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John KILGOUR - Consultant

Secretary Off. He. Soc. Ind. Econ.

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**Indicative programme for the development of the
Agricultural Machinery Industrial Systems in Egypt**

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SUMMARY

This report is part of the second stage in the UNIDO PDSU programme for the development of the Agricultural Machinery Industrial System (AMI) in Africa. The report examines the existing AMI system in Egypt which was previously identified as one of a set of countries with "relatively well developed AMI facilities". The purpose of the report is to confirm that Egypt is currently classified in this group; to identify types of programmes and projects for AMI development suitable to Egypt and possibly to other group members.

A study was made of the agricultural sector and the level of mechanisation ascertained. The Agricultural Machinery Manufacturing sector was studied to determine the types of factories and their level of capital investment and capabilities. The import sector, infrastructure and institutions were studied to see how they influence the manufacturing sector. A number of programs and projects are suggested which it is hoped will form an integrated approach to help develop the production of Agricultural Machinery.

The programmes and projects are concerned with developing the Agricultural Machinery Strategy, providing technical assistance on three machine development projects for private sector companies and one project for a public sector company. Training aspects are included where appropriate in the projects. Provision has been made for study tours for selected companies (private sector) to help them find joint venture partners. The setting up of a development fund has been suggested to provide for project investments. The programs should take place over 5 years, the total cost being US\$ 1.5 M.. Credits should be recovered from the successful projects and made available for future projects.

This report was produced as a result of a visit to Egypt by the Consultant between 3 January to 25 January 1990.

The Consultant wishes to record his thanks to friends from Cairo University and the Ministry of Industry for helping to arrange the programme of visits.

Indicative Programme for the development of the
Agricultural Machinery Industrial Systems in Egypt

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Indicative Programme for the development of the Agricultural Machinery Industrial Systems in Egypt

1.0 INTRODUCTION

1.1 Background

The Programme Development Support Unit has been established at UNIDO to promote the application of the programme approach to project identification and formulation. In 1989 the Unit's efforts are being directed mainly to the preparation of the 1990/1991 Industrial Development Decade for Africa (IDDA) programme, which will concentrate on the development and rehabilitation of agro-related industries in Africa.

The programme approach is applied at three levels. The first level, which provides the basis for the following work, is the classification of countries according to patterns of development of specific industrial systems. In order to prepare the 1990/1991 IDDA programme, PDSU is classifying 50 African countries according to development patterns in the agro-food related sectors (agro-food industries, fertilizers and pesticides and agricultural machinery). The objective of the classification work is the identification of countries with similar development patterns in specific agro-related industrial sectors in order to facilitate the cost-effective design of integrated development programmes of technical assistance, investments and policies.

Building and expanding upon the results of the classification of African countries, UNIDO is now undertaking the second stage of the programme approach work, the preparation of indicative programmes for groups of countries to promote the development of specific agro-related industrial systems.

1.2 Objective of present study

- i) To assist the PDSU in the preparation of indicative programmes for a group of African countries, namely those with relatively well developed AMI facilities, of which Egypt is one.

- ii) To confirm that the classification so far produced accurately describes the situation in Egypt.
- iii) To suggest indicative programmes that could lead to the development of the Egyptian agricultural machinery industry in line with the governments' policy in this area.

1.3 Approach

The consultant-expert in Agricultural Machinery Use and Production visits Egypt for 3 weeks to collect information first hand and to make recommendations. The agriculture of the country was studied by visiting farms, Departments of agriculture in universities and the Government Ministries to find out what are the present, normal practices. It was necessary to identify what machines are presently used and what machines may be used in the near future in order to make recommendations for appropriate projects. A number of projects are suggested and details appear in the Appendices.

2.0 COUNTRY BACKGROUND

2.1 The Economy

The GDP is LE 28.98 billion (1985) with a GNP per capita of US\$ 700 (1983). The average growth rate was 5% in 1985 and appears to be falling. Inflation rose in the early 80's and was 18% in 1985.

Agriculture provides 15.9% of the GDP (1985) and employs 40% of the population. Cotton and fruits are the two main agricultural products which are exported.

2.2 Policy environment

The economy is partly centrally planned and controlled but in recent years a capitalist system has been introduced in some areas to encourage production. Many factories producing farm machinery are given production quotas each year. Those companies importing machines are also given quotas each year based on the Governments' plan.

2.3 Food Production

The quantity of food produced by agriculture is not sufficient for the present population. The main imports are wheat, maize, dairy products, sugar, and vegetables oils. The government is developing the new farming areas in the desert as rapidly as possible in order to increase production to and reduce the serious trade deficit of US\$6 billion. The total exports are only \$4,500 million.

2.4 The Agricultural Machinery Industry

The value of the imports of agricultural machinery was US\$112.6 M in 1987 being about 3% of the total imports of engineering products.

Most of the simpler agricultural engineering products are produced by artisan workshops or small factories, mostly in the private sector. Some large centrally controlled companies also make agricultural machinery and irrigation pumps, but these are only part of their products and are a small proportion of their turnover.

The more complicated machines are usually made under licence from a foreign manufacturer (mostly Italian origin) with the complex or difficult to make parts being imported.

3. THE AGRICULTURAL SECTOR

3.1 Agricultural Production

All agricultural production in Egypt is irrigated as there is no significant rainfall anywhere in the country. The land used for agriculture is a very small percentage of the total land area. Only 3% of the land area is cultivated; the other 97% is desert. Depending on the crop and rotation system up to 3 crops per year are possible. Average yields are very good compared to the world standards.

Table 1 shows the main agricultural crops grown in Egypt. Wheat, rice and cotton have government controlled prices, the rest are free market prices.

Table 1: The Main Agricultural Crops in Egypt (1980)

Crop	Production ('000 tonnes)	Cultivated area (Feddans '000)
Wheat	1796	1326
Beans	213	276
Barley	107	96
Lentils		15
Onions		28
Birsun		2711
Clover seed	54	
Cotton	1408	
Cotton seed	858	
Rice	2384	
Maize	3231	
Millet	635	
Sorghum		
Vegetables	6889	272
Oranges	921	
Fruit		
Sugar cane	8544	
Sugar beet		
Grapes	299	
Mangoes	98	
Dates	446	
Flax		68
Lupins		11
Chickpeas		17
Garlic	16	
Livestock products		

3.2 Agricultural holdings

The farms can be divided into three types.

3.2.1 Traditional Delta and Nile Valley farms, also those up the river valley

These farms are characteristically small, usually less than 5 feddans, maybe in blocks as small as 0.5 feddans, and owned by a family unit. The cropping programme is controlled by the Ministry of Agriculture with water provided by the Ministry of Irrigation. For instance, it may be decided that 100's feddans in the area will be planted to cotton this year. All the farms in that sector have to comply. The various departments of the Ministry of Agriculture, eg: The Agricultural Machinery Company, the Agricultural Cooperatives who control the tractor and machinery, will cultivate the whole area. The planting and weeding and watering are the responsibility of the

farmer, as is harvesting, but he is told when the start. The main insect spraying is carried out by aeroplane over the whole area and controlled by the Ministry of Agriculture. The Ministry of Irrigation is responsible for making sure that the irrigation canals are cleared out each year. The water level is lowered in January/ February to make this possible.

3.2.2 The new farming areas in the desert

These farms are being developed outside but adjacent to the traditional area. The farms are 50 feddan blocks with roads, drinking water, electricity and irrigation water on each block. They are given to selected people for a nominal rent or can be purchased. They are effectively privately owned. The farmers can grow what they like and sell on the free market. By various means some people can build up large holdings.

All the irrigation is by control drip, centre pivot or sprinkler systems - new, more efficient systems, as water will be at a premium in the future. Ground water is also supposed to be controlled to avoid salinity problems.

3.2.3 Industrial farms

An example of this type of farm is that of sugar cane production. Egypt is not self sufficient in sugar therefore the Government is putting a lot of effort in to developing new areas and factories and re-equipping old factories (eg: Komombo).

The government owns the sugar factory and sells the sugar. It provides the water, planting material and controls the time of planting and harvest. It provides the transport system to the factory. The farmer owns the land; usually a few feddans, sometimes as small as 0.5 feddans. He looks after the cane and uses the fertilisers sold by the Government at subsidised prices. When the factory gives the order he cuts the cane and loads it into the factory's transport system. He is paid on the weight of cane, less trash and dirt, that the factory receives. He is provided with technical advice by the factory as required.

There are 8 sugar cane factories which produced 805 386 tonnes of sugar in 1989, with one planned for the future. The total area under cane cultivation is 229,307 feddans with a government plan to expand this to over 250 000 feddans.

The sugar cane factory at Komombo near Aswan was visited. The factory does not own much agricultural machinery but does conduct experiments on new machines or samples imported from other countries. The farmers have too small an area to justify purchasing machinery just for their own use.

There are a number of hire companies who are set-up partly with state assistance or are privately owned. There are also machinery cooperatives run by the State and farmers.

These companies hire out tractors (with drivers) and various equipment and carry out most of the cultivations required. Nearly all the farmers use this system. Fertilizer is usually spread by hand. Some larger farms use herbicide spraying but weeding is mostly done by hand.

3.3 Mechanisation

The general level of mechanisation is summarised in Table II which shows the percentage of cultivated land or activity that is mechanised (based on CAPMAS 1985):

Table II: Percentage of operations mechanised

Operation	% of agricultural land or activity mechanised
Ploughing	90
Irrigation	62
Levelling and ridging	56
Threshing	80
Harvesting	0
Fertiliser application	0
Harrowing	30
On-farm transport	15
Planting	0

3.4 Cost of Hiring Agricultural Machinery

Table III shows the hire charges that farmers have to pay for various operations. These figures are an average quoted from a number of sources found during the visit.

Table III: Hire charges to farmers for agricultural machinery

<u>Operation</u>	<u>Charge</u>
Ploughing 2 passes	35 LE per feddan
4 passes	50 LE per feddan
Levelling	35 LE per hr
Sugar cane loading	175 LE/day (7 hrs) or 1.65/tonne
Subsoiling	15 LE/feddan 1 m/row
Bulldozer	75.5 LE/hr
Reclaiming	62.5/hr
Scatterer (for Sugar cane)	57.5 LE/hr
Canal dredging	52.5 LE/hr
Ridging	12 LE/feddan
Mechanical weed control	15 LE/feddan

3.5 Machinery used by Egyptian farmers

Table IV (see p.12) shows the machinery commonly used by Egyptian farmers and the companies known to produce it. Figures in (--) are the estimates of how many items could be sold per year; (✓) made to order.

3.6 Purchase price of Agricultural Machinery

Table V shows the price the farmer pays for Agricultural machinery in Egypt. The figures are from two sources and differ widely.

Table V Purchase price of Agricultural Machinery

- a) Source : Prison farm proposal
b) Local factories/Importers

	a. \$ US	b. L.E.
28/35 HP Tractors	12 000	25 000/16 000 for MT280
75/80 HP Tractor	16 000	
	(40 000 Military Factory)	
2 m Roto tiller	1 600	
1.25 m Roto tiller	1 200	
Subsoiler	2 000	
Forage harvester (P.T.O.)	6 000	
Fertilizer Spreader	3 000	
Grain drill	2 500	
4-row planter	2 300	
10 m ³ water tank	3 000	7 000 (incl. pump and engine)

Table V (continued)

	a. \$ US	b. L.E.
Forage tipping trailer	3 500	
Front end loader	3 000	18 000 (incl. tractor - Russian)
Post hole digger	1 500	
Busattis mower	1 500	
Knapsack mist blower	30	
Sprayer unit 600 l	3 000	
Dump truck 7MT	30 000	
2 wheel tiller	2 000	
Interrow cultivator	6 000	
Motor cycle	1 000	
+ side car	1 300	
4WD Jeep	14 550	
Trailer		3 500
9 tine plough		3 000
Thresher		5 600 6 000 Private Military
Excavator (tractor trailed)		19 000
4" pump + engine		2 800
6" pump + engine		3 500/15 000
Plastic greenhouse (steel frame)		2 L.E./m ²
Disc harrow		
Ridger		
Kolosker engine		6 000 1 600 Military Private
Sugar cane planter	15 000	
Sugar cane loader (Bell)	30 000	
Cameco loader	60 000	

Service Cost:

3 LE/diesel injector service exchange

2 LE/hr labour

50 LE/100 km per car/van running cost to visit site

Note: (i) Most private factories will not quote prices informally. There seems to be different prices for different people.

- (ii) Military factories will only quote a price to an official purchaser.
- (iii) Prices also seem to fluctuate depending on cost of raw materials at the time.
- (iv) There is a big discrepancy between prices in (a) and (b) columns, (a) will come from Italy, (b) from within country. Reasons for this are not known.

3.7 Farmers' Income

A farmer's income is difficult to determine as he not only farms but may hire any machinery he owns or carry out local transport. He may have other activities, such as building, or have relations working abroad who help support the family unit. The average labourer's wage is L.E. 5.13/day.

Table VI shows the average profit per feddan, ie: money available for the family to spend after all production costs have been paid. (Verbal report from Cairo University).

Table VI Average profit per feddan in LE per year

<u>Crop</u>	<u>Profit (LE)</u>
Sugar cane	1500
Maize	300 to 400
Wheat	300 to 400
Oranges	1200 to 2000
Tomatoes	3000

4.0 AGRICULTURAL MACHINERY MANUFACTURING SECTOR

4.1 Overview

There are two main types of factories. The first type are large state run factories which were originally known as the Military Factories but which now manufacture a wide range of goods including agricultural machinery. Examples of these types of factories are Factory 909 which manufactures irrigation pumps, Factory 999 which manufactures gear boxes, threshers and other agricultural machinery; Behera factory, manufacturing trailers, threshers, cultivators and related equipment.

The second type of factory is privately owned and financed. The smaller of this type of factory are the artisan workshops to be found in every town and

village, which make anything made of metal for use in agriculture. here are a few larger companies, often set up with the help of overseas companies or with licence agreements for manufacture of originally foreign equipment. Examples of this type of factory are Tanta Motor and Imagro, the latter has strong Italian connections.

Table VII Factories producing Agricultural Machinery in Egypt

Factories	Employees	Turnover L.E.	Site	Assets L.E.
Tanta) largest private Imagro) factories	275 75	10 m 5-6 m	10 400 m ² 4 800 buildings	
MSR (Military factory) No. 999 (No. 909 similar)	2 500 1 m mh/shift per year		133 acres	660 M
Mabrouk (largest of 4 similar in Tanta)	20	2-3 m	5 x 30 m shed	
Factories	Employees	Turnover L.E.	Site	Assets L.E.
Arab Company for Commerce Tanta	20	2-3 m	120 m ²	
Behera	50 on Farm Mach. 600 Total	5 m 130 m Total	25 Feddans	
Transportation, Engineering General Co.	3 000	100 m	5 main branches	
Tractors & Eng. Co.	3 000+	?		
Dirbec Service Centre	50 planned	-	2 Feddans 10 000 m ² buildings	3/4 M
Arab Co. for Home Trading Mansoura	20	3/4 M Spares 5 M tractors	4 shops 10m x 10m x 2 floors	

Table VII (continued)

Factories	Employees	Turnover L.E.	Site	Assets L.E.
-----------	-----------	------------------	------	----------------

Mr Abdulla	15	100 K+	18m x 40m + yard	
------------	----	--------	------------------	--

6 others in the area like this.

Simbillawein is similar

Sugar Factory
Komonko

4.3.1 Manpower

Production workers showed considerable skill in producing the agricultural machinery, often under poor conditions in some of the smaller companies. The larger companies had schemes to train their staff in specific skills to suit their requirements. In general the labour tended to stay with the same employer for a long time, only moving if there was no work due to lack of orders.

4.3.2 Machine tools

All the basic machine tools are manufactured in Egypt. More specialist tools are imported from a wide range of countries, the most important suppliers coming from Eastern Europe. There are often long delays in obtaining the necessary licence and arranging finance.

4.3.3 Engineering components

Many small components, for instance nuts and bolts, are manufactured in the country. Special parts like ball bearings are imported as it is not possible to manufacture these items on the small scale required in Egypt. This is normal as there are only a few large manufacturers worldwide. The supply of welding consumables and availability of rods seems to be satisfactory.

There are many small factories making spare parts for many types of machines and equipment. In every town there are engine rebuilders, vehicle repairers, farm machinery repairers. The materials may not be the same as the original quality nor the precise dimensions and surface finish, but the machine will function with these parts. It is not important if the rebuilt machine has a shorter life than would be the case in Western Europe; the parts are just

changed again. The efficiency of the original design may not be attained using 'home made parts', but fuel and labour costs are low and, in general, machines are not used to their maximum efficiency or output for many reasons, so the provision of parts to the original specification is not vital. As the use of machinery continues to grow, these machine repairers will provide an adequate service to suit the demand. They are driven by the market demand and, being small, private individuals, they can meet changing demands very rapidly.

4.3.4 Utilities and Energy

It is the policy of the Government to provide clean 'drinking water' supply and electrical power to everyone in Egypt. The water supply in the major towns is of good quality and reliable supplies are developing rapidly in the rest of the country.

The Government has a major programme for developing new electrical power stations using hydro, thermal and wind energy systems. Most places have electricity and the new developments are aimed at improving the reliability of the supply.

Some of the larger factories had standby generators for part of the load, most of the smaller private factories relied entirely on the Government supply. During my visit no power cuts were observed.

4.3.5 Raw materials

Mild steel of various standard sections is made in the three steel works in the country and seems to be of good quality and available in the common sizes. The smaller manufacturers have difficulty in obtaining a continuous supply from the steel factories. Alloy steels for higher strength parts have to be imported, and although imports are allowed the supply is difficult to schedule properly.

4.3.6 Production jigs and tools

Most of the welding jigs and other specialised equipment for the manufacture of agricultural machinery were made by the various factories themselves. Little use is made of press tools for making sheet metal components although Factory 999 had three medium sized presses. Electric resistance spot welding was not used much in the production of sheet metal

components. Few factories had heat treatment facilities for steel components, probably because heat treatable steels are not readily available or used in many of the agricultural machines produced.

4.3.7 Castings

There are a number of foundaries throughout the country. The smaller production factories can easily buy castings for subsequent machinery, eg: flywheel for thresher, bearing housings etc.

4.3.8 Forgings

Some drawbar parts are forged in small specialised workshops and sold to the trailer makers for machining and assembly. Forged parts were not common in the range of machines that were commonly used by Egyptian farmers, ie: machine-made forgings.

Many of the hand tools, animal harness, carts, parts for water wheels, were forged by traditional methods in artisan workshops.

4.3.9 Wood making machines

A few wood working shops were seen when visiting the smaller factories. Some had all the usual equipment - saws, planers, spindle moulders, assembly jigs, presses for making windows, doors and door frames. There is already a large industry associated with aluminium windows and door frames as many of the large buildings are fitted with them. Much of the equipment was made in Egypt.

4.3.10 Designs

Only the larger factories had a design department, but they were usually very small. It seems that most factories produce only the well known designs where they have a known and predictable market.

The simpler equipment such as cultivators and trailers are all made to the same design which seems to be universally known. The original design either came from an imported piece of equipment that was found to work well in Egyptian conditions, or was provided by one of the Government organisations (see later).

The more complex equipment is not designed in Egypt but the companies who wish to produce it seek a licencing agreement with an existing foreign company who already has sold the equipment successfully in Egypt. The

Egyptian company then has technical help, often financial assistance and a supply of the parts which are too difficult to make for themselves.

4.3.11 Outputs of the Agricultural Machinery Industry

The final products may be classified as follows:

1. Hand tools
2. Manually operated equipment
3. Animal drawn implements
4. Tractor drawn basic implements
5. Simple power equipment
6. Power operated equipment.

Machines described under 1, 2 and 3 are very well catered for by the local artisans. Many of the items produced are very good, eg: donkey carts and horse drawn carriages having a stylish, practical design and being skillfully made.

Items under 4 are well catered for, but some improvements could be made in the manufacture of mouldboards and tines.

The most common piece of equipment in Category 5 is the thresher. This was developed originally by the Government and is now made by many manufacturers. Most designs seem to work reasonably satisfactorily.

Machinery under item 6, power operated equipment, is where the greatest advances can be made.

5.0 IMPORT SECTOR

All the imports are controlled by the Government. An import license is required and, when granted, the authority to spend the required foreign exchange is also given. The overall Government policy is to restrict imports to only those items considered essential, eg: raw materials not available locally. In the case of agricultural machinery, if machines are made in Egypt then no imports are allowed even if the market desperately needs the equipment in question.

A number of Government departments are involved in making the decisions on the licenses and foreign exchange supply, eg: The Ministries of Finance, Industry, Planning, and Agriculture. This policy makes it difficult to

import new machines and because of the trend to licencing agreements from outside the country, the development of new machines is rather slow.

There are a number of import agencies both publically and privately owned. Of the two that were visited (one of each) both claimed that they could sell many times more equipment if there was no import controls as suitable equipment was either not available, or not available in the required quantities, from Egyptian factories.

6.0 INFRASTRUCTURE

6.1 Distribution network for Agricultural Machinery

The larger factories have a nationwide distribution service using local agents who sell to the farmers or hiring agents. The smaller companies sell to the local area and usually deal directly with the customers.

The local transport system is well developed, there are good roads throughout the country and there are many transport businesses operating lorries and transporters.

6.2 Repairs and Maintenance

All the companies producing machinery and the importers of equipment operate spare parts services. Parts are readily available where the importers can get the necessary foreign exchange. There are many specialised small companies making spare parts (see Section 4.3.3).

The repair and maintenance of tractors and agricultural machinery is carried out by Government organised workshops throughout the country. These are run by the Agricultural Marketing Company and agricultural cooperatives. Their roles and spheres of work seem to overlap but the farmer seems well served.

6.3 Machinery Hire companies

There are many throughout the country. A company at Aswan was visited as being typical of the larger, better organised companies. This is described as follows:

Aswan National Industrial Company for Agricultural Mechanisation

Tractor hire company at Komambo. Private company with Japanese loan and equipment.

\$ 12M from Japan }

2M LE from Government ! 30 year loan at 3% interest

Managing Director: Mr Keder Hassan Abd el Kamin

Equipment:

50 Komatsu 150 HP Crawler
 30 Iseki 90 HP Wheeled
 10 Scuttler 200-1, 200-3 model
 2 Bulldozer D100A
 6 Bulldozer D60A
 2 Tractor TO30 Russian
 30 Bell loader

plus planters, cultivators and ridgers.

90% available to work at any one time.

Hire charges: see under Hire Charges.

Area of work: 2 Feddans buildings, steel frame, good quality
 4 Feddans yard, sand surface.

Facilities: All hand tools, service tools.
 Complete engine rebuild and equipment.
 Complete track rebuild (not part rebuilding).
 Training room.
 Comprehensive stores with spare engines and some complete machines unused.

Staff: 4 Japanese trained staff, rest Egyptian trained.
 Seen very competent. About 40 in workshop plus drivers and assistants.

Commercial performance: Figures not available.

Work area: The company operate in an area of about 10 000 feddans in Komambo area.

7.0 INSTITUTIONS

7.1 Credit

There are a number of Agricultural Development banks and Industrial Development banks which have funds available to lend for suitable projects. There is no problem borrowing money, if the potential borrower has land or buildings as collateral. It is not possible to obtain credit if he does not have such collateral. Lack of credit causes similar problems for the smaller and private companies and is restricting their development.

Only a small proportion of the present World Bank loan has been taken up due to a lack of suitable projects which satisfy the required conditions.

7.2 Research

There are a number of Government research organisations.

The Ministry of Industry controls the National Research Council and the Ministry of Agriculture controls the Agricultural Machinery Research Institute. Some of the Government run factories, for instance the Komombo Sugar Factory, design and develop machinery for their particular requirements.

The Ministry of Industry also controls the Industrial Design and Development Council. One of their successful designs in the past was a 4-wheel road trailers. This is now made by many factories all over the country. The Standards Institute also has an input to these organisations to ensure that the various standards are met.

7.3 Universities

There are a number of universities throughout the country, many of which have a Department of Agricultural Engineering teaching to degree level and above. Many of the Departments also have an ongoing research programme with the work done both by the staff and research students.

There does not seem to be much cooperation with industry to help develop new machines which would be required by the farmer. Basically Universities provide graduates for the Government to employ in its various departments.

7.4 Ministry of Information

This Ministry collects information on production of farms and factories which is used by the other government ministries to make the decisions on controlling the cropping patterns and industrial production.

They do not seem to operate a market information service to help industry identify potential markets at home or abroad. Hardly any of the companies sell their equipment to other countries in North Africa and the Middle East where the crop types and soil conditions are similar. They seem, in general, to have no information on the types of equipment that are used or the likely numbers they could sell. They could have quite an advantage in these export markets as they have a common language and culture. Developing their export markets would increase the production numbers required, making the original investment more attractive.

7.5 Base diagram - Agricultural Machinery

All the various interacting organisations are shown on the Base diagram shown in Table 8. Most of the organisations and their activities have been described in the foregoing paragraphs.

8.0 CLASSIFICATION OF EGYPT IN AMI GROUP 1

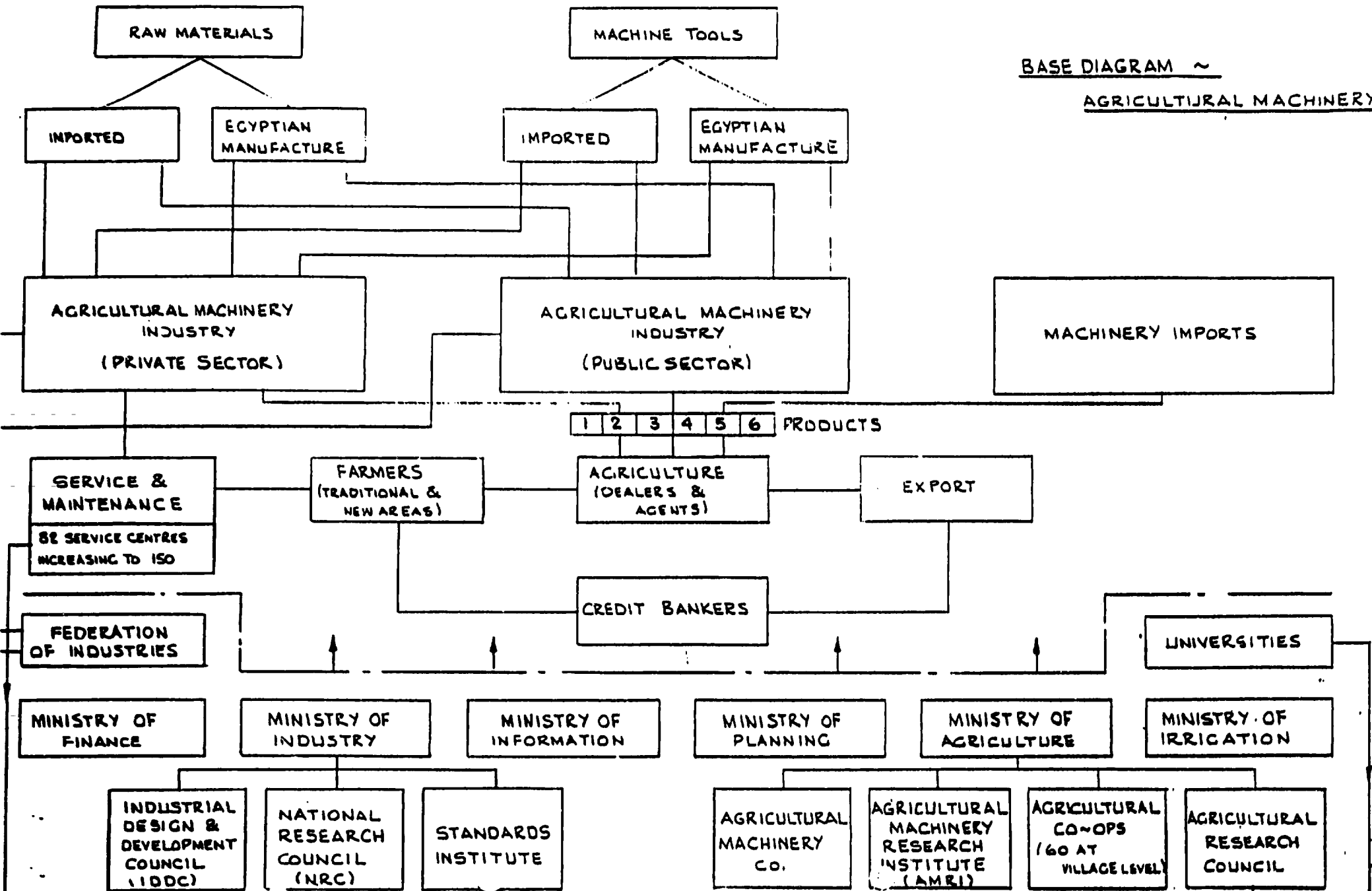
From the UNIDO report, (PDSU Draft Report No. 1673C, 30 November 1989), Egypt is considered to be in Group 1 and is described as having relatively well developed AMI facilities. The Summary of the group description describes Egypt very well and the Summary of Constraints and Summary of Enhancements match the situation very closely.

Of the strategies and actions listed in Table 4 some are selected as being the most appropriate for priority action. The next section highlights some of the special problems and makes suggestions for Programmes of Projects and indicates the appropriate actions.

TABLE 8

BASE DIAGRAM ~

AGRICULTURAL MACHINERY



9.0 PROGRAMMES AND PROJECTS FOR AGRICULTURAL MACHINERY INDUSTRY

9.1 Constraints and bottle necks

9.1.1 Finance

Many of the smaller private companies do not have access to further funds as they have already used their land as collateral.

9.1.2 Market information

Many companies do not have information on the types and numbers of machines sold to various farmers and contractors each year in order to help them assess the likely trends for the following year. The information does not seem to be available from the Ministry of Information.

9.1.3 Export Data

No data seems to be available on the machines that are imported by other Arab countries with a similar agricultural pattern where an export market could be developed. In general Egyptian companies do not seem to have considered export to increase their sales.

9.1.4 Coordination of Research work

There seems to be some very good developments by the research stations in cooperation with other organisations. The best success story is the development of the stationary thresher and winower for wheat, rice and other grains. A very high proportion of threshing is now done by this machine and the numerous copies made throughout the country.

Other developments for example the sugar cane planter carried out by AMRI and the Komombo Sugar Factory is not in wide use. The machine works satisfactorily and could be used profitably by farmers either as direct purchase and self hiring, or used through the tractor hire companies according to the studies done so far. the machine is not yet in production. many of the companies spoken to did not know of the work or its potential.

There are a number of other machines that seem in an advanced state of development which do not seem to be known by the factories.

9.1.5 Production Policy of Military Factories

The Military Factories are charged with making machines and selling them to the Egyptian farmers. If they manufacture a particular machine then other private factories are not allowed to manufacture or to import the same

type of machine. This policy obviously suits the military factory but not the farmers or private factories. For instance, it is said that the thresher made by the military factories to the design of AMRI costs more than if they were made by the private factories. The price from the Military factory is LE 6000 and from the Private factory LE 5600, with licences limiting the number from Private factories. A number of producers said they could make the machine for about LE 4000, and sell more of them if there were no restrictions.

Another example is the diesel powered water pump produced by Factory 909. A similar Italian design could be purchased for about two thirds the price if imports were permitted.

9.2 Previous technical assistance projects

The IDDC have been helped by a previous UNIDO project (details not available to hand). The FAO and World Bank had a major project on the 70's and 80's, starting with a Report 5/77 EGY11, 22 February 1977. USAID had a project starting with Report ERA 2000 in Further Mechanisation of Egyptian Agriculture, 15 April 1979. This project worth US\$ 47M involved actions to support farm mechanisation and local manufacture of farm machinery. The Project Completion Report (23 February 1987) made the following comments regarding lessons learned.

A. Projects which are designed to promote private sector manufacturing must be developed with ample private sector input. Specifically, the Agricultural Mechanization Project designers should have made a greater effort to speak with more private dealers and manufacturers and to form a clearer picture of their problems before deciding that mechanization research and development was what they needed and that the government should be the one to provide it.

B. Development of prototype machinery does not automatically lead to local manufacturing; market demand is the pre-requisite to manufacturing, not design.

C. When public and private sectors are competing in the same commercial venture, the public sector should not be charged with developing its competitor, the private sector.

D. Noting that at the beginning of the project only approximately 5% of existing Egyptian agricultural machinery was from the U.S. or U.S. designs and that USAID regulations so strongly favour US-source-and-origin commodities, AID probably should not have attempted the promotion of appropriate mechanization in a country where non-US (in fact, non-free world) machinery was the established standard.

Further details of these projects and others concerned with Mechanization, Irrigation, Maintenance, Manufacturing, Information should be obtained from the relevant sources. Sources that should be considered:

Egyptian ministries

UN, UNIDO, ILO and FAO agencies

Country aid, eg: ODA, USAID, GTZ etc.

A more comprehensive search should be made as there was not enough time during the visit. The projects, and the lessons learned, should be analysed to see when they could have performed better in order to help in the formulation of new projects to make them more effective.

9.3 Strategy for AMI Development

9.3.1 Agricultural Mechanisation Strategy

An Agricultural Mechanisation Strategy should be formulated in order to identify mechanisation needs in the country and most favourable potential export markets.

9.3.2 Existing Manufacturing

Existing manufacturing establishments should be upgraded for products in classification No. 6, Power operated equipment, particularly with the introduction of improved designs.

9.3.3 Joint Venture

Joint venture agreements should be established.

9.3.4 Development Fund

A Development Fund should be established to help productive companies finance the development of new products.

9.4 Programmes for the Development of the AMI

9.4.1 Agricultural Strategy Group

A group or committee should be established to formulate the Agricultural Mechanisation Strategy based at the Ministry of Industry. Needs, types and numbers of machines to be produced should be identified and market intelligence provided for both home and overseas markets.

Cost: \$ 64 000

9.4.2 Existing Companies (Private Sector)

Private sector companies should be upgraded by helping them to develop new designs suitable for the market.

Cost:	Category 1	Project 1	\$ 88 000
	Category 2	Project 2	\$ 132 000
	Category 3	Project 3	\$ 192 000

9.4.3 Existing Companies (Public Sector)

Public sector companies should be upgraded in the production of selected alloy steels.

Cost: \$ 88 000

9.4.4 Joint Venture

Companies, both in Egypt and abroad, and products that would be suitable for joint venture agreements for machinery production should be identified.

Cost: \$ 120 000

9.4.5 Development Fund

A Development Fund and the administrative system to enable companies to finance the new developments should be established. Funds for cooperation research programmes between universities and industry to develop ideas for the future should be provided.

Cost: \$ 700 000

9.5 Implementation Plan

The programmes proposed are interdependent and should progress together for the best chance of success.

Programme	Year	1	2	3	4	5
1		—	—	o	o	o
2	Proj. 1	—	—			
	Proj. 2	—	—	—		
	Proj. 3		—	—	—	
	Proj. x			o	o	o
3		—	—			
4		—	—	o	o	o
5		—	o	o	o	o

— Main work effort
o Work continues on routine basis

APPENDIX 1

1. Agricultural Mechanisation Strategy

Formation of Committee to formulate Agricultural Mechanisation Strategy.

Problem: Identify types and numbers of agricultural machinery that will be required in Egypt and in potential export markets.

At present information is lacking to enable an accurate assessment of mechanisation needs, especially in the new agricultural development areas.

Project: Set up a group with the aid of a Market Research expert at the Ministry of Industry to collect and collate the data and to organise the method of dissemination to the machinery industry. Identify production factories that have good management teams that could benefit from this information. Collect data on experimental machine development at various centres, eg: Research stations, Government factories, Universities, throughout the country. Make information available to potential manufacturers and users.

Provide detailed machine specifications for new machines that could be introduced in order to guide research organisations and potential producers to produce viable prototype machines for development.

Administer the Study Tour funds for Programme 4.

Administer the Development funds (see Programme 5) to industry and Universities.

Beneficiaries: The information will enable machinery production companies to make improved decisions on the new developments which should lead to a better success rate.

Project visits:

First visit: Set up organisation; select counterpart staff.

First plan.

Start machinery information collection.

Send selected staff for training.

- Second visit** **Improve plan.**
Information system on factories.
Experimental stations.
Send selected staff for training.
- Third visit** **Finalise plan for work procedures.**
Identify joint projects between Ministries, Research stations
and production companies.
- Fourth visit:** **Monitor performance.**
Advice, further training.

Visits normally 21 days each.

Budget:

Fee	100 days @ \$ 350	\$ 35 000
Tickets	4 @ \$ 3 000	\$ 12 000
Per diem	100 days @ \$ 146	\$ 14 600
Local travel	\$ 2 000	<u>\$ 2 000</u>
		<u>\$ 63 000</u>

APPENDIX 2

2. Existing companies (Private sector)

Provide detailed assistance to selected companies to enable them to design and develop new machines.

Problem: There are a number of categories of machines which seem to have a very good potential market. More accurate information will be available from Programme 1.

Category 1: Existing designs

Category 2: Existing designs requiring some improvement.

Category 3: New designs that may have a good potential market but need specific development under Egyptian conditions.

The information dissemination system in Programme 1 should be able to identify suitable manufacturers for Category 1 machines. The limitation for the development of Category 2 and 3 machines are lack of design, production engineering expertise, capital, (for capital see Programme 5), and specialised production machinery.

Project: Provide design and production experts to work with selected companies to produce modifications (Category 2) and new designs (Category 3). Provide specified training for selected staff. Prepare project plans to release funds for the development programme from Programme 5. Plan the test programme, production facilities and factory layout required for the potential numbers of machines planned to be produced.

Suggested projects are listed below. The final selection should be based on more accurate and comprehensive information collected in Programme 1. Priorities in each category can then be assigned.

Beneficiaries: The targetted companies will be able to develop an in-house capability to design and develop machines specifically designed for Egyptian conditions and for export to countries with similar conditions. The companies will be able to develop their expertise and equipment in testing and development of machines, and in the design and development of production equipment.

Category 1: Existing designs

1. Seed planter/drill (Agricultural Machinery Research Institute)
2. Sugar cane planter (Agricultural Machinery Research Institute)
3. Sugar cane cultivation equipment
4. Deep tube well pump (multistage)
5. Air blast sprayer (orchard sprayer). (Import machines at present.)

Category 2: Existing designs requiring some development

1. Mouldboard production for ploughs and ridgers, tine production.
2. Tractor powered Rotavator.
3. Drip irrigation emitters. Pressure regulator machines.
4. Improved crop cutter (not Busattis).
5. Boom sprayers - tractor mounted.
6. Rice transplanting/harvesting.
7. Olive 'shake and catch' harvester.
8. Cubers for animal feed (waferer).
9. 4" irrigation pump and engine (develop to make competitive to imported ones).
10. Micron sprayers (herbicide/insecticide).

Category 3: New designs to be developed for Egyptian conditions

1. Cotton stalk puller
2. Sugar cane loader)combined design using same basic parts.
- 2a. Canal cleaner/digger)
3. Grain harvester (to include straw collection)(Metianu or Stripper type)
4. Cotton harvester (55 cm rows)
5. Date Palm Harvesting equipment.(Considerable interest in Aswan region).

2.1 Project for Category 2 machines

The example given is for a Tractor powered rotavator.

Objective: To develop a locally-made rotavator which substitutes for imported products and which can be easily and cheaply made in a selected factory (identified in Programme 1).

Plan: Provide a series of consultants to work at the factory to assist local counterparts in the design of the machine, preparation of the drawings, design of production jigs and fixtures, and the planning of testing and evaluation programme.

Initiate pilot production and monitor machines for first year of product life. Provide assistance for updating design in the light of initial production experience. Identify training requirements and organise training programme for counterparts. Funding for equipment from Programme 5.

Project time: 2 years

Budget:

4 visits	@ \$ 16 000 each	\$ 64 000
2 training visits	@ \$ 12 000 each	<u>\$ 24 000</u>
		\$ 88 000
		=====

The funding obtained from Programme 5 would pay for making and testing a series of prototypes. Design and manufacture of the production jigs and purchase of specialised production machinery as required. Before all the details are known it is difficult to be precise on the amount required, but it would be in the order of \$ 100 000 over the 2 year period. This would be recovered by a surcharge on each machine collected over, say, a 10 year period.

2.2 Project for Category 3 machines

The example given is for a Cotton Stalk Puller.

Objective: To design, develop and test a Cotton Stalk Puller for use in Egyptian conditions. To develop the production capability in a selected factory (from Programme 1).

Requirement:

At present the farmer cuts the cotton stalks after harvest by hand or by Busattis mower prior to ploughing for the next crop. Hand work is physically hard. The Busattis mower is designed for cutting grass not cotton stalks, which are much stronger, so the machine is unreliable and costly in spares.

A cotton stalk puller powered by a tractor would enable the farmer to use the roots (one third of weight of plant), and it would reduce the carry over of crop disease from one season to the next.

Plan: Unlike the rotavator, the machine does not exist in a well defined form. More research and testing of the prototype will be required to perfect the machine. The project is otherwise similar to that described in 2.1.

Project time: 2.5 years

Visits: 3 visits by Design Engineer
 2 visits by Test Engineer
 1 visit by Production Engineer
 3 outside country training visits for internal staff.

Nominal length of visit 21 days.

Budget:

6 visits	@ \$ 16 000 each	\$ 96 000
3 training units	@ \$ 12 000 each	<u>\$ 36 000</u>
		\$ 132 000
		=====

Funding for the hardware as in 2.1 would be from Programme 5, and be of the order of \$ 150 000, recovered by a surcharge on the machines sold.

2.3 Project for Category 3 Machines

The example is for a Sugar Cane loader/self propelled ditch cleaner.

Objective: To design, develop and test Sugar Cane Loader/Self-propelled Ditch Cleaner suitable for use in Egyptian conditions. Develop the production capability at a selected factory (from Programme 1).

Requirement:

Tests at Komombo sugar factory have shown that it is cost effective for the farmers to hire a cane loader. There are 30 available for hire from one of the hiring agents in the area. They are well used. The machine is imported. The irrigation and drainage channels must be cleaned out each year. This is being done increasingly by hydraulic excavators and drag lines, most of which are imported (small tractor powered hydraulic types are now being made in small numbers). Both machines could use an engine

APPENDIX 4

4.1 Joint venture agreements

Problems: Joint venture agreements are quite popular with Egyptian companies as a quick method of producing an already developed machine. The cooperating company can also provide technical assistance and the more difficult-to-make parts.

It is difficult for the Egyptian companies to identify and make contact with the potential licencing company.

Project: Provide funds for study tours for the relevant company personnel to travel to selected countries to make initial contact and start discussions on possible licences. Tour programmes to be approved and administered by Programme 1.

Project time: Funds to be available for 2 years.

Budget:

20 tours to be available,

21 days nominal length @ \$ 6 000 each Total \$ 120 000

APPENDIX 5

5. Development Fund

Problem: The various consultants can help the local factories with the ideas and plans but it will require the input of funds to pay for the hardware to enable the projects to take place.

Funding from local conventional sources is often not available, as many of the companies have already used up their collateral.

Project: It is proposed to develop a new fund that will enable companies to carry out the plans which evolve. The monies will be recovered by a surcharge on each machine sold over a 10 year period. Each project will be approved by the Programme 1.

Beneficiaries:

The Fund will enable these new developments outlined in Programmes 2 to 4 to take place, so assisting Egyptian factories to produce the equipment required by the farmers.

Fund: A fund of \$ 700 000 will be required. As the machines go into production the money will return so that over the years it can be used for other projects. The nominal interest charged will pay for the administration charges. If the machines are not commercially successful, the money cannot be recovered.

10.0 UNITS

1 hectare (ha)	=	2.47 acres
1 Feddan	=	1.04 acres
		= 0.42 hectares
US \$ 1	=	L.E. 2.59
£ 1	=	L.E. 4.26
£ 1	=	US \$ 1.69

11.0 REFERENCES

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2. Ministry of Agriculture. Agricultural Mechanisation Research Institute. Annual Report 1988.
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8. Report on a Visit to Egypt, September 1988. Vic Moore, British Council.
9. Egypt - Country Profile. EIU 88/89.
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11. Agro Processing Overview, PDSU 1582C, December 1989.
12. Agricultural Employment, Wages and Government Policy, Alan Richards. The American University, Cairo December 1989, for the ILO.

12.0 INTERNAL TRAVEL

			L.E.
January	3	Taxi Airport to Ramesis Hilton, Cairo	61.5
	4	Taxi President Hotel	
		British Embassy	35
	6	Taxi Ismalia Desert Farms	200
	7	Taxi UNIC and Cairo University	10
	8	Taxi Tanta Factories	25
	9	Taxi Ministry of Agriculture, Ford Foundation	
		Catholic Centre, USAID	20
	10	Taxi Ministry of Industry	5
	11	Taxi Cairo University	
		British Council	8
	13	Taxi Ein Shaams University	
		999 Factory	70
	14	Taxi Tractor and Implement Co.	
		Ministry of Agriculture	10
	15	Taxi Alexandria)	
	16	Taxi Desert Farms)	340
	17	Taxi Tractor Service Station	20
	18	Taxi Ministry of Agriculture	
		Sugar Company, Head Office	10
	20	Taxi Mansoura Factories and Desert Farms	120
	21	Taxi Ministry of Industry	10
	22	Taxi to Airport - Visit Aswan	5
	23) Airfare - Komombo Sugar Factory	40
	24)	370
	25	Taxi To Airport	<u>40</u>
			1399.5

@ \$ 2.59 rate			<u>\$ 540</u>

US \$ 500 authorised 7 January 1990

13.0 ITINERARY, VISITS AND CONTACTS

January 1990

Wed 3 Ramsis Hilton then President Hotel

	<u>Contact</u>	<u>Organisation/Address</u>
Thu 4	Kassum	U.N., Zamalek
Fri 5	Local Holiday	
Sat 6	Visit to farming area, Ismalia/Suez	
Sun 7 (a)		UNIC, Garden City
	(b) Dr Ahmed el Raie Suliman Head, Dept. of Agricultural Engineering	Cairo University, Nasr City Tel: 604132/724107
	Dr Mourir A Morcos (Prof.) Dr Hassan A Fouad (Dean) Mohamed Sayed Omran (Lecturer) Gamal Mansour Mohamed (Lecturer) Dr Mohamed H Hatem (Lecturer)	
Mon 8 (a)	Hussan el Kouli Assem Abo Frika Hasham Abo Frika	Tanta Motors, Mbuirieh Street PO Box 111 Fax: 342686/Telex: 23898
	(b) Mohamed Mabrouk Nashat el Kaskawi & Co	Tanta
Tue 9 (a)	Dr Sabry	UN Office, Zamalek
	(b) David Nijgard	Ford Foundation, Garden City
	(c) Alex Rhondas	Catholic Centre, Garden City
	(d) Prof. Mohamed Nabi el Awady	Ain Shams University Shobra el Kheima, Cario
	(e) Ken Lyvres	USAID, Garden City
Wed 10(a)	UN office	
	(b) Amin Ahmed Kasim Selim Under Secretary of State	Ministry of Industry Garden City Tel: 355 3507, Floor 9
	Saad Abdel Gainad Dr Joseph Mazhar Reda Mohammed Moustafa Mohammad abd al Monem	First Under Secretary of State
Thu 11(a)	Prof. Miraziz	Cairo University
	(b) Peter Llewelyn	British Council 192 Sharia el Nil, Agouza Tel: 345 3281

	<u>Contact</u>	<u>Organisation/Address</u>
Fri 12	Rest day	
Sat 13(a)	Prof. Mohamed Nabil el Awady	Ain Shams University Shobra el Khama Tel: 942711
	Dr Ghany el Gindy	
	(b) Dr Abbas Abd el Azim	Helman Machine Tool Co (Factory 999), Helman Tel: 783 999 Fax: 780858
Sun 14(a)	Mr Kassim	Ministry of Industry Garden City
	(b) Mr Ahmed Daoud	Engineering and Trade Agencies Ltd Hassan Bachanidi Tel: 770 218
	(c) Mr Almed Shalaby (Chairman)	Tractors & Engineering Co. 33 Abdel Salam Area Bab el Louk POB 366 TEL: 393 2612
	Mohamed Ziada, General Manager Hassan M Hassan, General Manager Transport	
	(d) Dr Hossary Chairman, Panel of Mechanisation	Ministry of Agriculture 4th Floor, el Dokki Tel: 702042
Mon 15	Eng. Mohamed Saad General Manager	Behera Co. 21 Talaat Harb Street Alexandria Tel: 5874928
	Eng. Gaber El Khashab Agricultural Machinery Dept.	
Tue 16(a)	Visit New Farm area on Desert Road.	
	(b) Eng. Mohamed Nagiebh	El Waillar Pumps Faried Hassanien Tel: 769 144
Wed 17(a)	Eng. Abdel Kader Khedre Deputy Chairman	Engineering General Co 9 Orabi Street Tel: 777052
	Hamed Abou Sorra General Manager, Transport	
	(b) Eng. Khazan Abd Elaziz	Workshop at Rod el Farag
Thu 18(a)	Mr Kassim	Ministry of Industry
	(b) To make appointment	Sugar Corporation, Cairo
	(c) Mr Beheay (not available)	Ministry of Agriculture

	<u>Contact</u>	<u>Organisation/Address</u>
Fri 19	Rest day.	
Sat 20(a)	Eng. Khazan Abd Elaziz Khazan Consultant (Construction & Equipment)	Dirbec Service Centre Aga Turn Mansoura
	(b) Mr Amin Michael Omer	Arab Company for Home Trading Mansoura Tel: 344 956
	(c) Mr Abdulla Owner, small workshop	Mansoura
	(d) Simbillawein Trailer Co.	
	(e) New farms at Bilbeis.	
Sun 21(a)	Progress meeting with Dr Y Mazher	
	(b) Arrangements to visit Aswan	
Mon 22}	Mr el Sayed A Haridi	Komomko Sugar Factory
Tue 23}	Director	
Wed 24}	Personnel interviewed:	
	Mr El Sayed A Haridi, Director	
	Dr Gad El Karim Sayed, General Manager (Factory)	
	Dr Zeim E S Ali, Manager	
	Eng. Mohaned Abdul Rahman, Ag. Eng. Research	
	Eng. Abdul Aziz, Ag. Eng. Research	
	Aswan National Industrial Company for Agricultural Machinery	
	Mr Keder Hassan Abd el Karim, Managing Director	
Thu 25	Return Silsoe	
	<u>Other contacts:</u>	
	Dr F Fagotto Consultant, Agricultural Machinery	Via Torino 77, 96100 Siracuse, Italy
	E Davies Construction Manager	Mitsubishi Electric 4D el Gezira Street, Zamalek Tel: 341 2959
	D Craig Andrews	AMBRAC, PO Box 2265 Alaba Square Tel: 749 636
	Millington Hughes & Associates, Maps	Zamalek
	Peter Reynolds Conserv Contractors	17A M Mazhar Street, Zamalek
	Hamed el Shotey, Business man	Tel: 360 6128
	Kadry Osman Badr, Governor of Aswan	Aswan City, Tel: 745 450