ISMAILIA GOVERNORATE
THE ARAB REPUBLIC OF EGYPT

FEASIBILITY REPORT
ON
THE TENTH OF RAMADAN
AGRICULTURAL DEVELOPMENT PROJECT

SUMMARY

SEPTEMBER 1982

JAPAN INTERNATIONAL COOPERATION AGENCY

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CONTENTS

SUMMARY OF REPORT AND RECOMMENDATION

1. Introduction

(1) This is a summary of the Report which contains the results of the feasibility study undertaken on the agricultural development project at the Tenth of Ramadan area in the Governorate of Ismailia, Egypt.

(2) The feasibility study was carried out from February to April in 1982, with the steps and procedures as briefed in the below: Firstly, an overall approach aimed at grasping a panoramic view of the background of the project, namely: the socio-economic conditions prevailing in Egypt and the trends of agricultural development including desert development, was made. Secondly, identification, through systematic and scientific methods, of the location, natural features, and agricultural conditions in and around the Project area was made, in appreciation of the socio-economic and technical environments under which the Project is going to be planned and implemented. Thirdly, an objective study and analysis of the motivations and attitudes toward this Project as well as the intrinsic nature and characteristics of its sponsoring authorities, executing agency and the organization held responsible for its management was made respectively with the Governorate of Ismailia, Tenth of Ramadan Land Reclamation Co-operative Society and its members. Upon clarification of all these major premises, the nature and characteristics of the Project itself have been defined and the basic preconditions which need to be fulfilled have been recommended, the production potentials of the land having been critically analyzed through its classification by use, side by side, with the farm-management capability expected of the specific organizational set-up. At the same time, the technical feasibility of completing the Project as a model for agricultural development in desert-land in Egypt was also carefully examined, and the necessary measures to be taken toward this end have been suggested.

Finally, development benefits resulting from this Project have been estimated and the economic and financial viabilities of the project as a whole were examined.

2. Project Background

(1) With the termination of the Middle East War in 1973, the efforts of the nation came to be concentrated at rehabilitation and development of its national economy. Following the declaration of the "Open Door Policy" in 1974 came a radical change of policy towards intensification of economic interchange with the countries of the West and encouragement to the private capital for participation in the national development efforts, hand-in-hand, with new projects such as development of petroleum resources and widening of the Suez Canal, to cite a few. Under such a new atmosphere, traffic, transport and communication and other social capitals began to be expanded, and the cities and towns were newly founded, together with re-development of the existing ones. Tourism was one of the sectors which came to be largely developed. In the agricultural sector, re-development of the existing farmland and newly reclaimed area was taken up side-by-side with fresh development of a large extent of desert-land to make full use of the Nile water which was brought under control by the completion of the Aswan High Dam. Egypt's GDP which was estimated at LE 200 per capita in 1977 began shooting up rather rapidly since then, with a quickening tempo of economic growth which has recently captured a high rate of net 10% or even more.

(2) In view of accelerating economic development of the country in a coordinated manner, the New Five Year Plan (1978-82) was formulated, after a long interval since the First Five Year Plan (1960-65) had been introduced. The mid-term reappraisal of this New Five Year Plan is the basis of the current Five Year Plan (1980-84) which aims at increasing Egypt's per capita GDP to LE 400 by the end of

the Plan period. Achievement of this-much rise in its GDP requires a sustained rate of economic growth at 10.2% per annum, as a whole.

(3) Since a large amount of weight was put under the New Five Year Plan on non-agricultural industries which have been lagging behind in the past, the growth rate of agriculture was held down at 3.2% per annum, resulting in a fall of its share in the total GDP from 25.4% in 1979 to 18.3% in 1984. Yet, an important socio-economic significance given to agriculture in this country cannot be ignored. The population of Egypt has been doubling in shortening spans of time: from around 10 million to 20 million during half-a-century's time between the end of the last century and the Revolutionary time (20.9 million in 1951), and from the-then 20 million to 40 million during the following 30 years up until 1980. The incremental trend of her population is far from being abated due to high birth rate combined with a lowering mortality rate, resulting in nearly a 3% net increase per year at present. This causes the population-farmland ratio (number of persons to be fed by one feddan of farmland) to be increasingly burdensome, inspite of the expansion of the total farmland in the meantime, from 2 in 1897 to 6.6 in 1980 and possibly 10 by the end of this century.

(4) Population pressure as touched upon in the above brings about the deterioration of the food situation in the country as a whole, on the one hand, and concentration of the population in urban areas to the accompaniment of various unwelcome socio-economic phenomena, on the other. In rural areas, again, notwithstanding the series of Agrarian Reforms in three consecutive waves, under-employment remains a problem awaiting solution. Turning our attention to her foreign trade, the import bill amounting to LE 2,630 million in 1978 had to be liquidated by LE 680 million which was earned in the same year through export, leaving a deficit of LE 1,950 million. In this

deficit is reflected the unbalance in foreign trade with farm products and processed goods of agricultural origin. Although agriculture remains the biggest export industry by providing 60% of the gross exports in terms of value, the foreign counterpart being imported amounts to LE 680 million, which is almost equivalent to her total export earnings. Hence the traditional policy of encouraging commercial agriculture so as to earn enough foreign exchange to pay off the food imports has not so far been successful.

(5) Under the New Five Year Plan, therefore, agricultural development has been set with the long-term objectives of: (i) assurance of food; (ii) improvement of the balance of payments, and (iii) absorption of urban population to rural areas, and the basic strategy for their attainment was specified as: (i) vertical expansion of agriculture through better drainage, land improvements, dissemination of scientific production techniques, etc; (ii) priority to the development projects of shorter gestation period; (iii) priority to productivity-increase of the existing farmland and the land already reclaimed; (iv) lowering of cost for new land reclamation work and dependence on private efforts except the main irrigation-drainage works, and (v) promotion of export-oriented agriculature such as fruits and vegetables and encouragements to the peasantry for participation in such production. Policy-guidelines were chalked out in concrete details under the four headings of: (i) upliftment of productivity of the existing farmland; (ii) upliftment of productivity of the reclaimed land; (iii) reclamation and development of new land, and (iv) an overall development of agriculture.

(6) Reclamation of land was initiated by the State in a determined way since the Revolution, developing 976,000 feddan by 1973 of which, it is reported, that 895,000 feddan was by use of the Nile water and the remaining 81,000 feddan by use of groundwater. Now, completion of the Aswan

High Dam with a total storage capacity of 20 billion m^3 puts 8 billion m^3 of the Nile water at the disposal of the Egyptians who may use it, if they so wish, for developing additional land of 1.3 million feddan.

(7) Land reclamation by the State has been administrated by the Ministry of Land Reclamation as the supreme body of responsibility, and executed by four General Authorities in charge of general planning, research on desert development, establishment and management of the settlements and supervision of the companies engaged in reclamation works. The reclamation and development projects involving establishment of settlement villages are being implemented in three stages of: (i) Construction; (ii) Agricultural, and (iii) Social, one after another in the said order. These construction stage covers: (i) construction of drainage and irrigation canals; (ii) land-levelling; (iii) construction of roads, bridges, weirs and other appurtenant structures; (iv) establishment of the settler's colonies, including construction of public facilities and other livelihood environmental conveniences. Agricultural stage involves: (i) soil survey; (ii) land-classification; (iii) soil improvements, and (iv) cultivation of fodder crops on the reclaimed land to increase its productivity to a specific level. The social stage consists of organization of the settlers into an Agricultural Cooperative Society and Community Development Council, as well as provision of school, hospital, post office and other public facilities. It is said that land-productivity increase efforts under (iv) of the second stage alone generally take 3 to 6 years.

(8) It came to be realized, however, that the need for land development in the country cannot be fully and expeditiously met by the land reclamation-cum-farmer settlement under the sponsorship of the State alone, and the decision was made that, while the projects under State-control in remote areas should be re-directed to

State-Farms being equipped with modern machinery and facilities, more and more reclamation works should be taken up by the individuals, particularly by the land reclamation cooperative societies, whose organization was legalized through enactment of a special law in 1964. This Law provides for as its main purposes: (i) mobilization of idle private capital for land reclamation; (ii) creation of employment opportunities on behalf of the landless farmers, and (iii) provision of the ground for training on farm-management with the landless farmers thus employed to prepare themselves for future independence. This opened a way for diversification of the pattern of land-reclamation and farmer-settlement into such as those witnessed in the permanent settlement of nomadic tribesmen along the Mediterranean Sea coast under the administration of the General Authority for Desert Development (GADD), the transmigration and re-settlement of the Nubians who had to be evacuated for construction of the Aswan High Dam, as well as the general land reclamation and settlement projects under the control of the Egyptian Authority for Utilization and Development of Reclaimed Land (EAUDRL). Then came the State Farms, the Governorate Farms, the Company Projects, the Land Reclamation Co-operative Societies, and the Individual Farms.

(9) Along with the expansion of land reclamation activities, they have been experiencing geographical as well as technological changes such as: (i) from the neighbourhood of the established villages towards forlorn wastes in the far-away deserts; (ii) from comparatively more fertile alluvial soils to less favourable diluvial desert soils which are made up of sand, and (iii) from the fringe area of the Nile Valley and Delta to the ex-frontline, as in case of Ismailia and Sinai, during the Middle East War. Water-use practices are also being diversified into the more effective utilization of the Nile water, the more efficient use of groundwater and repetitive use of drainage water, or the combined use

of the two. This naturally causes an urge for adoption of manifold irrigation systems and the equipment appurtenant to them from the universally accepted flooding or surface irrigation of the more water-saving devices such as sprinkler, drip and center pivot methods.

(10) Under the current Five Year Plan, 776,650 feddan of waste land is scheduled for reclamation during 1980 and 1984: 222,800 feddan is for afforestation depending on rainfall water and the remaining 553,850 feddan for agricultural development by use of the Nile water, of which nearly 70% is expected to be undertaken by the Land Reclamation Co-operative Societies. It is thus expected that the land reclamation co-operatives will become the important-most institutions for land reclamation work in Egypt in the future.

3. Project Area

(1) The Project area is located in the desert land adjacent to Ismailia City which lies about 120 km east of Cairo. It can be reached within some 5 km from the center of the City, and is extending over 21,524 feddan (9,040 ha), with an east-west length of about 10 km and a south-north breadth of about 9 km. Its topography is generally even, slowly descending from south to north by 1/500. The Project-area is very conveniently located from the traffic and transport points-of-view: Cairo-Port Said By-Pass in its south, a paved road leading to Zagazig, the capital town of Sharkia Governorate, on its western border, and Salhiya Road, also paved, in its north. As for the canals, Port Said Canal is running from south to north in its eastern part and construction of Tolonbaht Canal drawing water from Salhya Canal is under way to reach the Project-area and its neighbourhood by August 1984.

(2) The meteorological records maintained in Ismailia say that the annual average temperature rises to a sub-tropical

level of 22.8°C: monthly average temperature during the summer season rising to 29.1°C and the mean lowest temperature falling to 10°C during winter months. Changes in season are more or less clearly discernable, but no frost falls in winter. Daily temperature moves up and down within a wide range of 13°C, which is a favourable condition for crop cultivation. Yet the relative humidity is low as can be expected in the desert, with an annual rainfall of less than 30 mm which is almost negligible for agricultural purposes. Evaporation amounts to 10 mm or so during the summer season but falls to about 5 mm during the winter season. The shift of sand takes place in March-April when strong winds blow from western and/or southwestern directions. Sunshine hours are long as clouds scarcely occur all through the year. Consequently, unless appropriate artificial remedies are taken, the land will remain ever so unkind to botanical beings that none of them will be assured of their growth except a few desert plants which are desparately clinging to its surface.

(3) The Project site stands along the northern fringe of the Eastern Desert on the diluvial plateau which is made up of sands and gravels, being the deposits which were accumulated in the geological epochs of Pleistocene to Holocene. It assumed the shape of a sand dune, rising above the sea-level by 6 m at the lowest point and 27 m at the highest. The groundwater, most probably unconfirmed, can be reached at a depth of between 0.5 - 10.4 m, its table standing higher in the north and lower in the south according to the topographic features of the site. The table of the groundwater lies between 2.2 - 7.9 m above sea-level, and it is supposedly maintained in part by recharge from Port Said Canal and Ismailia Canal. The temperature of the groundwater available in the Project site is 22.0 - 24.0°C, more alkaline in nature with 8.1 - 8.8 pH. Density of NaCl goes up to 1,500 - 2,000 ppm and, at places, as high as 2,500 - 3,500 ppm, which may be

compared to an average density between 170 - 220 ppm of the Nile water. Incidentally, its density in the groundwater available along the Suez Canal (sea water) is between 7,500 - 10,000 ppm, almost close to that of sea water itself. In considering the use of groundwater in the Project area, the volume available and its density of salt pose a problem. From the water-balance point-of-view, the amount of groundwater which may be lifted will have to be limited to 84,000 m^3/ day or 110 m^3 per hour per well. Thus 30 wells may be dug in total. Drawdown which may be allowed without inviting infiltration or seepage of sea water is 4.0 m at the maximum. It is imperative to keep a distance of 1.0 km or more between each well. From the water quality point-of-view, the high density of salt between 1,500 - 3,500 ppm precludes its general use as irrigation water except by mixing with the Nile water or for leaching purposes.

(4) As for the soils in the Project area, the Survey Team carried out 51 profile surveys and 320 stick boring surveys, plus observation of 6 outcrops, and the samples collected therefrom were analyzed physically as well as chemically. The results of the four kinds of surveys conducted between 1962 and 1967 were also made use of for reference purposes. Project area soils may be broadly categorized into 3 soil units of Dystric Regosols (Rd), Halpic Yermosols (Yh) and Calcic Yermosols (Yk), according to the classification method adopted by FAO-UNESCO in 1974. Rd is distributed at the central, northern and western parts, covering 13,750 feddan (63.9%), and Yh and Yk are spreading in the eastern and southern parts, on 7,485 feddan (34.7%). The latter two are found at a level even with the ground, while the former extends from even to undulating parts, some gently and the others ruggedly. Rd is mostly made up of coarse sand except for small patches of land where gravel horizons of 1 m in depth were identified. Both Yh and Yk contain gravels with a diameter of more than 2.0 mm, upto 13% in case of the former and 32% in case of the

latter. On the other hand, Yh and Yk consist of more fine sand of less than 0.2 mm diameter, silt and clay than Rd. Organic matter is recognizable in none of these soil units which are dotted with a few kinds of desert plant desperately clinging to the earth. There is no conspicuous difference among them in 3-phase distribution or porosity. The moisture holding capacity of the soils is higher than the average which is expected of desert soils: the estimated effective moisture per 10 cm of the soil layer is 13 mm with Yh and Yk, and the maximum of 10 mm with Rd. They contain 6.5 - 7.8 pH, Yh and Yk containing a slightly more CaO than Rd, and Yk a little more NaCl compared with the other two. Generally speaking, alkaline contents are smaller than expected of desert soils and, with little electric conductivity and low capillary rise, leaching will bring satisfactory results without much difficulty.

(5) Since the land devoted for Nili crops which used to be cultivated along the Nile River only during the flooding season has been diminished to a great extent, the cropping intensity has very much increased in Egypt. In 1978, the total area put under cultivation amounted to 11,148 thousand feddan, of which 45.1% was under winter crops, 44.5% under summer crops, 7.4% under Nili crops, and 3.0% under fruits. In the Governorate of Ismailia, on the other hand, out of 137,000 feddan which was brought under cultivation in 1981, 45.0% was under winter crops, 42.2% under summer crops, 12.8% under fruits, and almost none under Nili crops. The high percentage of orchard in its land-use is the characteristic feature of Ismailia agriculture. Cotton and sugarcane which are widely grown in the rest of the country are non-existent in this Governorate, and little rice and wheat either. Instead, fruits and vegetables which are raised as both summer crops and winter crops are intensively cultivated, as will be known from product-wise distribution of its farmland: field crops (39.2%), fodder crops (21.0%), vegetables (26.8%) and

fruits (12.8%), the last two items combined occupy nearly 40% which is 3.5 times as large as the national average of 11.5%. Tomato and watermelon are two major vegetable products each occupying 46.4% and 33.9% of the total production, while citrus and mango are predominant among the fruits respectively comprising 61.9% and 32.5% of their total production. As far as these four items are concerned, Ismailia's position in the entire country is spectacular (though the figures do not necessarily correspond to those in 1981) as follows:

Items of Products	Percentage in national total production
Tomato	5.4
Watermelon	10.3
Citrus	5.8
Mango	21.1

This unmistakably indicates the Governorate's specialization in agriculture to be in vegetables and fruits. Because of such local characteristics, the 3-year rotation system which is commonly adopted by the Agrarian Reform Cooperative Societies in the Deltaic region, is not made compulsory in this Governorate. On the other hand, vegetables and fruits being almost entirely marketed raw, their supplies sometimes exceed the local demands so much so their planned production, delivery adjustment and processing by kind as well as by season is attracting serious attention.

(6) As of 1981, kinds and strength of the cattle in this Governorate are reported to be: milk cows 750, Egyptian cows 38,460 and buffaloes 9,777, apart from donkeys, sheep, goats and fowls. When all the large cattle are put together, their percentage in the national total comes to 1.0%, as its farmland ratio to the national total likewise stands at 1.0%. From the keen interest for improvement of milk cows, Brown Swiss was first imported from Austria into this Governorate in 1975 and, generally speaking, improvement of the composition of cattle has reached a far

advanced stage in the whole country, as will be seen from the fact that buffaloes are being replaced, through the progress of agricultural mechanization, by traditional Baladi stock, for instance. Milk cows are mostly reared in a small number, together with draft and beef cattle through a loose barn system including a free stall system but, recently, the scale of their breeding is expanding, sometimes comprising a large herd of 100, side by side with specialization of beef cattle fattening. They are fed with berseem during the winter season and with alfalfa and Napier grass during the summer season but, at the same time, a large quantity of straw is also used as their feed-stuff. Cultivation of coarse fodder crops will need to be made with more care in the future. The environmental conditions for development of dairy and cow meat production have so far been prepared, including a plant for treatment and processing of milk, an artificial insemination station, a veterinary clinic, and a slaughterhouse. An increasing number of agriculturists are now venturing into poultry-keeping for production of eggs and broilers and, independently from these sporadic, individual activities, a large-scale State poultry farm aiming at a self-supporting broiler production complex is under construction in this Governorate, a part of which is already in operation. Improvement of a supply system of stock broilers and chicks will become necessary in the near future.

(7) Agricultural research and experimentation has long been taken up by the State under the competent leadership of the Ministry of Agriculture which introduced in 1971 a radical re-organization of the old set-up into a network of regional experiment stations, each specializing in a few crops, and established the Agricultural Research Center as their apex. Research works for agricultural development in the country are also being carried on by the Water Research Center attached to the Ministry of Irrigation, the Desert Institute belonging to the Ministry of Land Reclamation, as well as by twelve National Universities. In 1980, the

Agricultural Research Center opened its branch-station in this Governorate in the name of Ismailia Agricultural Research Station, and 16 scientists attached to it recently started research activities centering around the water requirements and nutrients of desert crops. This Station can be reached within a short distance from the village site of the Tenth of Ramadan Project Area and is expected to bring a lot of benefits to the farmers working in its vicinity because of immediate applicability of its forth-coming results. Agricultural extension services meant for dissemination of the advanced knowledge and farming techniques are well organized in Egypt. In this Governorate, the Department of Agriculture is held responsible for extension services through 5 Township Agricultural Units each with a demonstration farm attached and attended by an extension worker. 32 multi-purpose local co-operative societies at the village-level also have at least one extension worker per society. Technical information is delivered by the medium of pamphlets and bulletins supplied from the Center which are made communicable to the grass-root farmers either directly or through their displays on the demonstration farms where experimental cultivation of a few selected crops may be shown at a discretion of the Governorate. Close association with the Governorate extension authorities is planned in implementation of this Project in which participation of the extension personnel from the Department of Agriculture is positively invited.

(8) Rural credit in Egypt is lined up with the Agricultural Development Credit Bank, which has its affiliate in this Governorate in terms of the Cooperative Agricultural Credit Bank Ismailia. This bank has 4 Township branches, each bearing the name of the Township in which it is established. 5 Village Banks catering for window-services and each equipped with a storehouse for storage and distribution of farm input materials are also located at places of importance. To meet the requirements of the

peripheral farmers, one outpost attended by a clerk is maintained at every village where a multi-purpose local cooperative is organized. Short-term loans in kind for such items as fertilizers, agro-chemicals, seeds, etc., are available on security of the harvestable crops, while medium-term loans are provided for procurement of live-stock and machinery. Medium-term loans are also being offered recently according to varieties of purpose such as for purchasing of durable consumer goods and the working capital of agriculture-based enterprises. Long-term loans are made available for land-reclamation on the favourable terms of 3% annual interest and repayment in 10 years' installment with 3-year grace period, which will naturally be made use of for implementation of this Project. The above-mentioned banking network also attends at acceptance and repayment of deposits. The Agricultural Cooperative Law, through its amendment in 1980, now provides for establishment of the Agricultural Cooperative Bank which is managed by the agricultural cooperative organizations and this may take place sooner or later as the time is getting increasingly ripe for it.

(9) The 1976 census registered the total population of the Governorate of Ismailia as 353,337 which roughly corresponds to 1% of the entire population of Egypt. Out of the total employed workers of 92,320, 38.1% are engaged in agriculture and fishery. The labour employed in this sector is dominated by male workers by 98.5%. They include peasants and landless farmers though it is rather difficult to identify their number. Most of them are living with their family members in humble cottages built in the fringe area bordering the villages or on the farms belonging to their landloards or their surroundings, getting income in terms of wage paid as either permanent workers or temporary labourers. Through interview with 32 of them, it was found that they were getting monthly income of LE 51.1 to sustain a 6.4 member-family, on an average. They are invariably aspiring for

more gainful employment opportunities and, particularly, possession of land which they can till by themselves. Different from the settlers arriving from the Delta, they have enough experience in dealing with horticultural crops and animals and are believed to be a powerful reserve force for reclamation operations in this Governorate.

(10) The total acreage put under cultivation in this Governorate is reported to be 66,634 feddan being divided among 20,838 farms, that brings 3.2 feddan per farm or 1.9 feddan per agriculturally employed person, which is higher than the national average. As for the pattern of land ownership, it is interesting to note that, while polarization of land holdings into the two extreme is undeniable all over the country inspite of a series of Agrarian Reform, medium-scale holdings between 5 - 20 feddan are occupying an important place in this Governorate. In a transitional period of farming from pairs of oxen to tractors and under the circumstances where 26% of the total farmland is occupied by orchard, owner-farming of a fairly sizable land by the proprietors themselves through employment of permanent labourers or managers is not uncommon in this Governorate so much so a considerable concern is being held among the non-agricultural families residing in urban areas towards agricultural ventures which promise lucrative income compared with white-collar jobs which are often less rewarding compared to their toilsomeness. Agriculture is thus being re-evaluated by the citizens from such angles as the second source of income and stability and comfort in the old age, if not as the alternative occupation.

(11) The Cooperative Movement in Egypt was developed under the British influences and a pioneer agricultural cooperative society was first organized in 1910 to be followed by enactment of the Agricultural Cooperative Law in 1923. The Agricultural Cooperative Law was amended from time to time until it came to assume the present style in which all the kinds of cooperative are being covered:

multi-purpose agricultural cooperatives, land reclamation cooperatives, Agrarian Reform cooperatives, and fishery cooperatives. They are organized in a pyramidal order from the primary societies at the bottom upto the national apex. In the case of the multi-purpose agricultural co-operatives, the local society at the village-level, the joint society at the Township-level, the central society at the Governorate-level, and the general society at the national-level. Both the specialized agricultural co-operatives and the Agrarian Reform cooperatives have a similar perpendicular set-up but without Township joint societies, while in the case of the Land Reclamation co-operatives, the general society at the national-level is directly affiliated with the local societies.
The general societies of all these national-level co-operatives are affiliated to the Central Agricultural Co-operative Union. The Governorate of Ismailia being a relatively small one, the system of agricultural co-operative network is somewhat different from that in other Governorates: for instance, the multi-purpose local societies in the villages are directly affiliated to the central society at the Governorate-level, without the joint society which elsewhere exists at the Township-level.
There are 32 multi-purpose local societies which are affiliated to their own central society as well as to two Specialized Central Societies, the one dealing with marketing of field crops and the other, horticultural products. There are also seven Agrarian Reform cooperatives and seven Land Reform cooperatives at the village-level which are affiliated to their respective central societies.
However, as the Agricultural Development Credit Bank is providing the general farmers with rural credit services linked up with supply of farm input materials, the agricultural cooperatives, irrespective of their designation, are given the nature of agricultural improvement associations. This may be known from the fact that, apart from the field

crops which largely come under the State purchase, an absolute majority of fresh fruits produced by the local farmers, for instance, are marketed by the merchants who are delivering them direct to the State Companies and the home markets, leaving only a small part to be handled through the cooperative channel, although it maintains a small pipe of supply to the public market in Ismailia.

(12) Cities, towns and villages in this Governorate have been developing in a linear manner along the three fresh-water canals of Ismailia, Port Said and Suez, which join together at Ismailia city in a "T" shape. The City of Ismailia, with a population around 150,000, is throbbing as a center of the Governorate in all of its aspects of administration, traffic, economics, education and culture. The rural area consists of the villages which are so many clusters of farmers' houses, and they are linked up with Township capitals which are small cities in appearance as well as function. This makes traffic convenient among different kinds of habitation which are properly equipped with facilities for electricity, communications, etc. Education is based on a school-system with 4 grades of primary (6 years), preparatory (3 years), secondary (3 years), and university (4 years), the former two having been made compulsory since last year. There is one national university with two local campuses established in the Governorate. Medical services are available at 4 State and Governorate general hospitals, besides many private hospitals and clinics. Brisk commercial activities are going on in shops and stores in the cities, while in rural areas the regular market held once a week provides the venue of transactions of sundry goods, including exchange of farm products with factory-made commodities as well as bulk purchase of agricultural produce by middlemen.

(13) Agriculture in the Governorate of Ismailia is believed to date back to excavation of Ismailia Canal which was commenced in 1863, 6 years prior to the completion of the Suez Canal (sea water), and the Governorate itself came to gain its present status through desert-development of a comparatively recent origin. Even after the Revolution, agricultural development in this Governorate was badly handicapped by the outbreak of the Suez War in 1956 and also by continuation of the Middle East War from 1967 to 1973 which prevented new reclamation of land, as Ismailia was virtually standing on the forefront of the battle in the meanwhile. It may be rightly said, therefore, that systematic agricultural development efforts came to be made rather recently. The State Farm in the western part of the Governorate (extending over 19,000 feddan, covering a part of the neighbouring Sharkia Governorate) and Arab Contractor Company's projects (covering 55,000 feddan in total) are now entering the "agricultural stage", and the individual reclamation works are going on both around the cities and along the roads and canals. Seven Land Reclamation Cooperative Societies so far registered in this Governorate, including the Tenth of Ramadan Society, are intending to develop a total acreage of around 45,000 feddan. The Project-area covers nearly half as much as this total land-space proposed for reclamation, and none of the other 6 projects is situated as closely as the Tenth of Ramadan to a big city which is in a position to offer various kinds of benefit for its development.

(14) The main difference between the general agricultural cooperatives and the land reclamation cooperative society lies in the procurement, development and distribution of the developed land among its membership on sale, and the construction of new villages, by the latter. The land reclamation cooperatives are also expected to reclaim a specific portion of their command area for distribution among the peasantry, to develop agro-industries, and to carry on agricultural cooperative activities in a more

up-to-date or pragmatic manner than by the general agricultural cooperatives. Its command area may be either more or less than 5,000 feddan, less if the plot of land distributable per member is less than 5 feddan and more if it is 5 to 20 feddan. The Tenth of Ramadan Society was registered in 1977 with its official designation of "The Tenth of Ramadan Society for Reclaiming and Developing Land", having its office in "Ismailia Governorate," with the membership of 900, among whom the ceiling allotment of 20 feddan will be made. Information obtained through interview with 76 of its members was that this Society consists of various circles including farmers, government officials, merchants, entrepreneurs, professionals, etc., who are mostly residing in and around the City of Ismailia, belonging to the upper-middle and upper classes of the local society. A majority of its members joined the Society by 1978, and almost all of the present members have paid-up share capital and 50% of the land purchasing fund. The land for distribution is predetermined in order of membership registration, and 84 of them received an early distribution of their allotments with the permission to start developing them through their own efforts. 15 of these pioneer members have now entered the second and third year of cultivation. The land costs LE 150 per feddan and the Society is requested to pay to the Governorate 10% of its total land value within 1982, and the rest by equal annual installment of 20 years. Incidentally, the land in the neighbourhood of Ismailia City which is made available to those who are going to undertake individual reclamation is rather costly, valued at LE 3,000 per feddan at the maximum.

4. Development Plan

(1) Judging from its background as mentioned in the above and the conditions prevailing in and around the Project area, the Tenth of Ramadan Project is given a public nature which may be characterized by such features as described under the following six items:

i) direct contribution towards an increased production of export-oriented farm products, while indirectly helping to mitigate the food difficulties in the country;

ii) contribution to the stability of the local community by providing gainful employment opportunities to the under-employed agricultural labourers who abound in its neighbourhood, while paving the way for agricultural development with the long-term perspectives through technical training given them;

iii) preparation of ground for effective utilization of idle private capital, generating spill-over effects for emergence of various agriculture-related industries in its vicinity;

iv) very high demonstration effects due to its geographical nearness to Ismailia City which, again, can afford to give many advantages for successful implementation of the Project;

v) offering many good ideas to the municipal planners on re-development of Ismailia City through construction of a modern village on its site, which will also stand as a model for elevating the cultural standards of the villagers in general, and

vi) distribution of land in an optimal size of 20 feddan each which both stimulates the enterprising spirit of its allottee and enables him to conduct modern commercial agriculture, thus, providing a sound basis for evolution of a new pattern of agricultural cooperative movement, an experience

which will give valuable lessons to those who are held responsible for establishment of policy measures for agricultural development, particularly desert reclamation, in the country.

(2) From the technical point-of-view, the natural conditions existing in the Project area are no doubt severe, lacking in any agricultural value if left unremedied by effective countermeasures. Water provided, however, the biggest obstacle to its productive use will be removed: artificial supply of irrigation water together with supplement of organic matters to ensure its continuous use as farmland will cause the detrimental elements inherent thereto to be either eliminated, neutralized or converted, in part, to those favourable for the growth of plants, and possibly awaken to function the advantageous factors which might have been kept dormant so far. The imperative need of irrigation water being taken for granted, such is possible on the condition that animal husbandry will be inseparably combined with farming. Fully realizing that water is a scarce resource in Egypt, the area commanded by the Project will need to be prepared by economical construction methods, on the premise that water-saving methods and apparatus as efficient as the present level of science and technology permits shall be adopted for irrigating its farmland. This Project is a large-scale undertaking which can be broadly divided into the three stages of: i) Planning; ii) Construction, and iii) Farm-Management. The construction stage covers implementation of construction works such as: i) roads and bridges; ii) planting of windbreaks and partial land-levelling; iii) main pumping station; iv) regulating pond and booster pump house; v) pipelines; v) field irrigation facilities; vii) installations for a cooperative pattern of farming, and viii) a new village. The preparatory works for the Farm Management Stage which are also required to be completed in this stage include: i) pilot farm; ii) joint or common nursery farms, and iii) training-cum-demonstration farms.

(3) Land classification is necessary for zoning of the Project area into various sections according to purposes, making decisions on soil-improvement measures, and establishing farm management policies. Project land has been classified into five grades, by taking into consideration and using as indices, such factors as ground surface, gravel content and mode of soil accumulation, and elevation of the groundwater table, which beyond permissible degrees are detrimental to farm management, and yet defying elimination through remedial measures commonly adoptable in the current civil engineering techniques, as follows:

Grade	Nature and Characteristics	Coverage
I	Flat land, made up of 3 types of soils, containing little or no gravel, preferably to be replenished by mud for productivity-increase	10.2%
II	Slightly undulating land, made up of Rd. soils, productivity effectively increased by replenishment of mud	20.1%
III	Undulating land, containing many gravels	61.0%
IV	High groundwater table, containing gravels, sufficiently suitable for cultivation of vegetables and fodder crops but problematic for the deep-rooted orchard, with limited adaptability for cropping	7.3%
V	Sharp sloped or covered by a thick gravel layer, being unsuitable for crop cultivation and unqualified as farmland for distribution	1.4%

Grade I to III lands will be improved to conditions universally suitable for crop cultivation through application of mud and organic matters, but with some reservations as trafficability and more wear and tear of the machinery will

remain in Grades II and III lands, to a slight extent in the former and to relatively more extent in the latter.

(4) The above land-classification primarily based on agricultural productivity has been made more sophisticated by taking into consideration some other factors such as traffic convenience and habitability and the systematic performance of agricultural activities before the final decision on the purpose wise zoning of the Project land has been made as follows:

i) farmland for allocation among the membership will fall into Grade I to III lands; ii) a new village will be located along the main route of traffic, closer to Ismailia City; iii) common facilities of the Society will be built in proximity to the residential area; iv) facilities including those for pilot projects aimed at the future and the reserve land for future distribution among the peasantry and the employees of the Society will be appropriated for in Grade IV land, and v) Grade V land will be put under an afforestation programme and reserved as a residential area of the agricultural labourers to be employed in the future, and other unidentifiable purposes.

Categorical Zoning of the Project Area

Purpose	Size (feddan)	%
Residential area	440	2.1
Area for cooperative installations	110	0.5
Farmland for allocation among the membership	18,000	83.6
Joint/common farmland	462	2.1
Roads, canals, etc.	920	4.3
Cooperative administration and management area	504	2.3
Reserve land for distribution	1,088	5.1
Total	21,524	100.0

(5) Each member of the Tenth of Ramadan Society is going to be allocated with 20 feddan (400 x 210 m) for their individual farm-management. Through the interviews with 76 members of the Society, the Survey Team could obtain a broad picture of the farm-management which the Society-members are intending to adopt. First of all, there is unanimity of opinion among all of them in that it should be a combination of three types: i) fruits; ii) animal husbandry, and iii) vegetables of local speciality. There is a shade of difference in the mode of their combination. 70% of the membership are intending to give an equal importance among fruit, dairy and vegetable, while 15% are desirous of growing fruits as their main line of production, plus beef cattle. A pattern of dairy as a main line combined with fruits and vegetables is preferred by 7.5%, and another 7.5% choose cultivation of vegetables as a mainstay, adding production of fruits and beef cattle, each in a specialized way. Above and beyond these four main types, all the members are invariably interested to keep poultry primarily for egg production. The contents of each line of production are as follows: fruits consist of mangoes, oranges, lemons, etc.; vegetables include tomatoes, as both summer and winter crops, watermelons, cucumbers, potatoes, and sometimes strawberry. Among the livestock, multi-purpose Brown Swiss, being recommended by the Governorate, is the first choice for dairy cattle, to which fattening of bull calves of the same variety are added for beef cattle production. Poultry is mainly for egg production. Cattle will be fed by berseem, to be supplemented by alfalfa and Napier grass, but green fodder crops such as maize and/or sorghum may also come to be used. Those introduced in the above are the ultimate patterns of farm-management which the members are intending to adopt upon completion of the Project. In the meanwhile, miscellaneous courses are open for them: some may put weight in growing of fruits as cash crops while others may prefer cultivation of vegetables and/or poultry-keeping as both of them seem to be more suitable for quick capital turnover.

(6) Successful farm-management on a 20 feddan plot by each individual household or proprietor needs to be carried on at the lowest possible cost of production and marketing of the products at the most favourable terms and conditions, through common use of irrigation water and roads, etc., within a framework of the self-same irrigation block. Being faced with this basic requirement, nobody will fail to realize the imperative need of coordination among each individual farm's management and of organizing some sort of appropriate production team-work on the farm level. Now, the most workable scale of such team-work by kind of job would be as follows: i) for common-use of tractors = 6 households covering altogether 120 feddan; ii) for joint-operation of pest and disease control of orchards = 36 households looking after about 300 feddan of orchard in total; iii) for joint cooling and collection of cow milk - about 3,000 kg of milk/day; iv) for picking-up and sorting of vegetables and fruits = 108 households, with a combined acreage of 1,600 feddan under orchard and vegetables, and v) O&M of the branch pipeline and irrigation water distribution = 108 households in the same irrigation block. It would be most desirable that 108 households or proprietors will come forward to organize one 'farming unit' (which more or less corresponds to each one Irrigation Block, as will be discussed later), which will each function one 'farm management association' belonging to the Society as its subordinate group.

(7) The Tenth of Ramadan Society is indeed a large-scale establishment, with a membership of 900 and the command area of more than 20,000 feddan, aiming at production centering around the export-oriented commercial crops by use of modern common installations and machinery, simultaneously paying attention to the maintenance of the residential area which belongs to it. Its administration and management, therefore, would call for systematic activities which might have no

precedent among the existing cooperative organizations. It is deemed necessary that a proper administrative division between the social activities meant for the residential area and the economic activities pursued after through agricultural cooperative mechanism, is the same as in the case of the reclamation and settlement projects under State sponsorship. For the successful management of agricultural activities, a workable system must be established so that their distributive aspect such as credit, input supply, technical guidance and education, and marketing will be co-ordinated, if possible linked up, among each other for production of fruits, vegetables and animal husbandry while their service aspect such as distribution of irrigation water and allocation of transport services will be given full accord with their production processes. It will be very necessary that good mutual understanding will not only be maintained but also deepened between the cooperative management and the general membership through establishment of various Committees; amicable adjustment of interests among the 'farming units' through such Committees will also serve for strengthening the cooperative organization. Last but not least, smooth collaboration with the Governorate is one of the essential conditions for the Society in achieving its self-imposed task.

(8) The Project area will draw its irrigation water from Tolonbaht Canal which branches off from Salhya Canal. Salhya Canal branches off from existing Ismailia Canal, and is under construction as a national project. The intake structure will be located at 30 km downstream of Tolonbaht Canal. The irrigation water pumped up by the main pumping station which is built on the headwork is sent to the farm ponds through the main pipelines. The pondage water will then be conveyed to the hydrants on the farm through the branch pipelines under the pressure of booster pumps equipped in each farm pond. Hydrants are connected to peripheral

irrigation facilities meant for supply of water to respective crops. To facilitate for efficient irrigation and smooth water control, the entire Project area has been divided into 10 Irrigation Blocks, each constituting an area for co-ordinated and cooperative farm-management operations among the farms situated therein. The motive power required for irrigation purpose is suppliable by diesel generators.

(9) The radial plane headwork will have a manually operated gate and a screen, and the main pumping station on it will be equipped with volute pumps of 800 mm diameter, 6 in number, which will lift 530 m^3/minute at a total head of 28 m; 3 diesel generators @2,000 KVA with a total output of 3,600 kW will supply the necessary power required for pumping operations. Guiding structures will be of a culvert-box type, and the design water level of the inlet basin will be 0.50 m. Conveyance of water from the main pumping station to the regulating ponds will be made through the main pipelines made of fibre-glass reinforced plastic mortar (FRPM) with 1,500 - 400 mm diameter, which are running in 10 directions through a reticulate pipeline system; the total distance of these 10 main pipelines is 37.95 km.

(10) Each regulating pond with a total storage capacity of 8,200 m^3 is equipped with a set of 3 volute-type booster pumps of 350 mm diameter, run by 660-kW motor output by use of 2 diesel generators @600 kVA. These booster pumps will pump out 53 m^3 of pondage water per minute, at a total head of 46 m, into the secondary pipelines, also a reticulate system and made of FRPM and VP of 200 - 800 mm diameter, which are leading to the hydrants at the peripheral farms; the total length of the secondary pipeline is 120 km.

(11) The hydrant installed in each farm is connected with the pipes which distribute the irrigation water to the sprinkler. The total length of this distribution pipeline will

be 400 km. The capacity of the hydrants and the distribution pipelines are so designed as to be free from any trouble whether irrigation is made sporadically according to independent irrigation requirements in some farms or simultaneously in all the farms existing in the Irrigation Block. However, it is more desirable that the member-farmers who are sharing the irrigation water from a self-same branch-pipeline will jointly attend to its O&M and take up collective responsibility for equitable distribution of irrigation water among their individual farms.

(12) A windbreak will need to be planted around individual farms as well as along the roads and, preferably along the border-line of the Project area too, to prevent the surface soils of the farms from being blown away by strong winds, particularly 'khamasine' in the early spring season, and also to protect crops therefrom. Casuarina which is commonly used for this purpose will be planted rather densely, the more densely the windbreak is planted, the more effective it is against wind damages. Three kinds of farm road are provided in the Project area: main or trunk roads, branch roads, and farm roads running on each farm. The former two, i.e., main road and branch road, their total length being about 160 km, would need to be metalled by the locally available laterite soils mixed with gravels to withstand traffic duty of motor trucks.

(13) 900 houses on behalf of the membership and 50 houses to accommodate teachers and employees of the Society will be built in the residential area which has a size of 440 feddan. Public facilities to be equipped there will consist of the primary and preparatory schools, mosque(s), clinic(s), shopping center, fuel stations, parking areas, etc., and a social and cultural center, a part of which is occupied by the Society Headquarters, will also be built there. Roads will conveniently run criss-cross in the

residential area which will be provided with city water, sewage, electricity and communications. Out of these essential public facilities, road network, electricity and city water will be made available through the assistance of the Governorate, and road construction has already been commenced. Garbage will have to be collected, to keep up the living environment and hygienic conditions, and ploughed back, as far as possible, to the farmland.

(14) The course and method of agricultural development on the basis of the above-mentioned concept and plan very much depend on such factors as the natural characteristics inherent to the Project area, its location seen from marketing and traffic conveniences, the requirement of public nature expected by the State and Governorate, the need of raising the standard of farming techniques, and the subjective terms and conditions of each individual executor of agricultural undertakings in the allocated plot of farmland. Taking all these factors into consideration, the pattern of agriculture which will be visualized may be described as a composite of the following five: i) agriculture combined with animal husbandry; ii) mechanized agriculture; iii) export-oriented commercial agriculture; iv) land-water-intensive agriculture, and v) semi-commercialized agriculture through stabilized employment of farm-labourers. The farm-management patterns which can be recommended at the time of completion of the Project will also need to be examined by taking into account the under-mentioned factors: rentability or profitability of production, irrigation methods (drip for orchard and sprinkler for the rest), mechanization of farming work except harvesting (excluding pasture grass), maintenance of land-fertility, self-supply of coarse fodder crops, and cropping rotation. The answer obtainable from such deliberation would be categorized into four types of: i) compound type; ii) fruit type; iii) dairy type, and iv) vegetable type, as follows:

Compound Type

10 feddan	Orchard	
1 feddan	Pasture grown with alfalfa and Napier grass = 5 milking cows out of 7 adult cows, plus 1,000 egg-laying hens.	
9 feddan	3 feddan Vegetables 3 feddan Fodder crops 3 feddan Field crops	3-year rotation

Fruit Type

13 feddan	Orchard	
1 feddan	Pasture = 10 meat cows, selling 5 of them each year, plus 1,000 egg-laying hens	
6 feddan	3 feddan Vegetables 3 feddan Fodder crops	2-year rotation

Dairy Type

6 feddan	Orchard
2 feddan	Pasture = 10 milking cows out of 14 adult milk cows, plus 1,000 egg-laying hens
12 feddan	3-year rotation of vegetables and fodder crops

Vegetable Type

4 feddan	Orchard
2 feddan	Pasture = 20 meat cows, selling 10 of them each year, plus 1,000 egg-laying hens
14 feddan	Rotation of vegetables, field crops and fodder crops

(15) Items for export among the vegetables are: oranges, mangoes, tomatoes, strawberry, watermelon, cucumber, groundnuts, potatoes, onions, etc. Sesame may be cultivated as an import substitute. Alfalfa and Napier grass which are renewable each 3 years will be the most important fodder crops, plus berseem mainly available during the winter season and green fodder crops of maize and sorghum during the summer season may also be grown. Multi-purpose Brown Swiss for dairy cattle and fattening of bull calves of the same variety for beef cattle. Egg-laying hens will be Rhode Island and L.S.L. (white leghorn variety). Crop-wise on item-wise production is estimated as follows: 160 orange-trees standing per feddan will bring 6,600 kg/feddan from the 7th year after their planting; tomatoes, 5,600 kg/feddan; watermelon, 12,700 kg/feddan; cow milk, 3,600 kg per cow per year; beef cattle, fattening to 450 kg within 24 months after birth; eggs, 240/hen/year. Except for the Fruit Type, the other 3 types can afford to self-supply almost all organic matters which are required for maintenance of fertility of the entire farm out of cattle dung. The requirement of organic matter to be ploughed back into farmland needs to be met by use of all available kinds of farm waste, including straw, cattle dung, fowls' droppings, and through introduction of green manure crops.

(16) As no positive data could have been made available for estimation of a total amount of irrigation water which will be required in the Project area, a theoretical value has been sought through the formula developed by FAO, that is to use such figures as month-to-month evaporation, wind velocity, crop-wise water requirements as the basis, plus crop combination, difference in irrigation method, conveyance and distribution losses, etc., as the variables. Consequently, water requirements per feddan per year obtained through the weighted average of all the four types of farming was 5,900 m^3. Of course, this remains a theoretical value, which needs to be verified from time to time by

actual case-studies resulting in the pilot projects, etc., in view of identifying the more economical or water-saving methods. Miscellaneous water requirements including those for breeding of livestock are to be met by groundwater. Since irrigation water originating from the Nile water contains salt to an approximate degree of 200 ppm, drip or sprinkler methods will inevitably bring about accumulation of salt on the surface of farmland. Although salt resistance varies from crop to crop, between 0.06% and 0.32% in salt density among those recommended under the Project, a maximum permissible extent has been fixed at 0.13% for both citrus as well as crops of shorter growth period (in consideration of their rotational cultivation). Actual salt density of the irrigation water being 0.0%, the above-quoted permissible maximum would be reached in 5 years. Under such estimate, leaching by spraying of 29 mm/year of water in a concentrated manner at the frequency of once a year will be enough.

(17) Agricultural products are almost exclusively meant for marketing: the traffic conveniences are readily available, Port Said and Suez, both within a short distance of some 80 km, for their shipment abroad, and Cairo for their air-borne export. Important domestic markets which can be reached by land transport include Port Said, Suez, Cairo and Ismailia at the local end. Since the output amounts to large quantities, their production and shipment needs to be pre-planned and controlled, and the facilities for thier sorting and storage must also be prepared. Processing will naturally become a problem to be considered, but there is a treatment and processing plant in Ismailia City for cow milk and a private Company will be established in the Governorate to start processing of tomatoes, potatoes, and ground nuts, and some processing plants may as well be invited at the neighbouring Free Zone for processing of any other items originating from the Project area. This is the reason why no processing plant or mill has been planned, at least for the time being, but this does not

preclude the possibility or profitability of doing so in the future from a comprehensive standpoint of the Governorate as a whole.

(18) The progress of the Project will be made through four major stages: the first for preparation in general accompanying the construction work, the second for raising of land-productivity, introduction of cattle, and planting of orchards, the third for overall consolidation, and the fourth for maturing. Modern agriculture on 20 feddan of desert-land as a unit involves many unknown factors and unpredictable elements both technically and managerally, and no precedents can be referred back for guidance in dealing with its membership problems and employed labour issues. It is, therefore, of critical importance that two requisites for production and management, that are technical factors and personnel elements, will have to be established through a number of pilot trials and efforts such as experimental production, training and education, demonstration, etc., in a course of the preparatory stage. Allout supports and encouragements by the Governorate are particularly hoped for in these respects.

5. Project Implementation

(1) The Governorate of Ismailia has been sparing no efforts in materializing this Project as a venture which is aligned to the basic policy of the State aiming at agricultural development and desert reclamation in the country and what is expected to stand as a model for the future undertakings of a similar nature. The Secretary-General of the Governorate personally assumes the responsibility of its implementation as the Project Director. Mobilization of every possible support and eradication of any suspectable hitch or difficulty shall, therefore, be made to ensure implementation of this Project, through such organizational and functional arrangements as follows:

A. National-level: Establishment of 'Inter-Ministerial Co-ordination Committee', being chaired by the Governor of Ismailia and constituted by the representatives of all the Ministries and National Agencies concerned.

B. Governorate-level: Establishment of 'Project Co-ordination Committee', being chaired by the Secretary-General of the Governorate (Project Director) and constituted by the Directors of all the concerned Departments and the representatives of the Tenth of Ramadan Cooperative Society.

C. Local-level: Establishment of the Project Office, manned by the qualified experts delegated from the Governorate. While the Inter-Ministerial Committee attends at co-ordination of the issues which extend over several jurisdictional spheres of the Central Government, the Project Co-ordination Committee takes up the problems directly connected with the Project Implementation through quick decision-making on the impending issues and smooth co-ordination among the inter-related actions. The Project Office at the site is,

of course, held responsible for day-to-day administration and management of the multifarious jobs called for execution of the programmes set for the construction stage as well as the preparatory works for the ensuing agricultural stage.

(2) The Project construction period will take 6 years from August 1983 to July 1989, and agricultural development will be commenced immediately upon completion of the construction job to last for another 6 years. The first two years of the construction period will be spent for detailed design, tender document preparation, bidding and other preparatory works to be followed by actual construction work, of which construction of the main pumping station and its appurtenant structures will start since January 1986, and the whole construction job will come to an end with installation of the peripheral irrigation facilities in the individual farms which will be completed by the middle of 1989. Agricultural production begins in the fifth year with 6,000 feddan which is one third of farm land, extends to 12,000 feddan in the sixth year and enters in full swing in the seventh year. different phase of the construction work, approximately 26% of the total cost for construction has been allocated to the local currency portion and the remainder to the foreign currency portion. O&M cost of various installations has been estimated at L.E. 1,015 per year to meet depreciation, repairs, operation and maintenance.

(3) For successful implementation of the construction work which extends over many years, it is necessary to obtain expertise assistance from a well experienced foreign agency which is in a position to send qualified experts and specialists on such as civil engineering design, machinery, water control, crop cultivation, farm management economics, and rural development programming based on farmers' organization. Needless to say, the main responsibility of the Project implementation rests on the local

engineers and technicians but, in view of assuring satisfactory O&M of the installations and smooth agricultural development in the future, it will be both desirable and necessary to send some of the local engineers and the Project staff members abroad for training.

(4) The items which have been excluded in computation of the cost required for implementation of this Project are the procurement cost of the land at L.E.150/feddan, construction cost of Tranbart Canal by the State, construction and installation costs of road network, electricity supply and the arterial system of city water and sewage by the Governorate in the new village area, and construction cost of residential quarters which will be built according to individual specifications. As for the machinery, equipment and installations which are required for production in the initial period of farming on each individual farm, only those which are extremely useful for common purposes and deemed as indispensable items of inaugurating investment have been appropriated. Consequently, a gross total amounted to LE 69,357,000, which can be broken down to: preparation of the farmland including construction of pipelines and road network = 54.0% equipment of supporting service facilities including those required for cooperative or common ventures, pilot projects, etc. = 1.5% public facilities including schools, etc., in the new village = 1.7% installations required for Project implementation and their O&M cost = 6.3%, physical contingencies = 7.6%, and price contingencies = 28.9%. Farmland construction cost which amounts to LE 37,484,000 is proportional to the unit cost at LE 1,916/feddan covering 19,560 feddan of irrigation area (not including physical and price contingencies). Farmland construction cost can be itemized as follows.

- Primary irrigation facilities ... LE 11,072,000 (29.5%)
  (intake structure, main pumping station, main pipelines, etc.)
- Secondary irrigation facilities . LE 11,960,000 (31.9%)
  (regulating ponds, booster pumps,

branch pipelines, etc.)

- On farm facilities (on the individual farms)	LE10,472,000	(27.9%)
- The rest (survey, land-levelling, roads, wells, etc.)	LE 3,980,000	(10.7%)
Total	LE 37,484,000	(100.0%)

6. Economics of the Project

(1) This Project has enough economic viability as will be known from the pertinent values which read as follows: the economic cost of LE 44,404 million O&M cost of LE 1,015 millon per year, economic benefits of LE 531,091 millon, B/C ratio of 1.3 (at 12% of discount rate), as calculated on the basis of 50 years as its economic life. EIRR is estimated at 14.6%, which is deemed a satisfactory rate among the similar desert irrigation projects. Sensitivity analysis in 6 cases of: i) 10% discount in the product's price, ii) inclusion of the costs of Tolonbaht Canal to be constructed by the Ministry of Irrigation, and iii) two year progress in completion of the construction work invariably proved the soundness of the Project.

(2) Indirect benefits accruable for the Project include, among others, the increment of food-import through increased export of farm products, the provision of stabilized employment opportunities to the agricultural labourers, the increased added-value through development of agro-industries and other agriculture-related enterprises and, all these benefits being combined with the increased purchasing power among the people directly concerned with this Project, the prosperous trade activities in the Governorate and, eventually, spill-over effects in favour of the areas far beyond the immediate confines of the Project influence will also be quite appreciable.

(3) The total cost of LE 75,114,000 which is required for the Project implementation is comprised of the foreign currency portion by 74% and the local currency portion by 26%. The foreign currency portion is expected to be provided in terms of a loan from the international financial organization at the annual rate of interest of 3.5% and repayable within 30 years including a 10-year grace period. The local currency portion will be financed by the reclamation loan from the Agricultural Development Credit Bank at the annual interest rate of 3%, repayable within 10 years including a 3-year grace period. Initial investment required for commencement of individual farm-management has been excluded from the above-mentioned cost, in consideration that almost all the Society-members have enough resources to equip themselves with necessary tools and machinery and to pay the initial cost and expenses without depending on outside sources.

Repayment of the international and domestic loans will cause no serious difficulties, as the benefit-side has been calculated on quite a conservative ground, for instance, by ignoring the income from cash crops in terms of vegetables or poultry-keeping and any other possible sources of income during the initial period of agricultural development, by exemption of mangoes and strawberries which fetch good prices in the fully developed stage of fruit and vegetable cultivation, and by adopting moderate yield with all the representative crops which can be raised in the fully matured stage.

7. Recommendations

(1) The Tenth of Ramadan Project, an agricultural development scheme based on desert irrigation, is technically feasible and economically viable. It can bring about many-sided socio-economic benefits such as the provision of employment opportunities and the generation of ample spill-over effects in favour of the areas extending around it. Being aligned to the national food policy and aimed at a model for desert development by the hand of the land reclamation cooperative societies, it is expected to make due contributions on behalf of the planning and executing agencies of the State in chalking out appropriate policy-measures towards structural re-organization of agriculture in the country through its modernization, and also on behalf of the cooperative leaders at both national and Governorate levels in establishing new guidelines for revitalization of the agricultural cooperative movement which has been sunk in stagnation. It is, therefore, very much hoped for that full consideration be given to expedite its implementation. Likewise, support and encouragement by the Central Government are hoped for not only for the whole work of the Project, but also for the construction of Tolonbaht Canal and Salhya Canal as its mother stream, since this construction is the premise of the Project.

(2) Agricultural processing industry which plays an important role in achieving a stabilized supply of farm products in large quantities and in enhancement of the added value are expected to be positively taken up by the existing State Company as well as the private concerns which are enterring anew into this field of enterprise, rather than by this Project itself. The Governorate of Ismailia is looking forward to an increasingly important phase of its own development and, from such a comprehensive standpoint, the private companies may need to be given more chances and opportunities to expand their share in agricultural products

processing, including invitations to foreign capital interested in agro-based industries to start their own venture in the Free Zone.

(3) As the premise in this plan, the water requirements per feddan per day was determined to be 28.1 cubic meters in the peak month and 5,900 cubic meters per annum. The Ismailia Governorate, which has already recognized this requirement figure, should make strenuous efforts to secure this in its negotioations with the central Government. Since, water is the most valuable, finite resource in Egypt, it will be necessary to study a much more modern method of water utilization within the framework of the pilot plan with the assistance of the national institutes in the overall implementation of this Project. Also, it is necessary to ensure timely completion of construction or expansion of the canals which will provide the Project with irrigation water and, therefore, are premises of the feasibility of the Project.

(4) This Project requires quite a number of qualified engineers and technicians all through its implementation period. Overseas training and education is recommended on behalf of the personnel directly engaged in the Project work for obtaining not only technical know-how modern agricultural production but also the understanding of the agricultural cooperative operation and management meeting the requirements of the day, and the engineering techniques called for in reclamation and development of desert-land. The knowledge, experience and information absorbed from the Project personnel of the developed countries will also prove beneficial to similar undertakings in the other parts of the country.

(5) In conclusion, a special mention will probably need to be made on the plan which is proposed for operation of the Project funds. The repayment conditions taken into consideration, however, it is presumed that a more or less tight situation will have to be experienced in the initial period of its development. To tide over such a stringent situation, it is necessary to put into effect: i) steady progress of the construction work through the most effective and economical ways and means; ii) farm-management guidance to facilitate for quick turnover of the capital; iii) establishment and operation of an appropriate mutual-aid type credit system among the membership, and iv) credit-repayment measures taken by the Governorate which assumes an overall responsibility for the Project implementation.