-STOCK CENTER

Bahr Saft drain

El Salam canal

Bahr Baqar drain

KEY MAP



SCALE

0 1 2 3 4 5 Kilometres

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PROJECT EXECUTION AND O & M PROGRAM

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ABBREVIATIONS AND GLOSSARY

ARE	:	Arab Republic of Egypt
B/C	:	Benefit Cost Ratio
CIF	:	Cost, Insurance and Freight
EIRR	:	Economic Internal Rate of Return
ET	:	Evapotranspiration
FAO	:	Food and Agriculture Organization
FC	:	Foreign Currency
FOB	:	Free on Board
FY	:	Fiscal Year (July 1st to June 30th)
IBRD	:	International Bank of Reconstruction and Development
JICA	:	Japan International Cooperation Agency
K	:	Potassium
LC	:	Local Currency
LE	:	Egyptian Pound = 1.4 US$ = 300 Japanese Yen
MOA	:	Ministry of Agriculture
MOI	:	Ministry of Irrigation
MOLR	:	Ministry of Land Reclamation
N	:	Nitrogen
O & M	:	Operation and Maintenance
P	:	Phosphorous
$, US$	:	Dollar, US$ = 0.74 LE

Units of Measurement

Length

mm	:	millimeter
cm	:	centimeter
m	:	meter
km	:	kilometer

Area

sq.cm, cm^2	:	square centimeter
sq.m, m^2	:	square meter
sq.km, km^2	:	square kilometer
MSM, $10^6 m^2$	:	million square meter

Volume

ℓ, lit	:	liter
cu.m, m^3	:	cubic meter
MCM, $10^6 m^3$	:	million cubic meter

Weight

g	:	gram
kg	:	kilogram
ton, m.t.	:	metric ton

Others

EL	:	elevation above mean sea level
MSL	:	mean sea level
FWL	:	full water level
HWL	:	high water level
LWL	:	low water level
sec	:	second
minu	:	minute
hr, hrs	:	hour or hours
min	:	minimum
max	:	maximum
%	:	percent
PPM	:	part per million
No.	:	Number
°C	:	degree centigrade
°F	:	degree fahrenheit
Cl	:	Chlorine
HP, PS	:	Horse Power
lit/sec	:	liter per second
m/s	:	meter per second

Conversion Factors

Unit	Comparison
Units of Length	
Millimeter (mm)	0.001 meter
Centimeter (cm)	0.01 meter
Meter (m)	100 cm
Kilometer (km)	1,000 meters
Units of Area	
Square centimeter (sq.cm)	0.0001 sq.m
Square meter (sq.m)	
Hectare (ha)	10,000 sq.m
Square kilometer (sq.km)	1,000,000 sq.m
Feddan	4,200 sq.m
Units of Volume	
Cubic centimer (cu.m)	0.001 cu.m
Liter (1,000 cu.m)	0.001 cu.m
Cubic meter (cu.m)	1,000 liters
Units of Weight	
Gram (g)	
Kilogram (kg)	1,000 g
Metric Ton (mt)	1,000 kg

Miscellaneous

1 cu.m per sec	=	1,000 liters per second (ℓ/s)
	=	35.3145 cu.ft per second (cfs)
	=	15,850 gallons per minute (gpm)
1 liter per second for 1 day	=	8.64 mm depth over one hectare
10 mm depth over 1 hectare	=	1.157 liters per second for 1 day
	=	3,532 cu.ft
1 horsepower (metric)	=	75 kg-m per second
	=	550 ft-lb per second
1 cu.m per day per feddan	=	0.238 mm/day = 2.38 ℓ/day/ha

I-1. PROJECT IMPLEMENTATION

I-1-1. Executing Body

The South Hosainia Valley Agricultural Development Project, which is a land reclamation project, is different in nature from those projects for provision and improvement of the irrigation/drainage facilities in existing farm lands; in short, the land reclamation project is an integrated development project involving farm land formation and provision of adequate irrigation/drainage facilities together with social infrastructures for settlers in the area concerned.

The executing body of the Project is the Ministry of Irrigation and the Ministry of Land Reclamation, the former of which is responsible for constructing major facilities of irrigation/drainage and the latter for making on-farm facilities including land reclamations and constructing the necessary social infrastructures for the settlers. An executing comittee consisting of the representatives of the respective organizations will be established for efficiently operating the Project under close coordination with each other.

On the other hand, the both organization shall provide their own project offices at site with the Project Managers to be assigned by the respective departments for carrying out the works in their responsibility. The project offices will have three divisions such as construction, administrative and agricultural divisions.

The construction division shall be responsible for smooth implementation of the construction works to meet the local conditions according to the plans and designs to be given by the headquarters (Central Office). This division will have three sections; one of which is the equipment section to be responsible for operation and maintenance of construction equipment and machinery during the implementation period.

The administrative division will be responsible for personnel affairs, documents and records management, accounting, property custody, procurement of goods and materials and other miscellaneous services.

The agricultural division will be responsible for carrying out physical planning and design of the agri-related works in the Project Area as well as be indirectly responsible for construction works of the facilities concerned.

The Project Manager shall be responsible in particular for coordinating among these divisions so as to execute the Project works efficiently and effectively. The organization chart for implementation is shown in Fig. I-1.

I-1-2. Construction Method and Implementation Schedule

1) Construction

The contract-basis construction is considered recommendable in view of the Project requirements in a variety of construction works such as irrigation/drainage facilities, roads, etc., and construction schedule including many coordination works. And it will be the best way to implement the Project works by the respective ministry-related construction companies, the organization of which is illustrated in Fig. I-2 as what they are now in Egypt, althouth it is deemed most effective that import of various equipment and materials should be made by the respective ministries in charge.

2) Implementation Schedule

The Project Area covers 31,400 ha of the land area in gross, including about 20,900 ha of the net irrigable area. Construction works for the Project can be roughly stages into four; construction for main and lateral canals for irrigation/drainage, for pumping stations, for on-farm development and for roads.

The construction period for such project works commonly depends upon meteorological conditions prevailing in the job-sites, social environment surrounding the area and the work volumes. Advantageously, however, no obstacles nor difficulties can be observed in the Project. As a result of due considerations - the construction period is proposed

to take seven years including preparatory stages, two years of which will be consumed for financial preparation (about one year) according to the result of the feasibility study and detail design (about six months from Sept. 1982). And in parallel with these preparatory works, construction of project office building and other pre-engineering works will be proceeded.

Procurement should be started in early 1983 for the construction machinery and equipment for irrigation/drainage canals (main and secondary) and the pumping facilities so that the implementation can be commenced from August 1983 for these works. In other words, the implementation of this Project should coincide in its possibly early commencement with completion of the El Salam canal for the part relating to the Project by 1983. The construction works are planned to take five years for the whole project facilities. This construction period is determined according to the average period applied by the international financing agencies to the similar natured projects (commonly 5 - 7 years applicable).

The construction works shall be implemented on the block-by-block basis (three irrigation blocks) from the upstream block No.1 along the El Salam canal to the downstream blocks of No.2 and 3 in order. In the schedule, the earliest implementation is required for the main drainage canal and the drainage pumping station, among many in due consideration of carrying out the leaching works for the newly-reclaimed farm lands.

The construction works for the on-farm facilities will be started in the site where the construction of the basic facilities for irrigation/drainage will be completed.

The construction works for agricultural development will be started in 1985 and completed in 1988. In the agricultural development plan, the animal breeding should be commenced around 1986 and be gradually increased in raising head to cope with production increase in fodder crops.

The construction schedule is outlined in Fig. I-3.

Fig. I-1 Organization Chart for the Project Implementation

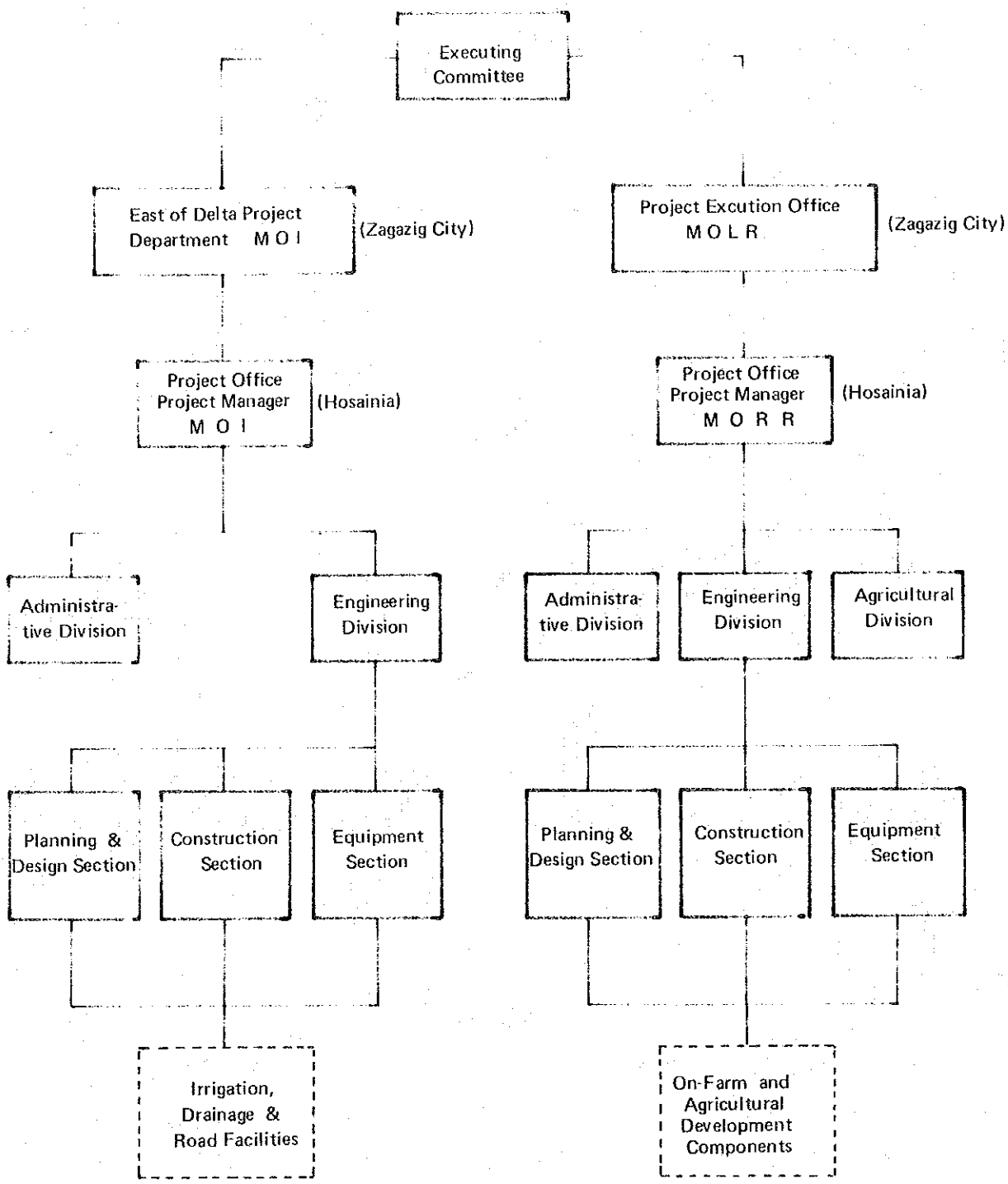


Fig. I-2 Organization Chart of the Ministry of Irrigation

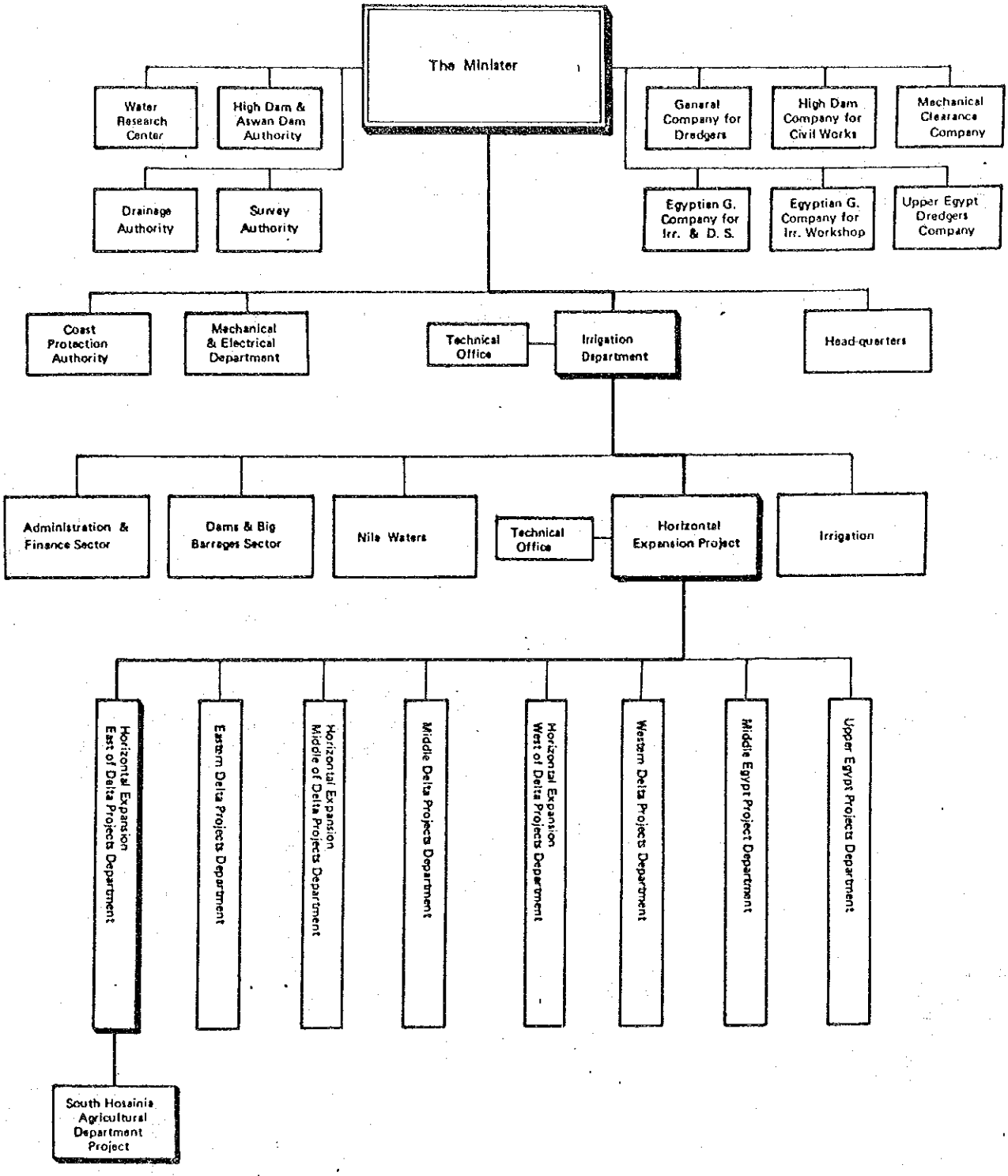
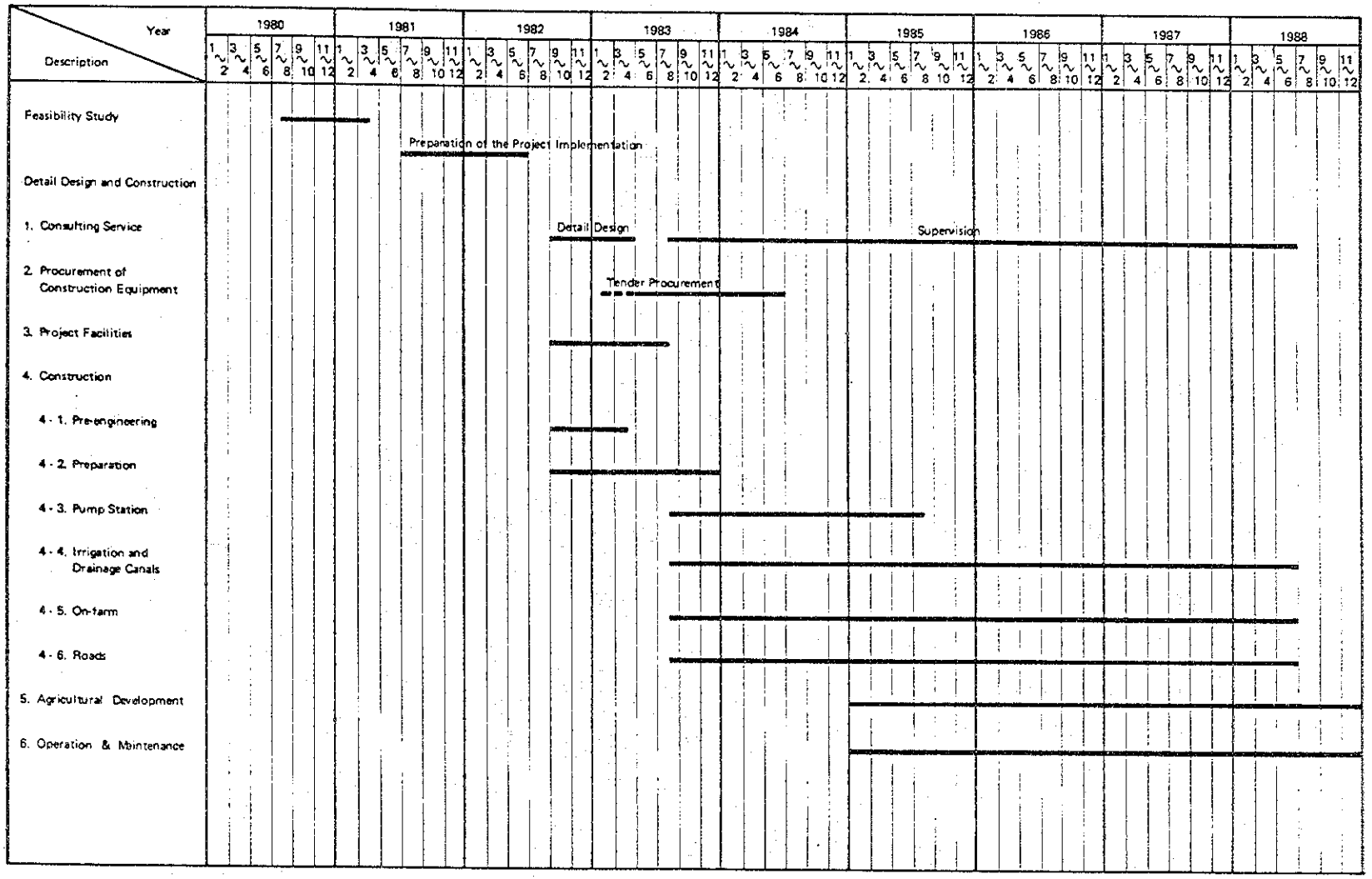


Fig. I-3 Proposed Implementation Schedule for the Project



I-2. Operation and Maintenance

I-2-1. Organization

The responsibility for operation and maintenance of all the Project facilities should be transferred to the government agencies concerned after the implementation of the Project. At present the provincial government office located at Zagazig city has taken charge of local administration whereas the regional office of the Central Government has been directly responsible for operation and maintenance of irrigation and drainage systems. Under the situations, these two existing offices have been focused, to the maximum extent, in formulating the organization for operation and maintenance of agricultural facilities.

Taking into consideration the above-mentioned circumstances, the establishment of the irrigation system office has been planned. This office will be open for activities and services of not only the Ministry of Irrigation but also the Ministry of Land Reclamation and the Ministry of Agriculture. The maintenance of field offices, sub-organization of the irrigation system office, has been planned specially in consideration of the importance of water management in the Project Area.

No field office of the Ministry of Land Reclamation will be established since, after the implementation of the Project, stress should be laid on the direct management of livestock centers, water management on the on-farm level, guidance to farmers for farm management and extension services, etc.

Furthermore, the responsibility for water managmeent on the on-farm level would be gradually transferred to farmers' organization. Therefore, this kind of practices will come under the jurisdiction of field offices. In addition, the water management on the on-farm level should be carried out with the participation of all farmers in the Project Area, in one to two-year period shift, so that all farmers might fully recognize the necessity and importance of water management. In this sence, it is not desirable that some selected farmers will

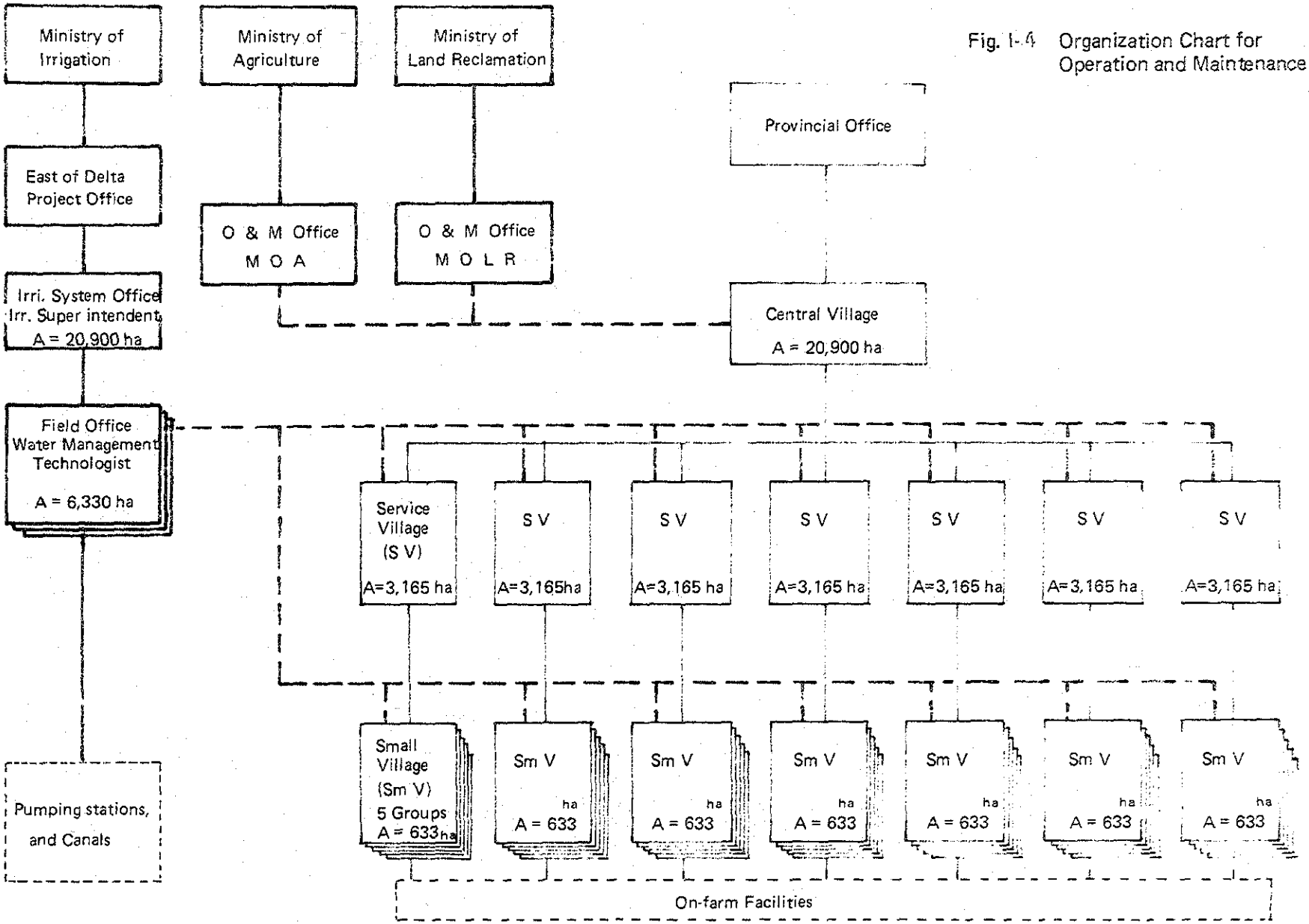


Fig. I-4 Organization Chart for Operation and Maintenance

permanently take charge water management. The Ministry of Land Reclamation and the Ministry of Irrigation should make continuous effort to impart education on water management to farmers so that every farmer would learn the importance of water management, will be under

The irrigation system office will have the operation & maintenence section, engineering section and administration section. The field offices whose routine works will be the water management, will be under the control of this operation & maintenance section.

As for farm management, agricultural extension services and water management on the on-farm level, the farmers' organization mentioned in the Annex D "Agriculture" will be effectively operated for this purpose. The organization chart is shown in Figure I-4 for clear understanding of the relationship between the water management organization and the farmers' organization.

I-2-2. Operation & Maintenance of Facilities

The operation & maintenance of irrigation and drainage systems will be made by two organizations, that is, the Governmental organization and the farmers' organization.

The Governmental organization such as the Ministry of Irrigation and the Ministry of Land Reclamation will be responsible for the operation & maintenance of all roads and facilities to be realized under the Project with the exception of main and secondary irrigation and drainage canals, pumping facilities and on-farm roads whereas the farmers' organization will take charge of the operation & maintenance of all facilities on the on-farm level.

The communication among offices for operation & maintenance will be made through the telephone system to be installed in connecting villages. Jeeps and motorcycles will be used for transportation necessary for operation and maintenance.

I-2-3. Operation & Maintenance Cost

The operation and maintenance cost of the mentioned facilities is computed as follows;

Operation and Maintenance Cost

1) Salary and Wage

(i) Irrigation System Office 5-person x 2-office = 10-person
10-person x 150 L.E. x 12
= 18,000 L.E.

(ii) Field Office

a) Water management technologist
10-person x 3-office = 30-person
30-person x 150 L.E. x 12 = 54,000 L.E.

b) Gate keeper 10-person x 3-office = 30-person
30-person x 100 L.E. x 12 = 36,000 L.E.

c) Ditch tender 60-person x 3-office = 180-person
180-person x 100 L.E. x 10 = 180,000 L.E.

d) Pump station 16-person x 100 L.E. x 10 = 16,000 L.E.

(iii) Labour Cost (main and secondary canals)

L = 60 km, Unit cost: 1.0 L.E./m

600,000 m x 1.0 L.E. = 600,000 L.E.

Sub-total 904,000 L.E.

2) Electric Power Charge (Unit Cost: 2.5 PT/KWH)

(i) Drainage pumping station 220 KW	48,500 L.E.
(ii) Return flow pumping station 120 + 95 = 215 KW	4,000 L.E.
(iii) Booster pumping station 149 KW	29,500 L.E.
(iv.) Office equipment 400 KW (100 KW x 4-office)	79,000 L.E.

Sub-total	161,000 L.E.
Total	1,065,000 L.E.

(Unit cost per ha: 51 L.E.)

I-2-4. Consultant Services

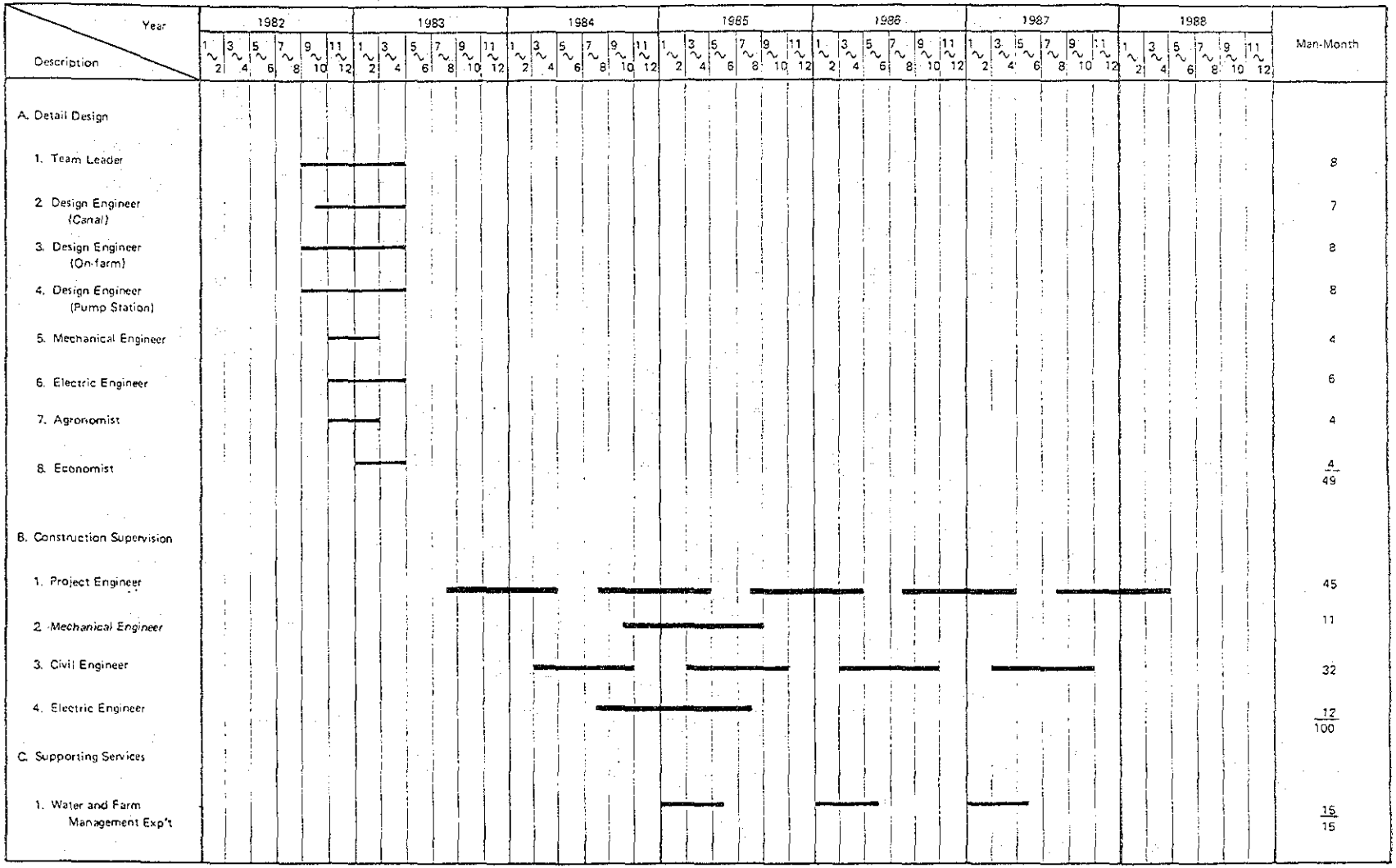
The consultancy services required for implementation of the Project are divided as follows;

1) Final design of the Project as well as preparation of tender documents. The service period would be 43-month period from September 1982. Highly qualified experts will be employed such as an irrigation engineer, a mechanical engineer, a design engineer and an economist.

2) Construction supervision and training of local counterpart personnel in all phases of the Project activities. The service period would be from August 1983 to April 1988. The required experts would be a project engineer, a mechanical engineer and a civil engineer.

3) Agri-institutional establishment covering all agricultural institutional development program and training will be made within a 15-month period highly qualified experts will required to participate in the services such as an agronomist, an agri-institutional expert, a water management expert and a farm management expert. The proposed schedule is shown in Fig. I-5.

Fig. I-5 *Proposed Schedule for Consultant's Services*



Annex J

PROJECT EVALUATION

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Annex J

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J-1. GENERAL DESCRIPTION

J-1-1. Objective

The main objective of the proposed project is an agricultural development for 31,400 ha (74,700 feddan) of desert land where no economic activity is prevailing except some limited cultivated land of 2,500 ha (6,000 feddan).

The objective follows the government's agricultural policy which aims both horizontal and vertical expansion, because the following agricultural outputs would be expected after full development of the project.

Item	Production (ton)
Paddy	48,969
Cotton	20,691
Maize	18,831
Wheat	29,657
Beef	7,956

J-1-2. Project Component

The project component is mainly divided into two, namely, development of agricultural infrastructures and agricultural development (livestock), and the former is subdivided into pumping facilities, canals, roads and on-farm facilities. It is proposed in this report that the proposed livestock center will be operated and managed under the government.

J-1-3. Project Benefit

Since the main objective of the proposed project is an agricultural development of about 70,000 feddans of desert land by newly providing such agricultural infrastructures as irrigation and drainage facilities, on-farm facilities and so on with social infrastructures,

its primary benefit would be measured through an incremental agricultural production between two cases of "with project" and "without project".

Beside the primary benefit, there would be some secondary and other benefit in the Project, and these benefit would be incorporated into the project benefit as far as they can be measured in monetary terms. Usually, it is rather difficult to measure those benefits in monetary terms which are arising from such social infrastructures as hospital, school, police station, mosque, etc.

J-2. ECONOMIC EVALUATION

J-2-1. Method of Evaluation

For the economic evaluation of the project, it seems presently most appropriate to compute an economic internal rate of return which can be obtained by discounting both streams of economic cost and benefit over a project life.

In order to decide the project life, it must be considered that there are various project facilities which have respective durable life. In this project, it is assumed that most of all project facilities except pumping equipment has enough durable life to evaluate the project over 50 years as far as maintenance works for these facilities will be sufficiently implemented. For pumping equipment, some replacement cost will be required once every 15 years after installation. Thus, the project life is considered to be 50 years.

In the economic evaluation, an application of accounting prices has been recently theorized even for an agricultural development project. The accounting prices are to be computed under the concept that all goods and services to be needed for, as well as to be produced by the proposed project must be valued in the world market where more free competition is considered to be prevailing.

In order to compute accounting prices, it requires several conversion factors like a standard conversion factor, conversion factors for capital goods, consumption, transportation, and so on, but only a standard conversion factor has been estimated in this report due to limitation of data availability.

While it has been attempted in this report to convert all prices into their accounting prices as much as possible, by applying a standard conversion factor, the term of economic price is still used instead of accounting price.

J-2-2. Economic Price

1) Standard Conversion Factor (SCF)

A standard conversion factor is given by the following formula:

$$SCF = (Im + Ex)/(Im + Ex + TIm - TEx + SEx)$$

where;

SCF : Standard Conversion Factor
Im : Total Amount of Import (C.I.F.)
Ex : Total Amount of Export (F.O.B.)
TIm : Total Amount of Import Duties and Taxes
TEx : Total Amount of Export Duties and Taxes
SEx : Total Amount of Export Subsidy

The custom tariff in Egypt is divided into 22 sections and further subdivided into 99 chapters. In the monthly bulletin of foreign trade published by Central Agency for Public Mobilization and Statistics, both amount of import and export is available for years of 1978 and 1979 by the chapter, based on which tariff amount in repective year and their weighted tariff rates by section are calculated as shown in Tables J-2-1 and J-2-2.

By applying the weighted tariff rates for the other years, both import and export tariffs are calculated by section (See Tables J-2-3 and J-2-4).

On the basis of the above formula and Tables J-2-3 and J-2-4, a standard conversion factor is estimated at 0.835 as show in Table J-2-5.

2) Foreign Trade of Selected Agricultural Products

In Egyptian agricultural export, raw cotton is playing very important role followed by milled rice. Table J-2-6 and J-2-7 show quantity and value of agricultural export, respectively, and Table J-2-8 does the respective export price of selected agricultural products.

On the other hand, Egypt is importing many basic foodstuffs, like, wheat, wheat flour, maize, sugar, edible oils and meat to meet with their domestic demand (See Tables J-2-9 and J-2-10). Table J-2-11 also shows import prices for selected agricultural products. From Tables J-2-8 and J-2-11, both export and import prices fluctuate depending upon their world market prices.

As a result, all project output, paddy, cotton, maize, wheat and beef are considered to be internationally traded goods.

3) Farmgate Prices

In Egypt, farmgate prices of both input and output are depending upon the government pricing policy. Recently, the government has introduced her economic policy of liberalization, hence, the government's controlled prices would be more closely reflected by the prevailing market condition.

Table J-2-12 shows both financial and economic farmgate prices of project output as well as input. For the financial prices, they are mostly based on current market price except agricultural chemicals which are derived from international prices with assumption that they must be subsidized by the government. Table J-2-13 indicates estimated financial prices of agricultural chemicals without government subsidy.

For the economic prices, they are derived from IBRD Commodity Price Forecast, and details of these price structure are given in Appendix J-1. Table J-2-14 shows estimated economic prices of agricultural chemicals

J-2-3. Economic Benefit

1) Without Project

As mentioned in Annex D "Agriculture" there are presently 2,500 ha of cultivated land and its production is as follows;

Crop	Area (ha)	Yield (ton/ha)	Production (tons)
Cotton	800	1.1	880
Rice	1,600	2.9	4,640
Wheat	800	1.6	1,280
Vegetables 1/	200	8.0	1,600

Note: 1/ Mainly tomatoes

From these lands, L.E. 921 thousand of net production value is brought out as shown in Table J-2-15, and further increase of N.P.V. is not expected, because these land is cultivated illegally and has limitation of water resources for irrigation.

2) With Project

(i) Beneficial area

Although total project area is 31,400 ha, net irrigable area is estimated at 20,900 ha, and the balance is considered to be those area for canals, roads, new villages and so on.

Cropped area after full development is shown below;

Crop	Summer	Winter	Total
Paddy	6,900	-	6,900
Cotton	6,900	-	6,900
Maize	3,550	-	3,550
Soiling Corn	3,550	-	3,550
Full-term Berseem	-	6,900	6,900
Catch-cropping Berseem	-	7,100	7,100
Wheat	-	6,900	6,900
Total	20,900	20,900	41,800

Note: Figures are rounded.

Thus, cropping intensity after full development is 200 percent against the net irrigable area.

(ii) Cost of mechanized farming

As stated in Annex D "Agriculture", it is proposed to introduce mechanized farming. An alternative study on harvesting works for paddy and wheat by combine or by labor with sickle, has been made, and conclusively harvesting works by labor is cheaper than that by combine. Therefore, crop production cost is calculated on the basis of not using combine.

Table J-2-16 shows monthly unit requirement of labor and agricultural machinery by crop, and Table J-2-17 does crop-wise monthly requirement of them. Also, Table J-2-18 gives total monthly requirement for cultivation of 20,900 ha after full development.

Table J-2-19 indicates required number of agricultural machineries and their useful life, taking into consideration their total durable hours and annual operation hours of them.

On the basis of Tables J-2-20, J-2-21 and J-2-22 hourly fixed cost of each machinery is estimated.

(iii) Net production value

Since benefit arising from such fodder crops as soiling corn and berseem is evaluated in the livestock development, total net production value of paddy, cotton, maize and wheat is estimated at L.E. 17,693 thousand after full development, of which details are given in Table J-2-23.

(iv) Net production value (livestock development)

As mentioned in Annex D "Agriculture", total 88,400 heads of beef cattle will be fed by the project production of soiling corn, berseem and paddy straw after full development of the project.

It is planned to feed 100 heads of beef cattle as one herd, and thus total 884 herds will be fed, and composition per herd is 30 heads of calves, 30 heads of up-bringing cattle and 40 heads of cattle.

Net production value is estimated at L.E.2,150 per herd, of which details are given in Table J-2-24. Thus, total net production value of livestock development will be L.E. 1,900 thousand after full development of the project.

(v) Economic benefit

An economic benefit after full development of the project can be estimated as follows;

	(L.E. thousand)
N.P.V. with project	
crop production	17,693
livestock production	1,900
Sub-total	19,593
N.P.V. without project	921
Incremental N.P.V.	18,672

Thus, it is expected that L.E. 18,672 thousand will be arising from the project as the economic benefit after its full development.

(vi) Benefit accrual

It is planned to develop 31,400 ha of the project area by phasing, and it is expected to obtain the first project output in the 5th project year. Details of the phasing are given in Annex D, "Agriculture".

In the economic evaluation, the following benefit accrual is assumed to reach its full benefit.

Project Year	Percent to full benefit (%)
5	5
6	15
7	30
8	40
9	50
10	60
11	70
12	80
13	85
14	90
15	95
16	100

J-2-4. Economic Cost

1) General

An economic cost to be used in the economic evaluation must be real cost to the national economy, and then transfer payments such as taxes, subsidy, cost for land acquistion and compensation, price contingency and so on, are deducted from the financial cost.

In the financial cost, costs of construction equipments are valued from their purchasing prices, but in the economic cost, such equipment costs are valued at their depreciation costs.

Further, a local currency portion in the financial cost is converted into its border price by applying the standard conversion factor.

2) Initial Cost

The initial cost consists of those costs for civil works, agricultural development (livestock development), operation and maintenance during construction period, project facilities, project administration, consulting services and physical contingency.

The estimated total economic cost is L.E. 51,111 thousand of which about 57 percent or L.E. 29,332 thousand is foreign currency portion and the rest, L.E. 21,779 thousand is local currency portion (See Table J-2-25).

Table J-2-26 shows annual disbursement schedule of the economic cost over seven years of construction period.

3) Operation and Maintenance Cost

To successfully manage the project, an operation and maintenance cost will be recurrently required, which is estimated at L.E. 1,065 thousand, and it is assumed to expend the O & M cost by the following schedule;

Project Year	4th	5th	6th	7th	8th	9th & further
Percen of O & M cost (%)	5	10	25	50	90	100
O & M cost (L.E. thousand)	53	107	266	533	959	1,065

4) Replacement Cost

Since some of pumping facilities have lesser durable life than the project life, total amount of L.E. 1,427 thousand would be required as a replacement cost once every 15 years after their installation.

5) On-Farm Development Cost (Farm drain)

It is assumed that costs for digging farm drains on-farm level are born by farmers themselves, of which unit cost is estimated at L.E. 230.7 per ha (L.E. 96.9 per feddan) for gross irrigable lands (26,800 ha), and the total cost would be L.E. 6,183 thousand.

All the costs of L.E. 6,183 thousand are considered local currency portion, thus the total economic cost would be L.E. 5,163 thousand by applying the standard conversion factor which will be equally disbursed in five years after the 3rd project year.

Also, it is assumed that the government will expend these cost in the beginning and be repaid by farmers in four years after the second year of farmers' settlement.

J-2-5. Economic Internal Rate of Return (EIRR)

By discounting both streams of economic benefit and cost at several discount rates, the economic internal rate of return can be worked out. Table J-2-27 shows streams of economic benefit and cost over project life, and Tables J-2-28 and J-2-29 give annual present worth of benefit and cost at several discount rates, respectively. Summarizing these Table J-2-28 and J-2-29, 16.3 percent of economic internal rate of return for the project has been worked out as shown in Table J-2-30 and Figure J-2-1.

The EIRR of 16.3 percent shows definitely that the proposed project is economically feasible.

J-2-6. Sensitivity Analysis

Sensitivity analysis is an effective measure to examine riskness of the proposed project. The analysis is usually made on change of key factors in the project. In this report the following items are taken for the sensitivity analysis.

I.	Initial Investment Cost	10% increase
II.	Construction Period	1 year extension
III.	Crop Yields	10% decrease
IV.	Prices of Project Outputs	10% decrease
V.	Including Costs of El Salam Canal	

By calculating EIRRs for the above items, results of the sensitivity analysis are summarized below and the details are compiled in Appendix J-3.

Case	Item	EIRR (%)
I	10% increase of initial cost	15.4
II	one year extension of construction period	15.4
III	10% decrease of crop yields	13.6
IV	10% decrease of project output prices	13.6
V	Including Costs of El Salam Canal	11.8

J-3. FARM BUDGET ANALYSIS

1) Representative Farm Size

In the proposed project, most of all cultivable lands is newly reclaimed, and it is planned to provide five feddans of gross cultivable area to every new settlers under the government policy. Therefore, a representative farm size can be considered 2.1 ha (5 feddans) of gross area, of which net irrigable area is 1.64 ha (3.9 feddans).

2) Family Size

On the basis of interview to farmers who are dwelling nearby the project area, an average family size is six and workable person can be accounted for two in a family during peak period for cultivation and 1.5 during usual period.

3) Labor Balance

Table J-3-1 gives monthly labor requirement per farm which cultivates 1.64 ha of net irrigable area with the proposed cropping pattern. In this Table J-3-1, peak requirement happens month of September, accounting for 363 man-hours, which can be met by two men with workable days of 25 per month and working hours of eight per day. Therefore, each family does not require any hired labor in his cultivation throughout a year.

4) Farm Income

Table J-3-2 shows financial crop returns per ha after full development of the project, in which all prices are valued at their financial prices. As for financial prices of agricultural chemicals, it is assumed that 80 percent of their prices which are derived from international prices (See Table J-2-13), would be subsidized by the government.

After full development of the project, total of L.E. 1,009 will be gained by farmers through their cultivation of project crops such

as paddy, cotton, maize, soiling corn, berseem and wheat with their farm size of five feddans in gross and the proposed cropping pattern (See Table J-3-3).

5) Off-farm Income

It is planned to take two years for leaching after settlement and three years for the tentative cropping pattern, during which farmers will have chance to work for construction works of the project as an unskilled labor.

Assuming that one and half man-day per family is considered workable for 25 days per month, it is expected that one farm family will obtain L.E. 675 of wage in the first two years after settlement and L.E. 467 in the following three years.

6) Other Expenses

Assuming that farmers will purchase their farm land at cost of L.E. 1,000 per feddan and their house at L.E. 1,000 per house, their mortgage repayment would be L.E. 278 as full burden from the 8th year after settlement. The payment upto 7th year is shown in Table J-3-4 by following the Cabinet Decree Nr. 288.1979 which is shown in Appendix J-6.

Loan repayment for the costs of on farm drains will be L.E. 121 annually in four years from the second year after settlement. The loan is expected to be made through the Principal Bank for Development and Agricultural Credit.

Land tax will be chargeable from the seventh year after settlement as verfied in Table J-3-4, of which total amount is L.E. 25 per farm or L.E. 5 per feddan.

The operation and maintenance cost has been estimated at L.E. 1,075 thousand annually, which is equivalent to L.E. 51 per ha or L.E. 107 per farm. Farmers will be able to bear the amount of L.E. 107 from

the nineth year after settlement.

7) Cost of Living

According to interviews to farmers adjacent to the project area, the following costs of living for family member of six are obtained.

(Unit: L.E.)

Item	Subsistence Level		Desirable Level	
	per month	Total	per month	Total
Foods	25	300	45	540
Cloths	5	60	10	120
Lights & Fuel	2	24	3	36
Others	5	60	9	108
Total	-	444	-	804

8) Conclusion

As shown in Tables J-3-3 and J-3-4, farmers can maintain their subsistence level of living upto 26th year after settlement and enjoy the desirable level of living from 27th year and further.

Table J-2-1 Calculation of Weighted Tariff Rate (Import)

(Unit: L.E.1,000)

Section	Chapter	1978 Import Amount	1978 Tariff	1979 Import Amount	1979 Tariff	Weighted Tariff (%)
I	1- 5	95,175	13,291	109,271	15,885	14.3
II	6-14	366,570	56,042	360,438	55,774	15.4
III	15	69,240	5,905	94,693	12,454	11.2
IV	16-24	155,405	88,379	143,197	72,811	54.0
V	25-27	96,735	20,105	129,872	33,891	23.8
VI	28-38	210,966	27,408	195,780	26,048	13.1
VII	39-40	87,455	20,925	81,251	19,555	24.0
VIII	41-43	4,045	982	3,335	789	24.0
IX	44-46	114,694	19,334	104,278	17,866	17.0
X	47-49	63,923	14,822	55,744	13,247	23.5
XI	50-63	62,483	34,943	77,295	31,395	47.5
XII	64-67	1,487	801	2,202	1,176	53.6
XIII	68-70	39,610	35,109	32,752	20,321	76.6
XIV	71-72	7,520	1,901	2,033	759	27.8
XV	73-83	235,334	61,265	322,442	70,769	23.7
XVI	84-85	575,436	148,075	548,346	126,721	24.5
XVII	86-89	389,832	255,604	354,711	229,470	65.2
XVIII	90-92	41,113	7,318	47,539	8,769	18.1
XIX	93	1,182	396	840	249	31.9
XX	94-98	13,970	8,638	19,739	12,305	62.1
XXI	99	5	0	4	0	0.0
	Total	2,632,180	821,243	2,686,212	770,254	29.9

Table J-2-2 Weighted Tariff Rate (Export)

Export Tariff in 1978 & 1979

(Unit: L.E. 1,000)

Code No.	Tariff Rate	1978 Q'ty or Amount	1978 Tariff	1979 Q'ty or Amount	1979 Tariff
5/6	L.E. 0.6/ton	-	-	-	-
17/3	L.E. 6.0/ton	230,025 ton	1,380	110,860 ton	665
41/1	L.E. 1.2/ton	39 ton	0	-	-
55/1	L.E. 19.0/ton	418,845 ton	7,958	461,739 ton	8,773
73/3	L.E. 11.0/ton	-	-	-	-
74/1	"	-	-	1 ton	0
75/1	"	-	-	-	-
76/1	"	69,235 ton	762	41,240 ton	454
79/1	"	-	-	-	-
99/6	5% of value	6	0	-	-
Total	-	-	10,100	-	9,892

Caluculation of Weighted Tariff Rate

(Unit: L.E. 1,000)

Section	Chapter	1978 Export Amount	1978 Tariff	1979 Export Amount	1979 Tariff	Weighted Tariff (%)
1	1- 5	5,621	-	5,129	-	0.0
4	16-24	26,177	1,380	30,233	655	3.6
8	41-43	5,179	0	14,963	-	0.0
11	50-63	286,571	7,958	488,359	8,773	2.2
15	73-83	40,215	762	73,006	454	1.1
21	99	6	0	-	-	0.0
Total		363,763	10,100	611,690	9,892	2.0

Table J-2-3 Import Tariff

(Unit: L.E. 1,000)

Section	Tariff (%)	1973 Amount	1973 Tariff	1974 Amount	1974 Tariff	1975 Amount	1975 Tariff	1976 Amount	1976 Tariff	1977 Amount	1977 Tariff
1	14.3	7,670	1,097	9,732	1,392	17,934	2,565	39,249	5,613	54,911	7,852
2	15.4	77,389	11,918	310,042	47,746	328,152	50,535	274,785	42,317	267,887	41,255
3	11.2	16,758	1,877	47,313	5,299	136,575	15,296	39,189	4,389	35,096	3,931
4	54.0	13,372	7,221	42,137	22,754	72,932	39,383	78,071	42,158	82,997	44,818
5	23.8	10,780	2,566	31,030	7,385	115,705	27,538	84,129	20,023	80,260	19,102
6	13.1	53,574	7,018	122,192	16,007	197,542	25,878	126,921	16,627	164,038	21,489
7	24.0	10,125	2,430	22,844	5,483	38,737	9,297	43,933	10,544	58,404	14,017
8	24.0	3,127	750	3,708	890	4,339	1,041	3,066	736	2,673	642
9	17.0	11,603	1,973	30,876	5,249	53,436	9,084	42,144	7,164	112,027	19,045
10	23.5	11,836	2,781	32,924	7,737	61,769	14,516	60,682	14,260	57,776	13,577
11	47.5	16,877	8,017	21,972	10,437	29,710	14,112	55,422	26,325	78,291	37,188
12	53.6	47	25	182	98	541	290	1,700	911	2,239	1,200
13	76.6	3,555	2,723	4,976	3,812	14,935	11,440	20,224	15,492	24,196	18,534
14	27.8	68	19	255	71	272	76	465	130	432	121
15	23.7	32,100	7,845	70,700	16,756	141,683	33,579	134,949	31,983	173,565	41,135
16	24.5	51,722	12,672	78,593	19,255	169,793	41,599	280,145	68,636	389,463	95,418
17	65.2	25,940	23,433	84,378	55,014	139,820	91,163	178,022	116,070	261,283	170,357
18	18.1	4,083	739	5,255	951	12,120	2,194	21,113	3,821	27,439	4,966
19	31.9	8	3	20	6	517	165	519	166	1,515	483
20	62.1	380	236	989	614	2,811	1,746	5,177	3,215	9,782	6,075
21	0.0	3	0	-	-	3	0	3	0	4	0
Total		361,017	95,343	920,118	226,956	1,539,326	391,497	1,489,908	430,580	1,884,278	561,205

Table J-2-4 Export Tariff

(Unit: L.E. 1,000)

Section	Tariff (%)	1973		1974		1975		1976		1977	
		Amount	Tariff	Amount	Tariff	Amount	Tariff	Amount	Tariff	Amount	Tariff
1	0.0	1,563	0	1,126	0	1,132	0	4,077	0	5,129	0
2	-	70,597	-	78,345	-	69,359	-	93,804	-	97,856	-
3	-	182	-	52	-	616	-	116	-	332	-
4	3.6	14,807	533	20,380	734	28,303	1,019	22,756	819	27,106	976
5	-	50,091	-	54,782	-	55,443	-	152,595	-	164,105	-
6	-	9,385	-	11,853	-	23,823	-	18,006	-	22,113	-
7	-	279	-	56	-	98	-	58	-	165	-
8	0.0	2,127	0	2,740	0	5,138	0	5,477	0	4,685	0
9	-	288	-	261	-	397	-	558	-	628	-
10	-	1,644	-	3,589	-	4,537	-	4,460	-	6,946	-
11	2.2	275,018	6,052	394,888	8,688	322,025	7,085	266,525	5,864	312,070	6,866
12	-	5,801	-	8,240	-	14,156	-	4,256	-	5,431	-
13	-	448	-	649	-	739	-	547	-	523	-
14	-	1,175	-	153	-	749	-	285	-	253	-
15	1.1	4,938	54	8,729	96	11,602	128	13,215	145	15,727	173
16	-	1,735	-	1,745	-	2,186	-	1,134	-	1,197	-
17	-	953	-	1,094	-	3,368	-	3,215	-	389	-
18	-	291	-	503	-	672	-	731	-	1,027	-
19	-	20	-	8	-	9	-	42	-	-	-
20	-	2,834	-	4,092	-	4,225	-	3,592	-	2,790	-
21	0.0	21	0	14	0	8	0	1	0	6	0
Total		444,197	6,639	593,299	9,518	548,585	8,232	595,450	6,828	668,478	8,015

Table J-2-5 Estimation of Standard Conversion Factor

(Unit: L.E.1,000)

	1973	1974	1975	1976	1977	1978	1979	Average
1. Import (c.i.f., total)	361,017	920,118	1,539,326	1,489,908	1,884,278	2,632,180	2,686,212	1,644,720
2. Export (f.o.b., total)	444,197	593,299	548,585	595,450	668,478	679,754	1,287,813	688,225
3. Import Duties & Taxes	95,343	226,956	391,497	430,580	561,205	821,243	770,254	471,011
4. Export Duties & Taxes	6,639	9,518	8,232	6,828	8,015	10,100	9,892	8,461
5. Export Subsidy	-	-	-	-	-	-	-	-
6. 1 + 2	805,214	1,513,417	2,087,911	2,085,358	2,552,756	3,311,934	3,974,025	2,332,945
7. 1 + 2 + 3 - 4 + 5	893,918	1,730,855	2,471,176	2,509,110	3,105,946	4,123,077	4,734,387	2,795,495
8. SCF (6/7)	0.900	0.874	0.845	0.831	0.822	0.803	0.839	0.835

Table J-2-6 Export of Selected Agricultural Products

Item	Unit	1973	1974	1975	1976	1977	1978	1979
Raw Cotton	M.K.million	5.7	4.6	3.7	3.3	2.9	2.7	2.9
Milled Rice	1,000 tons	298	136	100	191	191	133	95
Onions	"	89	103	70	66	81	57	24
Potatoes	"	108	100	48	158	166	98	113
Tomatoes	"	-	-	2	3	4	8	4
Watermelon	"	3	4	13	12	26	23	10
Oranges	"	246	162	209	169	170	133	75
Garlic	"	20	21	15	12	22	19	5
Artichokes	"	0.2	0.1	1.2	0.4	0.9	1.0	0.7

Source: Central Agency for Public Mobilization and Statistics

Table J-2-7 Export of Selected Agricultural Products

(Unit: L.E. Million)

Item	1973	1974	1975	1976	1977	1978	1979
Raw Cotton	191.9	279.1	201.0	154.8	182.3	131.5	267.3
Milled Rice	26.2	39.7	23.8	29.4	20.7	18.5	22.1
Onions	9.3	7.6	7.0	8.0	7.3	5.1	3.3
Potatoes	6.6	5.9	3.2	17.2	16.4	5.8	18.8
Tomatoes	-	-	0.3	0.5	0.7	1.4	1.1
Watermelon	0.2	0.3	1.0	1.1	2.7	3.1	3.0
Oranges	15.8	11.1	18.5	18.9	21.4	20.7	14.4
Garlic	3.3	3.2	2.4	2.2	4.6	4.9	1.7
Artichokes	0.0	0.0	0.1	0.0	0.1	0.1	0.2

Source: Central Agency for Public Mobilization and Statistics

Table J-2-8 Export Price of Selected Agricultural Products

(Unit: L.E./ton)

Item	1973	1974	1975	1976	1977	1978	1979
Raw Cotton	213.7	385.0	344.8	297.7	398.9	309.4	584.9
Milled Rice	87.9	291.9	238.0	153.9	108.4	139.1	232.6
Onions	104.5	73.8	100.0	121.2	90.1	89.5	137.5
Potatoes	61.1	59.0	66.7	108.9	98.8	59.2	166.4
Tomatoes	-	-	150.0	166.7	175.0	175.0	275.0
Watermelon	66.7	75.0	76.9	91.7	103.8	134.8	300.0
Oranges	64.2	68.5	88.5	111.8	125.9	155.6	192.0
Garlic	165.0	152.4	160.0	183.3	209.1	257.9	340.0
Artichokes	-	-	83.3	-	111.1	100.0	285.7

Table J-2-9 Import of Selected Agricultural Products

Item	Unit	1973	1974	1975	1976	1977	1978	1979
Wheat	1,000 tons	1,490	2,251	2,628	2,358	2,419	3,001	2,252
Wheat Flour	"	227	258	521	404	615	960	704
Maize	"	67	388	418	459	591	730	494
Sesame	"	11	21	9	23	17	8	13
Lentils	"	8	10	-	64	18	51	26
Seed Potatoes	"	13	22	35	30	37	27	7
Raw Cane Sugar	"	43	47	28	6	-	8	15
Cane Sugar Refined	"	35	70	133	165	158	362	188
Fixed Vegetable Oils	"	78	102	322	42	15	70	156
Animal Fat & Oils	"	53	112	134	164	155	146	63
Bovine Species	head	29,891	9,177	-	4	-	1,787	256
Sheep & Goats	"	-	13,954	19,465	-	-	-	-
Meat, chilled or frozen	1,000 tons	12	6	11	36	47	56	63

Source: Central Agency for Public Mobilization and Statistics

Table J-2-10 Import of Selected Agricultural Products

(Unit: L.E. Million)

Item	1973	1974	1975	1976	1977	1978	1979
Wheat	55.1	232.8	213.0	153.6	128.6	169.6	174.3
Wheat Flour	10.6	29.1	46.5	36.4	49.4	74.8	68.4
Maize	2.5	26.7	27.1	30.8	30.0	38.0	31.3
Sesame	1.5	5.1	2.5	5.1	6.0	4.5	5.3
Lentils	0.7	2.5	-	7.1	4.0	3.6	2.0
Seed Potatoes	0.8	2.2	4.4	4.5	4.1	2.7	1.1
Raw Cane Sugar	n.a.	8.4	9.2	1.0	-	0.8	2.7
Cane Sugar Refined	n.a.	17.9	32.1	23.8	16.8	40.6	34.9
Fixed Vegetable Oils	11.3	21.2	112.4	8.9	4.6	27.2	48.9
Animal Fats & Oils	5.2	25.1	22.8	28.4	26.1	32.8	26.1
Bovine Species	1.4	0.5	-	0.0	-	0.6	0.1
Sheep & Goats	-	0.2	0.9	-	-	-	-
Meat, chilled or frozen	3.7	2.5	4.1	13.5	22.9	34.6	50.8

Source: Gentral Agency for Public Mobilization and Statistics

Table J-2-11 Import Price of Selected Agricultural Products

(Unit: L.E./ton)

Item	1973	1974	1975	1976	1977	1978	1979
Wheat	37.0	103.4	81.1	65.1	53.2	56.5	77.4
Wheat Flour	46.7	112.8	89.3	90.1	80.3	77.9	97.2
Maize	37.3	68.8	64.8	67.1	50.8	52.1	63.4
Sesame	136.4	242.9	277.8	221.7	352.9	562.5	407.7
Lentils	87.5	250.0	-	110.9	222.2	70.6	76.9
Seed Potatoes	61.5	100.0	125.7	150.0	132.3	100.0	157.1
Raw Cane Sugar	n.a.	178.7	328.6	166.7	-	100.0	173.3
Cane Sugar Refined	n.a.	255.7	241.4	144.2	106.3	112.2	185.6
Fixed Vegetable Oils	144.9	207.8	349.1	211.9	306.7	388.6	314.5
Animal Fats & Oils	98.1	224.1	170.1	173.2	168.4	224.7	414.3
Bovine Species 1/	46.8	54.5	-	n.a.	-	335.8	390.6
Sheep & Goats 1/	-	14.3	46.2	-	-	-	-
Meat, chilled or frozen	308.3	416.7	372.7	375.0	487.2	617.9	806.3

Note: 1/ L.E./head

Table J-2-12 Projected Farmgate Prices (1980 constant price)

Item	Unit	Financial (L.E.)	Economic (L.E.)
Paddy	ton	65.00	212.50
Cotton (Raw)	ton	308.00	591.00
Maize	ton	78.00	176.00
Soiling Corn (Wet)	ton	12.00	10.00
Berseem (Wet)	ton	12.00	10.00
Wheat	ton	83.00	204.20
Tomatoes	ton	63.50	53.00
Beef	ton	1,800.00	1,202.30
Hide	piece	12.00	10.00
Urea (N: 46%)	ton	89.22	233.00
S.P. (P_2O_5: 15%)	ton	27.30	66.23
Captan	kg	1.73	7.86
MEP	ℓ	1.89	8.60
Kasugamycin	kg	0.11	0.51
Topzin-M	kg	3.42	15.56
DCPA	ℓ	1.23	5.57
Corbex	ℓ	2.98	13.55
CAT	kg	2.35	10.68
Gozaprim	kg	2.05	10.15
Diesel Oil	ℓ	0.03	0.13
Kerosene	ℓ	0.03	0.13
Operator	day	1.50	1.25
Common Labor	day	3.00	2.51

Table J-2-13 Financial Price of Agricultural Chemicals

		MEP (kℓ)	Kasugamycin (ton)	Topzin-M (ton)	DCPA (kℓ)	CAT (ton)	Corbex (kℓ)	Gezaprim (ton)	Captan (ton)
1.	International Price (US$)	12,100	650	21,950	7,810	15,050	19,100	14,290	11,050
2.	Freight and Insurance (US$)	141	30	240	98	171	211	163	131
3.	c.i.f., Alexandria (US$)	12,241	680	22,190	7,908	15,221	19,311	14,453	11,181
	L.E.equivalent (L.E.)	8,569	476	15,533	5,536	10,655	13,518	10,117	7,827
4.	Import Taxes (L.E.)	857	48	1,553	554	1,066	1,352	1,012	783
5.	Port Handling and (US$) Transport Cost from Alexandria to San El Hagar	30	30	30	30	30	30	30	30
6.	Value at Cooperative Store (L.E.)	9,456	554	17,116	6,120	11,751	14,900	10,248	8,640
7.	Transport Cost from (L.E.) Cooperative Store to Farm Gate	5	5	5	5	5	5	5	5
8.	Farm Gate Price (L.E.)	9,461	559	17,121	6,125	11,756	14,905	10,253	8,645
		(9.46/ℓ)	(0.56/kg)	(17.12/kg)	(6.13/ℓ)	(11.76/kg)	(14.91/ℓ)	(10.25/kg)	(8.65/kg)

Table J-2-14 Economic Price of Agricultural Chemicals

		MEP (Kℓ)	Kasugamycin (ton)	Topzin-M (ton)	DCPA (Kℓ)	CAT (ton)	Corbex (Kℓ)	Gezaprim (ton)	Captan (ton)
1.	International Price (US$)	12,100	650	21,950	7,810	15,050	19,100	14,290	11,050
2.	Freight and Insurance (US$)	141	30	240	98	171	211	163	131
3.	c.i.f., Alexandria (US$)	12,241	680	22,190	7,908	15,221	19,311	14,453	11,181
	L.E. equivalent (L.E.)	8,569	476	15,533	5,536	10,655	13,518	10,117	7,827
4.	Port Handling and Transport Cost from Alexandria to San El Hagar (L.E.)	25	25	25	25	25	25	25	25
5.	Value at Cooperative Store (L.E.)	8,594	501	15,558	5,561	10,680	13,543	10,142	7,852
6.	Transport Cost from Cooperative Store to Farm Gate (L.E.)	4	4	4	4	4	4	4	4
7.	Farm Gate Price (L.E.)	8,598	505	15,562	5,565	10,684	13,547	10,146	7,856
		(8.60/ℓ)	(0.51/kg)	(15.56/kg)	(5.57/ℓ)	(10.68/kg)	(13.55/ℓ)	(10.15/kg)	(7.86/kg)

Table J-2-15 Net Production Value without Project

I. N.P.V. per ha

	Paddy	Cotton	Wheat	Vegetables 1/
Yield (ton/ha)	2.9	1.1	1.6	8.0
Unit Price (L.E./ton)	212.5	591.0	204.2	53.0
G.P.V. (L.E.)	616.25	650.10	326.72	424.00
Production Cost (L.E.)				
Seed	29.40	82.60	36.00	2.50
Fertilizers	27.60	31.80	14.95	31.80
Agr. Chemicals	-	5.82	-	15.56
Fuel	4.11	3.08	3.65	3.08
Agr. Machinery 2/	17.54	13.54	15.56	13.54
Labor	203.35	158.66	79.94	126.32
Miscellaneous	28.20	29.55	15.01	19.28
Sub-total	310.20	325.05	165.11	212.08
N.P.V. (L.E.)	306.05	325.05	161.61	211.92

II. Total N.P.V.

	Paddy	Cotton	Wheat	Vegetables	Total
Cropped Area (ha)	1,600	800	800	200	3,400
N.P.V. per ha (L.E./ha)	306.05	325.05	161.61	211.92	-
Total N.P.V. (L.E.1,000)	490	260	129	42	921

Note: 1/ In terms of tomatoes as representative
2/ Including cost for operator

Table J-2-16

***** MONTHLY UNIT REQUIREMENT OF LABOR AND MACHINERY *****

CASE: HALF MECHANIZED (UNIT: HOURS/HA)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
CROP: PADDY													
OPERATOR	-	-	-	0.27	4.11	10.56	8.61	6.08	3.02	18.75	-	-	51.40
COMMON LABOR	-	-	-	10.00	16.18	310.73	83.00	49.78	37.76	291.75	-	-	799.20
TRACTOR	-	-	-	0.27	4.11	10.56	8.61	6.08	3.02	18.75	-	-	51.40
BOTTOM PLOW	-	-	-	0.27	2.42	2.15	-	-	-	-	-	-	4.84
DISC HARROW	-	-	-	-	-	-	-	-	-	-	-	-	-
TOOTH HARROW	-	-	-	-	-	-	-	-	-	-	-	-	-
DRIVE HARROW	-	-	-	-	0.66	5.30	-	-	-	-	-	-	5.96
BROADCASTER	-	-	-	-	0.07	0.58	-	-	-	-	-	-	0.65
SEEDER WITH RIDGER	-	-	-	-	-	-	-	-	-	-	-	-	-
POWER SPRAYER	-	-	-	-	0.96	2.53	8.61	6.08	3.02	-	-	-	21.20
CORN HARVESTER	-	-	-	-	-	-	-	-	-	-	-	-	-
RECIPROCATING MOWER	-	-	-	-	-	-	-	-	-	-	-	-	-
TRAILER	-	-	-	-	-	-	-	-	-	18.75	-	-	18.75
COMBINE	-	-	-	-	-	-	-	-	-	-	-	-	-
THRESHER	-	-	-	-	-	-	-	-	-	12.50	-	-	12.50
CORN SHELLER	-	-	-	-	-	-	-	-	-	-	-	-	-
CROP: COTTON													
OPERATOR	-	-	19.49	5.54	2.54	3.79	2.53	1.56	4.69	-	-	-	40.14
COMMON LABOR	-	-	33.09	264.91	322.29	27.83	21.80	171.07	489.18	-	-	-	1330.17
TRACTOR	-	-	19.49	5.54	2.54	3.79	2.53	1.56	4.69	-	-	-	40.14
BOTTOM PLOW	-	-	4.30	-	-	-	-	-	-	-	-	-	4.30
DISC HARROW	-	-	3.54	-	-	-	-	-	-	-	-	-	3.54
TOOTH HARROW	-	-	-	-	-	-	-	-	-	-	-	-	-
DRIVE HARROW	-	-	-	-	-	-	-	-	-	-	-	-	-
BROADCASTER	-	-	0.58	-	-	-	-	-	-	-	-	-	0.58
SEEDER WITH RIDGER	-	-	8.54	4.28	-	-	-	-	-	-	-	-	12.82
POWER SPRAYER	-	-	2.53	1.26	2.54	3.79	2.53	-	-	-	-	-	12.65
CORN HARVESTER	-	-	-	-	-	-	-	-	-	-	-	-	-
RECIPROCATING MOWER	-	-	-	-	-	-	-	-	-	-	-	-	-
TRAILER	-	-	-	-	-	-	-	1.56	4.69	-	-	-	6.25
COMBINE	-	-	-	-	-	-	-	-	-	-	-	-	-
THRESHER	-	-	-	-	-	-	-	-	-	-	-	-	-
CORN SHELLER	-	-	-	-	-	-	-	-	-	-	-	-	-

(cont'd)

***** MONTHLY UNIT REQUIREMENT OF LABOR AND MACHINERY *****

CASE: HALF MECHANIZED (UNIT: HOURS/HA)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
CROP: MAIZE													
OPERATOR	-	-	-	1.31	9.09	13.63	5.06	4.22	10.00	5.00	-	-	48.31
COMMON LABOR	-	-	-	6.22	40.41	61.86	123.25	83.02	171.16	80.04	-	-	565.96
TRACTOR	-	-	-	1.31	9.09	13.63	5.06	4.22	10.00	5.00	-	-	48.31
BOTTOM PLOW	-	-	-	0.72	3.58	-	-	-	-	-	-	-	4.30
DISC HARROW	-	-	-	0.59	2.95	-	-	-	-	-	-	-	3.54
TOOTH HARROW	-	-	-	-	-	-	-	-	-	-	-	-	-
DRIVE HARROW	-	-	-	-	-	-	-	-	-	-	-	-	-
BROADCASTER	-	-	-	-	-	-	-	-	-	-	-	-	-
SEEDER WITH RIDGER	-	-	-	-	2.14	10.68	-	-	-	-	-	-	12.82
POWER SPRAYER	-	-	-	-	0.42	2.95	5.06	4.22	-	-	-	-	12.65
CORN HARVESTER	-	-	-	-	-	-	-	-	-	-	-	-	-
RECIPROCATING MOWER	-	-	-	-	-	-	-	-	-	-	-	-	-
TRAILER	-	-	-	-	-	-	-	-	10.00	5.00	-	-	15.00
COMBINE	-	-	-	-	-	-	-	-	-	-	-	-	-
THRESHER	-	-	-	-	-	-	-	-	-	-	-	-	-
CORN SHELLER	-	-	-	-	-	-	-	-	1.67	0.83	-	-	2.50
CROP: SOILING CORN													
OPERATOR	-	-	-	1.97	3.92	9.63	10.21	2.52	19.31	-	-	-	47.56
COMMON LABOR	-	-	-	1.25	1.25	31.49	80.65	81.85	80.33	-	-	-	276.82
TRACTOR	-	-	-	1.97	3.92	9.63	10.21	2.52	19.31	-	-	-	47.56
BOTTOM PLOW	-	-	-	1.08	2.15	1.07	-	-	-	-	-	-	4.30
DISC HARROW	-	-	-	0.89	1.77	0.88	-	-	-	-	-	-	3.54
TOOTH HARROW	-	-	-	-	-	-	-	-	-	-	-	-	-
DRIVE HARROW	-	-	-	-	-	-	-	-	-	-	-	-	-
BROADCASTER	-	-	-	-	-	-	-	-	-	-	-	-	-
SEEDER WITH RIDGER	-	-	-	-	-	6.41	6.41	-	-	-	-	-	12.82
POWER SPRAYER	-	-	-	-	-	1.27	3.80	2.52	-	-	-	-	7.59
CORN HARVESTER	-	-	-	-	-	-	-	-	4.31	-	-	-	4.31
RECIPROCATING MOWER	-	-	-	-	-	-	-	-	-	-	-	-	-
TRAILER	-	-	-	-	-	-	-	-	15.00	-	-	-	15.00
COMBINE	-	-	-	-	-	-	-	-	-	-	-	-	-
THRESHER	-	-	-	-	-	-	-	-	-	-	-	-	-
CORN SHELLER	-	-	-	-	-	-	-	-	-	-	-	-	-

(cont'd)

***** MONTHLY UNIT REQUIREMENT OF LABOR AND MACHINERY *****

CASE: HALF MECHANIZED (UNIT: HOURS/HA)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
CROP: FT-BERSEEM													
OPERATOR	6.61	7.25	5.38	8.06	-	-	-	-	-	1.87	5.45	12.02	46.64
COMMON LABOR	13.48	16.84	10.10	11.35	-	-	-	-	8.40	18.46	27.88	24.84	131.35
TRACTOR	6.61	7.25	5.38	8.06	-	-	-	-	-	1.87	5.45	12.02	46.64
BOTTOM PLOW	-	-	-	-	-	-	-	-	-	-	-	-	-
DISC HARROW	-	-	-	-	-	-	-	-	-	-	-	-	-
TOOTH HARROW	-	-	-	-	-	-	-	-	-	-	-	-	-
DRIVE HARROW	-	-	-	-	-	-	-	-	-	-	-	-	-
BROADCASTER	0.39	0.19	-	-	-	-	-	-	-	0.19	0.39	0.58	1.74
SEEDER WITH RIDGER	-	-	-	-	-	-	-	-	-	-	-	-	-
POWER SPRAYER	0.84	1.69	-	-	-	-	-	-	-	1.68	5.06	3.38	12.65
CORN HARVESTER	-	-	-	-	-	-	-	-	-	-	-	-	-
RECIPROCATING MOWER	2.88	2.87	2.88	4.31	-	-	-	-	-	-	-	4.31	17.25
TRAILER	2.50	2.50	2.50	3.75	-	-	-	-	-	-	-	3.75	15.00
COMBINE	-	-	-	-	-	-	-	-	-	-	-	-	-
THRESHER	-	-	-	-	-	-	-	-	-	-	-	-	-
CORN SHELLER	-	-	-	-	-	-	-	-	-	-	-	-	-
CROP: CC-BERSEEM													
OPERATOR	5.38	2.68	-	-	-	-	-	-	5.25	7.31	5.45	12.03	38.10
COMMON LABOR	10.09	3.76	-	-	-	-	-	-	6.30	14.36	27.84	24.83	87.18
TRACTOR	5.38	2.68	-	-	-	-	-	-	5.25	7.31	5.45	12.03	38.10
BOTTOM PLOW	-	-	-	-	-	-	-	-	2.15	2.15	-	-	4.30
DISC HARROW	-	-	-	-	-	-	-	-	1.77	1.77	-	-	3.54
TOOTH HARROW	-	-	-	-	-	-	-	-	1.14	1.13	-	-	2.27
DRIVE HARROW	-	-	-	-	-	-	-	-	-	-	-	-	-
BROADCASTER	-	-	-	-	-	-	-	-	0.19	0.58	0.39	0.58	1.74
SEEDER WITH RIDGER	-	-	-	-	-	-	-	-	-	-	-	-	-
POWER SPRAYER	-	-	-	-	-	-	-	-	-	1.68	5.06	3.38	10.12
CORN HARVESTER	-	-	-	-	-	-	-	-	-	-	-	-	-
RECIPROCATING MOWER	2.88	1.43	-	-	-	-	-	-	-	-	-	4.32	8.63
TRAILER	2.50	1.25	-	-	-	-	-	-	-	-	-	3.75	7.50
COMBINE	-	-	-	-	-	-	-	-	-	-	-	-	-
THRESHER	-	-	-	-	-	-	-	-	-	-	-	-	-
CORN SHELLER	-	-	-	-	-	-	-	-	-	-	-	-	-

(cont'd)

***** MONTHLY UNIT REQUIREMENT OF LABOR AND MACHINERY *****

CASE: HALF MECHANIZED (UNIT: HOURS/HA)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
CROP: WHEAT													
OPERATOR	1.68	5.06	-	9.37	9.38	-	-	-	-	-	12.19	4.41	42.09
COMMON LABOR	23.87	29.00	8.76	145.34	141.01	-	-	-	-	-	9.57	31.95	389.50
TRACTOR	1.68	5.06	-	9.37	9.38	-	-	-	-	-	12.19	4.41	42.09
BOTTOM PLOW	-	-	-	-	-	-	-	-	-	-	4.30	-	4.30
DISC HARROW	-	-	-	-	-	-	-	-	-	-	3.54	-	3.54
TOOTH HARROW	-	-	-	-	-	-	-	-	-	-	2.27	-	2.27
DRIVE HARROW	-	-	-	-	-	-	-	-	-	-	-	-	-
BROADCASTER	-	-	-	-	-	-	-	-	-	-	0.39	0.19	0.58
SEEDER WITH RIDGER	-	-	-	-	-	-	-	-	-	-	-	-	-
POWER SPRAYER	1.68	5.06	-	-	-	-	-	-	-	-	1.69	4.22	12.65
CORN HARVESTER	-	-	-	-	-	-	-	-	-	-	-	-	-
RECIPROCATING MOWER	-	-	-	-	-	-	-	-	-	-	-	-	-
TRAILER	-	-	-	9.37	9.38	-	-	-	-	-	-	-	18.75
COMBINE	-	-	-	-	-	-	-	-	-	-	-	-	-
THRESHER	-	-	-	5.55	5.55	-	-	-	-	-	-	-	11.10
CORN SHELLER	-	-	-	-	-	-	-	-	-	-	-	-	-

Table J-2-17

***** MONTHLY LABOR AND MACHINERY REQUIREMENT *****

CASE: HALF MECHANIZED

(UNIT: 1000 HOURS)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
CROP: PADDY (6900 HA)													
OPERATOR	-	-	-	2	28	73	59	42	21	129	-	-	354
COMMON LABOR	-	-	-	69	112	2144	573	343	261	2013	-	-	5515
TRACTOR	-	-	-	2	28	73	59	42	21	129	-	-	354
BOTTOM PLOW	-	-	-	2	17	15	-	-	-	-	-	-	34
DISC HARROW	-	-	-	-	-	-	-	-	-	-	-	-	-
TOOTH HARROW	-	-	-	-	-	-	-	-	-	-	-	-	-
DRIVE HARROW	-	-	-	-	5	37	-	-	-	-	-	-	42
BROADCASTER	-	-	-	-	-	4	-	-	-	-	-	-	4
SEEDER WITH RIDGER	-	-	-	-	-	-	-	-	-	-	-	-	-
POWER SPRAYER	-	-	-	-	7	17	59	42	21	-	-	-	146
CORN HARVESTER	-	-	-	-	-	-	-	-	-	-	-	-	-
RECIPROCATING MOWER	-	-	-	-	-	-	-	-	-	-	-	-	-
TRAILER	-	-	-	-	-	-	-	-	-	129	-	-	129
COMBINE	-	-	-	-	-	-	-	-	-	-	-	-	-
THRESHER	-	-	-	-	-	-	-	-	-	86	-	-	86
CORN SHELLER	-	-	-	-	-	-	-	-	-	-	-	-	-
CROP: COTTON (6900 HA)													
OPERATOR	-	-	134	38	18	26	17	11	32	-	-	-	276
COMMON LABOR	-	-	228	1828	2224	192	150	1180	3375	-	-	-	9177
TRACTOR	-	-	134	38	18	26	17	11	32	-	-	-	276
BOTTOM PLOW	-	-	30	-	-	-	-	-	-	-	-	-	30
DISC HARROW	-	-	24	-	-	-	-	-	-	-	-	-	24
TOOTH HARROW	-	-	-	-	-	-	-	-	-	-	-	-	-
DRIVE HARROW	-	-	-	-	-	-	-	-	-	-	-	-	-
BROADCASTER	-	-	4	-	-	-	-	-	-	-	-	-	4
SEEDER WITH RIDGER	-	-	59	30	-	-	-	-	-	-	-	-	89
POWER SPRAYER	-	-	17	9	18	26	17	-	-	-	-	-	87
CORN HARVESTER	-	-	-	-	-	-	-	-	-	-	-	-	-
RECIPROCATING MOWER	-	-	-	-	-	-	-	-	-	-	-	-	-
TRAILER	-	-	-	-	-	-	-	11	32	-	-	-	43
COMBINE	-	-	-	-	-	-	-	-	-	-	-	-	-
THRESHER	-	-	-	-	-	-	-	-	-	-	-	-	-
CORN SHELLER	-	-	-	-	-	-	-	-	-	-	-	-	-

(cont'd)

***** MONTHLY LABOR AND MACHINERY REQUIREMENT *****

CASE: HALF MECHANIZED (UNIT: 1000 HOURS)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
CROP: MAIZE (3550 HA)													
OPERATOR	-	-	-	5	32	48	18	15	36	18	-	-	172
COMMON LABOR	-	-	-	22	143	220	438	295	608	284	-	-	2010
TRACTOR	-	-	-	5	32	48	18	15	36	18	-	-	172
BOTTOM PLOW	-	-	-	3	13	-	-	-	-	-	-	-	16
DISC HARROW	-	-	-	2	10	-	-	-	-	-	-	-	12
TOOTH HARROW	-	-	-	-	-	-	-	-	-	-	-	-	-
DRIVE HARROW	-	-	-	-	-	-	-	-	-	-	-	-	-
BROADCASTER	-	-	-	-	-	-	-	-	-	-	-	-	-
SEEDER WITH RIDGER	-	-	-	-	8	38	-	-	-	-	-	-	46
POWER SPRAYER	-	-	-	-	1	10	18	15	-	-	-	-	44
CORN HARVESTER	-	-	-	-	-	-	-	-	-	-	-	-	-
RECIPROCATING MOWER	-	-	-	-	-	-	-	-	-	-	-	-	-
TRAILER	-	-	-	-	-	-	-	-	36	18	-	-	54
COMBINE	-	-	-	-	-	-	-	-	-	-	-	-	-
THRESHER	-	-	-	-	-	-	-	-	-	-	-	-	-
CORN SHELLER	-	-	-	-	-	-	-	-	6	3	-	-	9
CROP: SOIL. CORN (3550 HA)													
OPERATOR	-	-	-	7	14	34	36	9	69	-	-	-	169
COMMON LABOR	-	-	-	4	4	112	286	291	285	-	-	-	982
TRACTOR	-	-	-	7	14	34	36	9	69	-	-	-	169
BOTTOM PLOW	-	-	-	4	8	4	-	-	-	-	-	-	16
DISC HARROW	-	-	-	3	6	3	-	-	-	-	-	-	12
TOOTH HARROW	-	-	-	-	-	-	-	-	-	-	-	-	-
DRIVE HARROW	-	-	-	-	-	-	-	-	-	-	-	-	-
BROADCASTER	-	-	-	-	-	-	-	-	-	-	-	-	-
SEEDER WITH RIDGER	-	-	-	-	-	23	23	-	-	-	-	-	46
POWER SPRAYER	-	-	-	-	-	5	13	9	-	-	-	-	27
CORN HARVESTER	-	-	-	-	-	-	-	-	15	-	-	-	15
RECIPROCATING MOWER	-	-	-	-	-	-	-	-	-	-	-	-	-
TRAILER	-	-	-	-	-	-	-	-	53	-	-	-	53
COMBINE	-	-	-	-	-	-	-	-	-	-	-	-	-
THRESHER	-	-	-	-	-	-	-	-	-	-	-	-	-
CORN SHELLER	-	-	-	-	-	-	-	-	-	-	-	-	-

(cont'd)

***** MONTHLY LABOR AND MACHINERY REQUIREMENT *****

CASE: HALF MECHANIZED (UNIT: 1000 HOURS)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
CROP: FT-BERSEEM (6900 HA)													
OPERATOR	46	50	37	56	-	-	-	-	-	13	38	83	323
COMMON LABOR	93	116	70	78	-	-	-	-	58	127	192	171	905
TRACTOR	46	50	37	56	-	-	-	-	-	13	38	83	323
BOTTOM PLOW	-	-	-	-	-	-	-	-	-	-	-	-	-
DISC HARROW	-	-	-	-	-	-	-	-	-	-	-	-	-
TOOTH HARROW	-	-	-	-	-	-	-	-	-	-	-	-	-
DRIVE HARROW	-	-	-	-	-	-	-	-	-	-	-	-	-
BROADCASTER	3	1	-	-	-	-	-	-	-	1	3	4	12
SEEDER WITH RIDGER	-	-	-	-	-	-	-	-	-	-	-	-	-
POWER SPRAYER	6	12	-	-	-	-	-	-	-	12	35	23	88
CORN HARVESTER	-	-	-	-	-	-	-	-	-	-	-	-	-
RECIPROCATING MOWER	20	20	20	30	-	-	-	-	-	-	-	30	120
TRAILER	17	17	17	26	-	-	-	-	-	-	-	26	103
COMBINE	-	-	-	-	-	-	-	-	-	-	-	-	-
THRESHER	-	-	-	-	-	-	-	-	-	-	-	-	-
CORN SHELLER	-	-	-	-	-	-	-	-	-	-	-	-	-
CROP: CC-BERSEEM (7100 HA)													
OPERATOR	38	19	-	-	-	-	-	-	37	52	39	85	270
COMMON LABOR	72	27	-	-	-	-	-	-	45	102	198	176	620
TRACTOR	38	19	-	-	-	-	-	-	37	52	39	85	270
BOTTOM PLOW	-	-	-	-	-	-	-	-	15	15	-	-	30
DISC HARROW	-	-	-	-	-	-	-	-	13	13	-	-	26
TOOTH HARROW	-	-	-	-	-	-	-	-	8	8	-	-	16
DRIVE HARROW	-	-	-	-	-	-	-	-	-	-	-	-	-
BROADCASTER	-	-	-	-	-	-	-	-	1	4	3	4	12
SEEDER WITH RIDGER	-	-	-	-	-	-	-	-	-	-	-	-	-
POWER SPRAYER	-	-	-	-	-	-	-	-	-	12	36	24	72
CORN HARVESTER	-	-	-	-	-	-	-	-	-	-	-	-	-
RECIPROCATING MOWER	20	10	-	-	-	-	-	-	-	-	-	31	61
TRAILER	18	9	-	-	-	-	-	-	-	-	-	27	54
COMBINE	-	-	-	-	-	-	-	-	-	-	-	-	-
THRESHER	-	-	-	-	-	-	-	-	-	-	-	-	-
CORN SHELLER	-	-	-	-	-	-	-	-	-	-	-	-	-

(cont'd)

***** MONTHLY LABOR AND MACHINERY REQUIREMENT *****

CASE: HALF MECHANIZED (UNIT: 1000 HOURS)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
CROP: WHEAT (6900 HA)													
OPERATOR	12	35	-	65	65	-	-	-	-	-	84	30	291
COMMON LABOR	165	200	60	1003	973	-	-	-	-	-	66	220	2687
TRACTOR	12	35	-	65	65	-	-	-	-	-	84	30	291
BOTTOM PLOW	-	-	-	-	-	-	-	-	-	-	30	-	30
DISC HARROW	-	-	-	-	-	-	-	-	-	-	24	-	24
TOOTH HARROW	-	-	-	-	-	-	-	-	-	-	16	-	16
DRIVE HARROW	-	-	-	-	-	-	-	-	-	-	-	-	-
BROADCASTER	-	-	-	-	-	-	-	-	-	-	3	1	4
SEEDER WITH RIDGER	-	-	-	-	-	-	-	-	-	-	-	-	-
POWER SPRAYER	12	35	-	-	-	-	-	-	-	-	12	29	88
CORN HARVESTER	-	-	-	-	-	-	-	-	-	-	-	-	-
RECIPROCATING MOWER	-	-	-	-	-	-	-	-	-	-	-	-	-
TRAILER	-	-	-	65	65	-	-	-	-	-	-	-	130
COMBINE	-	-	-	-	-	-	-	-	-	-	-	-	-
THRESHER	-	-	-	38	38	-	-	-	-	-	-	-	76
CORN SHELLER	-	-	-	-	-	-	-	-	-	-	-	-	-

Table J-2-18

***** MONTHLY LABOR AND MACHINERY REQUIREMENT *****

CASE: HALF MECHANIZED (UNIT: 1000 HOURS)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
	CROP: TOTAL (20900 HA)												
OPERATOR	96	104	171	173	157	181	130	77	195	212	161	198	1855
COMMON LABOR	330	343	358	3004	3456	2668	1447	2109	4632	2526	456	567	21896
TRACTOR	96	104	171	173	157	181	130	77	195	212	161	198	1855
BOTTOM PLOW	0	0	30	9	38	19	0	0	15	15	30	0	156
DISC HARROW	0	0	24	5	16	3	0	0	13	13	24	0	98
TOOTH HARROW	0	0	0	0	0	0	0	0	8	8	16	0	32
DRIVE HARROW	0	0	0	0	5	37	0	0	0	0	0	0	42
BROADCASTER	3	1	4	0	0	4	0	0	1	5	9	9	36
SEEDER WITH RIDGER	0	0	59	30	8	61	23	0	0	0	0	0	181
POWER SPRAYER	18	47	17	9	26	58	107	66	21	24	83	76	552
CORN HARVESTER	0	0	0	0	0	0	0	0	15	0	0	0	15
RECIPROCATING MOWER	40	30	20	30	0	0	0	0	0	0	0	61	181
TRAILER	35	26	17	91	65	0	0	11	121	147	0	53	566
COMBINE	0	0	0	0	0	0	0	0	0	0	0	0	0
THRESHER	0	0	0	38	38	0	0	0	0	86	0	0	162
CORN SHELLER	0	0	0	0	0	0	0	0	6	3	0	0	9

Table J-2-19 Calculation for Number of Agricultural Machinery and Useful Life

	Peak Month Operation		Required Number	Annual Operation		Total Durable Hours (hrs)	Useful Life (yrs)
	Requirement (1,000 hrs)	Operating Hours (hrs)		Total Requirement (1,000 hrs)	Operating Hours (hrs/unit)		
Tractor	212	250	848	1,855	2,188	12,000	6
Bottom Plow	38	45	848	156	184	2,000	11
Disc Harrow	24	28	848	98	116	2,000	15
Tooth Harrow	16	75	212	32	151	2,500	15
Drive Harrow	37	175	212	42	198	2,000	10
Broadcaster	9	42	212	36	170	1,800	11
Seeder with Ridger	61	72	848	181	213	1,800	8
Power Sprayer	107	126	848	552	651	1,500	2
Corn Harvester	15	200	75	15	200	2,000	10
Reciprocating Mower	61	72	848	181	213	2,000	9
Trailer	147	173	848	566	667	2,400	4
Combine	32	200	160	64	400	2,000	5
Thresher	86	250	344	162	471	2,000	4
Corn Sheller	6	250	24	9	375	2,000	5

Table J-2-20 Basic Data for Calculation of Fixed Cost

	Useful Life (Yrs)	Remaining Value (%)	Annual Depreciation Cost (%)	Repairing Cost Total (%)	Repairing Cost Annual (%)	Hangar Cost (%)	Insurance (%)
Tractor	6	10	15.0	70	11.7	0.43	0.25
Bottom Plow	11	5	8.6	40	3.6	1.36	0.25
Disc Harrow	15	5	6.3	40	2.7	0.85	0.25
Tooth Harrow	15	5	6.3	40	2.7	1.66	0.25
Drive Harrow	10	5	9.5	40	4.0	1.66	0.25
Broadcaster	11	5	8.6	20	1.8	0.91	0.25
Seeder with Ridger	8	10	11.3	40	5.0	0.68	0.25
Power Sprayer	2	10	45.0	32	16.0	0.39	0.25
Corn Harvester	10	10	9.0	60	6.0	0.36	0.25
Reciprocating Mower	9	10	10.0	75	8.3	0.36	0.25
Trailer	4	10	22.5	24	6.0	2.24	0.25
Combine	5	10	18.0	50	10.0	0.36	0.25
Thresher	4	10	22.5	15	3.8	1.55	0.25
Corn Sheller	5	10	18.0	40	8.0	0.43	0.25

Table J-2-21 Fixed Cost of Agricultural Machinery

	Purchase Price (L.E.)	Annual Depreciation (L.E.)	Annual Repair Cost (L.E.)	Hangar Cost (L.E.)	Insurance (L.E.)	Annual Fixed Cost (L.E.)	Annual Operation Hour (hrs)	Hourly Fixed Cost (L.E./hr)
Tractor	13,261	1,989	1,552	57	33	3,631	2,188	1.66
Bottom Plow	1,578	136	57	21	4	218	184	1.18
Disc Harrow	1,438	91	39	12	4	146	116	1.26
Tooth Harrow	804	51	22	13	2	88	151	0.58
Drive Harrow	1,686	160	67	28	4	259	198	1.31
Broadcaster	711	61	13	6	2	82	170	0.48
Seeder with Ridger	1,995	225	100	14	5	344	213	1.62
Power Sprayer	2,180	981	349	9	5	1,344	651	2.06
Corn Harvester	5,250	473	315	19	13	820	200	4.10
Reciprocating Mower	1,268	127	105	5	3	240	213	1.13
Trailer	2,861	644	172	64	7	887	667	1.33
Combine	36,820	6,628	3,682	133	92	10,535	400	26.34
Thresher	773	174	29	12	2	217	471	0.46
Corn Sheller	5,529	995	442	24	14	1,475	375	3.93

Table J-2-22 Unit Price of Agricultural Machineries

	International Price (f.o.b.) (US$)	Freight & Insurance (US$)	c.i.f. Alexandria (US$)	c.i.f. Alexandria (L.E.)	Transport Cost from Alexandria to San El Hagar (L.E.)	Value at Project Area (L.E.)
Tractor	17,150	1,715	18,865	13,206	55	13,261
Bottom Plow	2,040	204	2,244	1,571	7	1,578
Disc Harrow	1,860	186	2,046	1,432	6	1,438
Tooth Harrow	1,040	104	1,144	801	3	804
Drive Harrow	2,180	218	2,398	1,679	7	1,686
Broadcaster	920	92	1,012	708	3	711
Seeder with Ridger	2,580	258	2,838	1,987	8	1,995
Power Sprayer	2,820	282	3,102	2,171	9	2,180
Corn Harvester	6,790	679	7,469	5,228	22	5,250
Reciprocating Mower	1,640	164	1,804	1,263	5	1,268
Trailer	3,700	370	4,070	2,849	12	2,861
Combine	47,620	4,762	52,382	36,667	153	36,820
Thresher	1,000	100	1,100	770	3	773
Corn Sheller	7,150	715	7,865	5,506	23	5,529

Table J-2-23 Net Production Value with Project

I. N.P.V. per ha

	Paddy	Cotton	Wheat	Vegetable 1/
Yield (ton/ha)	7.1	3.0	5.3	4.3
Unit Price (L.E./ton)	212.5	591.0	176.2	204.2
G.P.V. (L.E./ha)	1,508.75	1,773.00	933.86	878.06
Production Cost (L.E./ha) 1/				
Seed	29.40	82.60	9.00	36.00
Fertilizers	77.05	99.60	82.80	59.80
Agr. Chemicals	145.21	90.74	64.88	63.12
Fuel	31.49	24.58	31.08	27.43
Agr. Machinery 2/	189.44	144.02	181.31	150.16
Labor	127.87	212.83	90.55	62.32
Miscellaneous	56.97	65.44	45.96	39.88
Sub-total	657.43	719.81	505.58	438.71
N.P.V. (L.E./ha)	851.32	1,053.19	428.28	439.35

II. Total N.P.V.

	Paddy	Cotton	Maize	Wheat	Total
Cropped Area (ha)	6,900	6,900	3,550	6,900	24,250
N.P.V. per ha (L.E./ha)	851.32	1.053.19	428.28	429.35	-
Total N.P.V. (L.E.1,000)	5,874	7,267	1,520	3,032	17,693

Note: 1/ Details are referred to Appendix J-2.
2/ Including cost for operator

Table J-2-24 Net Proudction Value per herd

I. Gross Production Value (per herd)

Beef Production

Number of cattle to be slaughtered	40	nos
Live weight	450	kg
Yield of meat	50	%
Beef production	9	tons
Unit price of beef	L.E. 1,200	per ton
G.P.V.	L.E. 10,800	

Hide Production

Number of hide	40	peices
Unit price of hide	L.E. 10	per peice
G.P.V.	L.E. 400	
Total G.P.V.	L.E. 11,200	

II. Production Cost

Feed 1/	Requirement/herd (ton)	Unit Cost (L.E./ton)	Total Cost (L.E.)
Soiling Corn	241	7.13	1,718
Full-term Berseem	445	6.09	2,710
Catch-cropping Berseem	229	10.03	2,297
Sub-total	-	-	6,725
Labor	-	-	700
Artificial Insemination	-	-	467
Medicine, etc	-	-	333
Miscellaneous	-	-	825
Total	-	-	9,050

III. Net Production Value per herd L.E. 2,150

Note: 1/ Direct economic production cost and see Appendix J-2.

Table J-2-25 Economic Project Cost

(Unit: 1,000 LE / US$)

Description	Total (LE)	Foreign Currency (LE)	Foreign Currency (US$)	Local Currency (LE)	Local Currency (US$)	Remarks
1. Civil Works						
1-1. Preparation	151	83	(119)	68	(97)	Exchange Rate
1-2. Pumping Station (Irrigation	8,831	7,763	(11,090)	1,068	(1,526)	LE = 0.7 US$
1-3. Pumping Station (Drainage)	1,368	1,264	(1,806)	104	(149)	
1-4. Irrigation Canal						
Main Canal	3,028	1,360	(1,943)	1,668	(2,383)	
Secondary Canal	3,836	2,386	(3,408)		(2,071)	
1-5. Drainage Canal						
Main D. Canal	2,086	1,453	(2,076)	633	(904)	
Secondary D. Canal	2,472	1,413	(2,019)	1,059	(1,513)	
1-6. On-farm Facilities	14,562	7,880	(11,257)	6,682	(9,546)	
1-7. Road	1,048	219	(313)	829	(1,184)	
Sub-total	37,382	23,821	(34,031)	13,561	(19,373)	
2. Land Acquisition and Compensation	-	-	(-)	-	(-)	
3. Construction Equipment	-	-	(-)	-	(-)	
4. Agricultural Development	3,356	484	(691)	2,872	(4,103)	
5. Operation and Maintenance Cost	373	-	(-)	373	(533)	
6. Project Facilities	590	89	(127)	501	(716)	
7. Project Administration (8%)	1,385	-	(-)	1,385	(1,979)	
8. Consultant Services	1,358	1,112	(2,029)	246	(351)	
Total (1 to 8)	44,444	25,506	(36,438)	18,938	(27,055)	
9. Contingency (15%)	6,667	3,826	(5,466)	2,841	(4,059)	
Total (1 to 9)	51,111	29,332	(41,903)	21,779	(31,114)	

Table J-2-26. Disbursement Schedule of the Economic Cost

(Unit: 1,000 LE)

Description	Total		1982		1983		1984		1985		1986		1987		1988	
	FC	LC	FC	LC	FC	LC	FC	LC	FC	LC	FC	LC	FC	LC	FC	LC
1. Civil Works																
1-1. Preparation	83	68	-	-	83	68	-	-	-	-	-	-	-	-	-	-
1-2. Pumping Station (Irrigation)	7,763	1,068	-	-	3,105	427	4,658	641	-	-	-	-	-	-	-	-
1-3. Pumping Station (Drainage)	1,264	104	-	-	1,138	94	126	10	-	-	-	-	-	-	-	-
1-4. Irrigation Canal																
Main Canal	1,360	1,668	-	-	-	-	204	250	340	417	340	417	272	334	204	250
Secondary Canal	2,386	1,450	-	-	-	-	358	218	477	290	477	290	477	290	597	362
1-5. Drainage Canal																
Main D. Canal	1,453	633	-	-	291	127	726	316	436	190	-	-	-	-	-	-
Secondary	1,413	1,059	-	-	140	107	283	212	283	212	283	212	283	212	141	104
1-6. On-farm	7,880	6,682	-	-	788	668	1,576	1,336	1,576	1,336	1,576	1,336	1,576	1,336	788	670
1-7. Road	219	829	-	-	-	-	30	84	53	207	52	207	52	207	32	124
Sub-total	23,821	13,561	-	-	5,545	1,491	7,961	3,067	3,165	2,652	2,728	2,462	2,660	2,379	1,762	1,510
2. Land Acquisition and Compensation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3. Construction Equipment	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4. Agricultural Development	484	2,872	-	-	-	-	-	-	-	431	-	862	-	862	484	717
5. Operation and Maintenance Cost	-	373	-	53	-	53	-	53	-	53	-	53	-	54	-	54
6. Project Facilities	89	501	89	250	-	251	-	-	-	-	-	-	-	-	-	-
7. Project Administration	-	1,385	-	24	-	144	-	250	-	251	-	270	-	264	-	182
8. Consultant Service	1,112	246	168	37	246	55	155	34	155	34	155	34	155	34	78	18
Total (1 to 8)	25,506	18,938	257	364	5,791	1,994	8,116	3,404	3,320	3,421	2,883	3,681	2,815	3,593	2,324	2,481
9. Contingency (15%)	3,826	2,841	39	55	869	299	1,217	511	498	513	432	552	422	539	349	372
Total (1 to 9)	29,332	21,779	296	419	6,660	2,293	9,333	3,915	3,818	3,934	3,315	4,233	3,237	4,132	2,673	2,853

Table J-2-27 ***** STREAMS OF PROJECT COST AND BENEFIT *****

(UNIT: L.E. THOUSAND)

PROJECT YEAR	PROJECT COST				PROJECT BENEFIT	NET BENEFIT
	INITIAL COST	REPLACE. COST	O & M COST	TOTAL		
1	715	-	-	715	-	-715
2	8953	-	-	8953	-	-8953
3	14280	-	-	14280	-	-14280
4	8784	-	53	8837	-	-8837
5	8580	-	107	8687	934	-7753
6	8401	-	266	8667	2801	-5866
7	6561	-	533	7094	5802	-1292
8	-	-	959	959	7469	6510
9	-	-	1065	1065	9336	8271
10	-	-	1065	1065	11203	10138
11	-	-	1065	1065	13070	12005
12	-	-	1065	1065	14938	13873
13	-	-	1065	1065	15871	14806
14	-	-	1065	1065	16805	15740
15	-	-	1065	1065	17738	16673
16	-	-	1065	1065	18672	17607
17	-	-	1065	1065	18672	17607
18	-	-	1065	1065	18672	17607
19	-	1427	1065	2492	18672	16180
20	-	-	1065	1065	18672	17607
21	-	-	1065	1065	18672	17607
22	-	-	1065	1065	18672	17607
23	-	-	1065	1065	18672	17607
24	-	-	1065	1065	18672	17607
25	-	-	1065	1065	18672	17607
26	-	-	1065	1065	18672	17607
27	-	-	1065	1065	18672	17607
28	-	-	1065	1065	18672	17607
29	-	-	1065	1065	18672	17607
30	-	-	1065	1065	18672	17607
31	-	-	1065	1065	18672	17607
32	-	-	1065	1065	18672	17607
33	-	-	1065	1065	18672	17607
34	-	1427	1065	2492	18672	16180
35	-	-	1065	1065	18672	17607
36	-	-	1065	1065	18672	17607
37	-	-	1065	1065	18672	17607
38	-	-	1065	1065	18672	17607
39	-	-	1065	1065	18672	17607
40	-	-	1065	1065	18672	17607
41	-	-	1065	1065	18672	17607
42	-	-	1065	1065	18672	17607
43	-	-	1065	1065	18672	17607
44	-	-	1065	1065	18672	17607
45	-	-	1065	1065	18672	17607
46	-	-	1065	1065	18672	17607
47	-	-	1065	1065	18672	17607
48	-	-	1065	1065	18672	17607
49	-	-	1065	1065	18672	17607
50	-	-	1065	1065	18672	17607

Table J-2-28 *** PRESENT WORTH OF BENEFIT ***

(UNIT: L.E. THOUSAND)

YEAR	B.STREAM	5.00 %	7.50 %	10.00 %	12.50 %	15.00 %	17.50 %	20.00 %	22.50 %	25.00 %	27.50 %
1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	934.	732.	651.	580.	518.	464.	417.	375.	339.	306.	277.
6	2801.	2090.	1815.	1581.	1382.	1211.	1064.	938.	829.	734.	652.
7	5802.	4123.	3497.	2977.	2544.	2181.	1876.	1619.	1402.	1217.	1059.
8	7469.	5055.	4188.	3484.	2911.	2442.	2056.	1737.	1473.	1253.	1070.
9	9336.	6018.	4870.	3959.	3234.	2654.	2187.	1809.	1503.	1253.	1049.
10	11203.	6878.	5436.	4319.	3450.	2769.	2233.	1809.	1472.	1203.	987.
11	13070.	7642.	5899.	4581.	3578.	2809.	2217.	1759.	1402.	1123.	903.
12	14938.	8318.	6272.	4760.	3635.	2792.	2157.	1675.	1308.	1027.	809.
13	15871.	8417.	6199.	4597.	3433.	2579.	1950.	1483.	1135.	873.	674.
14	16805.	8488.	6105.	4425.	3231.	2375.	1758.	1309.	981.	739.	560.
15	17738.	8532.	5995.	4246.	3031.	2180.	1579.	1151.	845.	624.	464.
16	18672.	8554.	5870.	4064.	2836.	1995.	1414.	1010.	726.	526.	383.
17	18672.	8147.	5461.	3694.	2521.	1735.	1204.	842.	593.	420.	300.
18	18672.	7759.	5080.	3358.	2241.	1509.	1025.	701.	484.	336.	236.
19	18672.	7389.	4725.	3053.	1992.	1312.	872.	584.	395.	269.	185.
20	18672.	7037.	4396.	2776.	1771.	1141.	742.	487.	322.	215.	145.
21	18672.	6702.	4089.	2523.	1574.	992.	632.	406.	263.	172.	114.
22	18672.	6383.	3804.	2294.	1399.	863.	537.	338.	215.	138.	89.
23	18672.	6079.	3538.	2085.	1244.	750.	457.	282.	175.	110.	70.
24	18672.	5790.	3291.	1896.	1105.	652.	389.	235.	143.	88.	55.
25	18672.	5514.	3062.	1723.	983.	567.	331.	196.	117.	71.	43.
26	18672.	5251.	2848.	1567.	873.	493.	282.	163.	95.	56.	34.
27	18672.	5001.	2650.	1424.	776.	429.	240.	136.	78.	45.	26.
28	18672.	4763.	2465.	1295.	690.	373.	204.	113.	64.	36.	21.
29	18672.	4536.	2293.	1177.	613.	324.	174.	94.	52.	29.	16.
30	18672.	4320.	2133.	1070.	545.	282.	148.	79.	42.	23.	13.
31	18672.	4115.	1984.	973.	485.	245.	126.	66.	35.	18.	10.
32	18672.	3919.	1846.	884.	431.	213.	107.	55.	28.	15.	8.
33	18672.	3732.	1717.	804.	383.	185.	91.	46.	23.	12.	6.
34	18672.	3554.	1597.	731.	340.	161.	78.	38.	19.	9.	5.
35	18672.	3385.	1486.	664.	303.	140.	66.	32.	15.	8.	4.
36	18672.	3224.	1382.	604.	269.	122.	56.	26.	13.	6.	3.
37	18672.	3070.	1286.	549.	239.	106.	48.	22.	10.	5.	2.
38	18672.	2924.	1196.	499.	213.	92.	41.	18.	8.	4.	2.
39	18672.	2785.	1112.	454.	189.	80.	35.	15.	7.	3.	1.
40	18672.	2652.	1035.	413.	168.	70.	29.	13.	6.	2.	1.
41	18672.	2526.	963.	375.	149.	61.	25.	11.	5.	2.	1.
42	18672.	2406.	895.	341.	133.	53.	21.	9.	4.	2.	1.
43	18672.	2291.	833.	310.	118.	46.	18.	7.	3.	1.	1.
44	18672.	2182.	775.	282.	105.	40.	15.	6.	2.	1.	0.
45	18672.	2078.	721.	256.	93.	35.	13.	5.	2.	1.	0.
46	18672.	1979.	671.	233.	83.	30.	11.	4.	2.	1.	0.
47	18672.	1885.	624.	212.	74.	26.	10.	4.	1.	1.	0.
48	18672.	1795.	580.	192.	65.	23.	8.	3.	1.	0.	0.
49	18672.	1710.	540.	175.	58.	20.	7.	2.	1.	0.	0.
50	18672.	1628.	502.	159.	52.	17.	6.	2.	1.	0.	0.
TOTAL	769487.	213361.	128371.	82620.	56060.	39640.	28958.	21716.	16638.	12978.	10279.

Table J-2-29 *** PRESENT WORTH OF COST ***

(UNIT: L.E. THOUSAND)

YEAR	C.STREAM	5.00 %	7.50 %	10.00 %	12.50 %	15.00 %	17.50 %	20.00 %	22.50 %	25.00 %	27.50 %
1	715.	681.	665.	650.	636.	622.	609.	596.	584.	572.	561.
2	8953.	8121.	7747.	7399.	7074.	6770.	6485.	6217.	5966.	5730.	5507.
3	14280.	12336.	11495.	10729.	10029.	9389.	8803.	8264.	7768.	7311.	6890.
4	8837.	7270.	6617.	6036.	5517.	5053.	4636.	4262.	3924.	3620.	3344.
5	8687.	6807.	6051.	5394.	4821.	4319.	3879.	3491.	3149.	2847.	2578.
6	8667.	6467.	5616.	4892.	4275.	3747.	3293.	2903.	2565.	2272.	2017.
7	7094.	5042.	4276.	3640.	3110.	2667.	2294.	1980.	1714.	1488.	1295.
8	959.	649.	538.	447.	374.	313.	264.	223.	189.	161.	137.
9	1065.	687.	555.	452.	369.	303.	249.	206.	171.	143.	120.
10	1065.	654.	517.	411.	328.	263.	212.	172.	140.	114.	94.
11	1065.	623.	481.	373.	292.	229.	181.	143.	114.	91.	74.
12	1065.	593.	447.	339.	259.	199.	154.	119.	93.	73.	58.
13	1065.	565.	416.	308.	230.	173.	131.	100.	76.	59.	45.
14	1065.	538.	387.	280.	205.	151.	111.	83.	62.	47.	35.
15	1065.	512.	360.	255.	182.	131.	95.	69.	51.	37.	28.
16	1065.	488.	335.	232.	162.	114.	81.	58.	41.	30.	22.
17	1065.	465.	311.	211.	144.	99.	69.	48.	34.	24.	17.
18	1065.	443.	290.	192.	128.	86.	58.	40.	28.	19.	13.
19	2492.	986.	631.	407.	266.	175.	116.	78.	53.	36.	25.
20	1065.	401.	251.	158.	101.	65.	42.	28.	18.	12.	8.
21	1065.	382.	233.	144.	90.	57.	36.	23.	15.	10.	6.
22	1065.	364.	217.	131.	80.	49.	31.	19.	12.	8.	5.
23	1065.	347.	202.	119.	71.	43.	26.	16.	10.	6.	4.
24	1065.	330.	188.	108.	63.	37.	22.	13.	8.	5.	3.
25	1065.	315.	175.	98.	56.	32.	19.	11.	7.	4.	2.
26	1065.	300.	162.	89.	50.	28.	16.	9.	5.	3.	2.
27	1065.	285.	151.	81.	44.	24.	14.	8.	4.	3.	2.
28	1065.	272.	141.	74.	39.	21.	12.	6.	4.	2.	1.
29	1065.	259.	131.	67.	35.	18.	10.	5.	3.	2.	1.
30	1065.	246.	122.	61.	31.	16.	8.	4.	2.	1.	1.
31	1065.	235.	113.	55.	28.	14.	7.	4.	2.	1.	1.
32	1065.	224.	105.	50.	25.	12.	6.	3.	2.	1.	0.
33	1065.	213.	98.	46.	22.	11.	5.	3.	1.	1.	0.
34	2492.	474.	213.	98.	45.	22.	10.	5.	3.	1.	1.
35	1065.	193.	85.	38.	17.	8.	4.	2.	1.	0.	0.
36	1065.	184.	79.	34.	15.	7.	3.	2.	1.	0.	0.
37	1065.	175.	73.	31.	14.	6.	3.	1.	1.	0.	0.
38	1065.	167.	68.	28.	12.	5.	2.	1.	0.	0.	0.
39	1065.	159.	63.	26.	11.	5.	2.	1.	0.	0.	0.
40	1065.	151.	59.	24.	10.	4.	2.	1.	0.	0.	0.
41	1065.	144.	55.	21.	9.	3.	1.	1.	0.	0.	0.
42	1065.	137.	51.	19.	8.	3.	1.	1.	0.	0.	0.
43	1065.	131.	48.	18.	7.	3.	1.	0.	0.	0.	0.
44	1065.	124.	44.	16.	6.	2.	1.	0.	0.	0.	0.
45	1065.	119.	41.	15.	5.	2.	1.	0.	0.	0.	0.
46	1065.	113.	38.	13.	5.	2.	1.	0.	0.	0.	0.
47	1065.	108.	36.	12.	4.	1.	1.	0.	0.	0.	0.
48	1065.	102.	33.	11.	4.	1.	0.	0.	0.	0.	0.
49	1065.	98.	31.	10.	3.	1.	0.	0.	0.	0.	0.
50	1065.	93.	29.	9.	3.	1.	0.	0.	0.	0.	0.
TOTAL	105776.	60768.	51068.	44355.	39311.	35307.	32008.	29221.	26824.	24736.	22899.

Table J-2-30

***** CALCULATION OF INTERNAL RATE OF RETURN *****

(UNIT: L.E. THOUSAND)

DISCOUNT RATE	+++++ PRESENT WORTH +++++ BENEFIT	COST	B/C RATIO
5.00 %	213361.	60768.	3.51
7.50 %	128371.	51068.	2.51
10.00 %	82620.	44355.	1.86
12.50 %	56060.	39311.	1.43
15.00 %	39640.	35307.	1.12
17.50 %	28958.	32008.	0.90
20.00 %	21716.	29221.	0.74
22.50 %	16638.	26824.	0.62
25.00 %	12978.	24736.	0.52
27.50 %	10279.	22899.	0.45

INTERNAL RATE OF RETURN ---------- 16.3 %

Fig. J-2-1

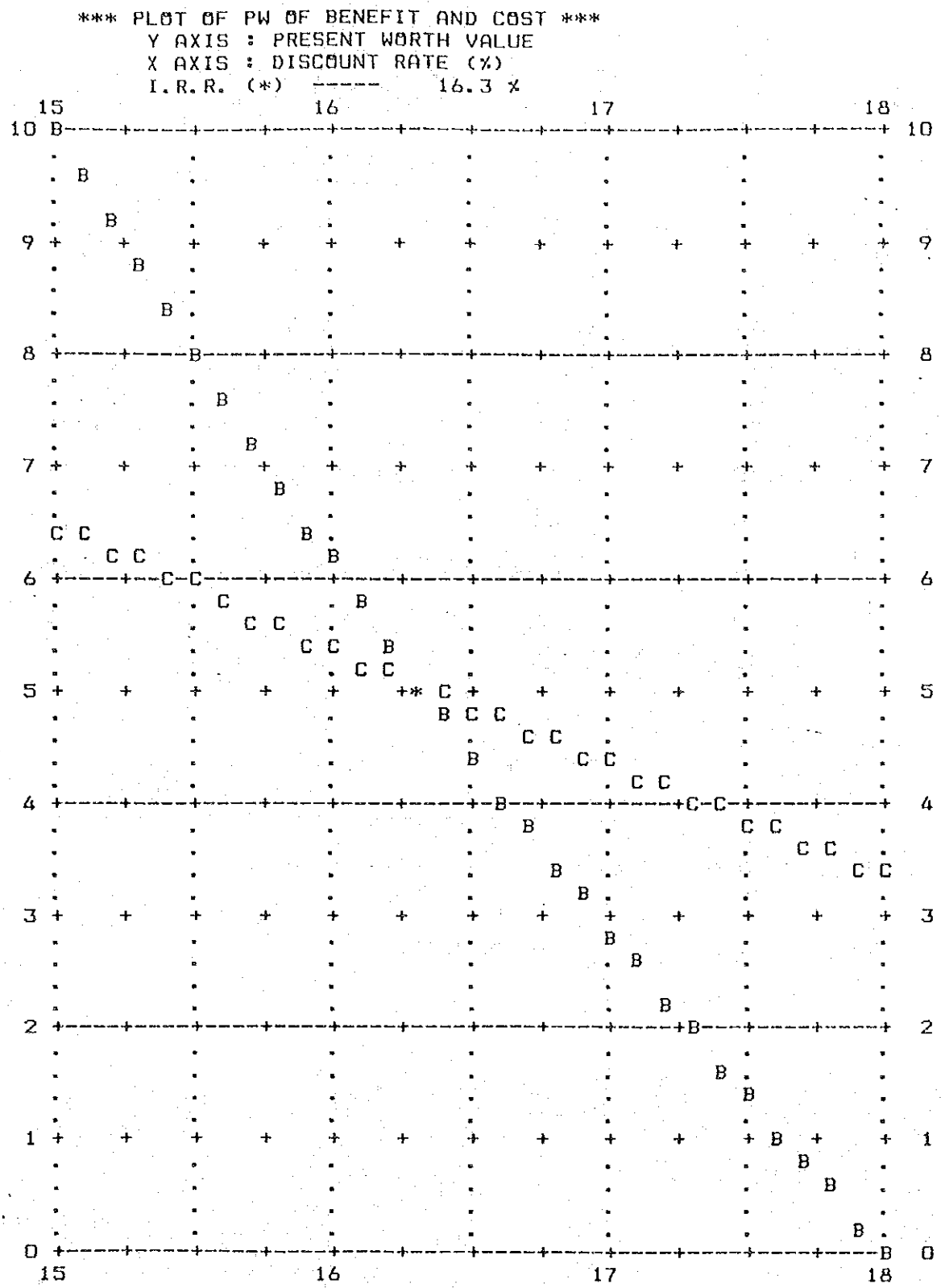
*** PLOT OF PW OF BENEFIT AND COST ***
Y AXIS : PRESENT WORTH VALUE
X AXIS : DISCOUNT RATE (%)
I.R.R. (*) ----- 16.3 %
15
16
17
18
10
9
8
7
6
5
4
3
2
1
0

Table J-3-1

***** MONTHLY LABOR AND MACHINERY REQUIREMENT *****

CASE: HALF MECHANIZED (UNIT: HOURS)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
	CROP: TOTAL (1.64 HA)												
OPERATOR	7.5	8.1	13.4	13.5	12.3	14.3	10.3	6.0	15.3	16.6	12.6	15.6	145.5
COMMON LABOR	25.8	26.9	28.1	235.2	270.6	209.0	113.7	165.4	363.0	198.0	35.8	44.6	1715.9
TRACTOR	7.5	8.1	13.4	13.5	12.3	14.3	10.3	6.0	15.3	16.6	12.6	15.6	145.5
BOTTOM PLOW	0.0	0.0	2.3	0.6	2.9	1.5	0.0	0.0	1.2	1.2	2.3	0.0	12.1
DISC HARROW	0.0	0.0	1.9	0.4	1.3	0.2	0.0	0.0	1.0	1.0	1.9	0.0	7.8
TOOTH HARROW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	1.2	0.0	2.5
DRIVE HARROW	0.0	0.0	0.0	0.0	0.4	2.9	0.0	0.0	0.0	0.0	0.0	0.0	3.2
BROADCASTER	0.2	0.1	0.3	0.0	0.0	0.3	0.0	0.0	0.1	0.4	0.6	0.7	2.9
SEEDER WITH RIDGER	0.0	0.0	4.6	2.3	0.6	4.8	1.8	0.0	0.0	0.0	0.0	0.0	14.1
POWER SPRAYER	1.4	3.6	1.4	0.7	2.0	4.6	8.5	5.2	1.6	1.8	6.5	6.0	43.3
CORN HARVESTER	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.0	1.2
RECIPROCATING MOWER	3.2	2.4	1.6	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.7	14.1
TRAILER	2.7	2.0	1.3	7.1	5.1	0.0	0.0	0.8	9.5	11.5	0.0	4.1	44.3
COMBINE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
THRESHER	0.0	0.0	0.0	3.0	3.0	0.0	0.0	0.0	0.0	6.8	0.0	0.0	12.7
CORN SHELLER	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.2	0.0	0.0	0.7

Note: For further details, refer to Appendix J-4.

Table J-3-2 Financial Crop Return per ha after Full Development

	Paddy	Cotton	Maize	Soil. Corn	FT-Berseem	CC-Berseem	Wheat
Yield (ton/ha)	7.1	3.0	5.3	60.0	57.0	28.5	4.3
Unit Price (L.E./ton)	65.0	308.0	78.0	12.0	12.0	12.0	83.0
G.P.V. (L.E./ha)	461.5	924.0	413.4	720.0	684.0	342.0	356.9
Production Cost (L.E./ha)[1/]							
Seed	12.60	4.20	4.50	4.50	24.00	24.00	14.40
Fertilizers	30.75	39.60	32.40	32.40	14.40	10.80	23.40
Agr. Chemicals	32.03	19.95	13.90	9.34	11.11	9.98	13.88
Fuel	7.27	5.67	7.17	7.28	6.46	5.53	6.33
Agr. Machinery[2/]	193.04	146.83	184.69	180.58	172.88	130.00	153.10
Hired Labor	-	-	-	-	-	-	-
Miscellaneous	27.57	21.63	24.27	23.41	22.89	18.03	21.11
Sub-total	303.26	237.88	266.93	257.51	251.74	198.34	232.22
N.P.V. (L.E./ha)	158.24	686.12	146.47	462.49	432.26	143.66	124.68

Note: 1/ For further details, refer to Appendix J-5.

2/ Including cost for operator

Table J-3-3 Farm Budget after Full Development

I. Farm Size : 2.1 ha (5 feddans)

II. Faily Size : 6

III. Net Irrigable Area : 1.64 ha (3.9 feddans)

IV. Farm Income

	Cropped Area (ha)	G.P.V. (L.E.)	Farm Cost (L.E.)	Net Income (L.E.)
Paddy	0.54	249	164	85
Cotton	0.54	499	128	371
Maize	0.28	116	75	41
Soling Corn	0.28	202	72	130
Berseem (F)	0.54	369	136	233
Berseem (C)	0.56	192	111	81
Wheat	0.54	193	125	68
Total	3.28	1,820	811	1,009

V. Other Expenses

Mortgage Repayment (Land & House)	L.E. 278
Land Tax	L.E. 25
O & M Cost	L.E. 107
Sub-total	L.E. 410

VI. Disposal Income L.E. 599 (L.E. 877)1/

VII. Cost of Living

Subsistence Level	L.E. 444
Desirable Level	L.E. 804

Note: 1/ Disposal income of L.E. 877 will be obtainable at 27th year and further after settlement.

Table J-3-4 Summary of Financial Cash Flow

(Unit: L.E.)

	Years after Settlement								
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th
Gross Farm Income	-	-	502	728	954	976	1,336	1,665	1,820
Farm Cost	-	-	355	525	641	626	758	811	811
Net Farm Income	-	-	147	203	313	350	578	844	1,009
Off Farm Income	675	675	467	467	467	-	-	-	-
Total Farm Income	675	675	614	670	780	350	578	844	1,009
Subsistence Living	444	444	444	444	444	444	444	444	444
Surplus	231	231	170	226	336	-94	134	400	565
Mortgage Repayment		60	60	120	120	180	180	278	278
Loan Repayment		121	121	121	121	-	-	-	-
Balance	231	50	-11	-15	95	-274	-46	122	287
(Balance Accumulated)	(231)	(281)	(270)	(255)	(354)	(80)	(34)	(156)	(443)