



**AgEcon** SEARCH

RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

*No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.*

CA

WP#118

**AGRICULTURAL DEVELOPMENT SYSTEMS  
EGYPT PROJECT**

**UNIVERSITY OF CALIFORNIA, DAVIS**

**FARM MECHANIZATION POLICY IN EGYPT**

By

**Shawky A. Imam**

**Morad Khalil**

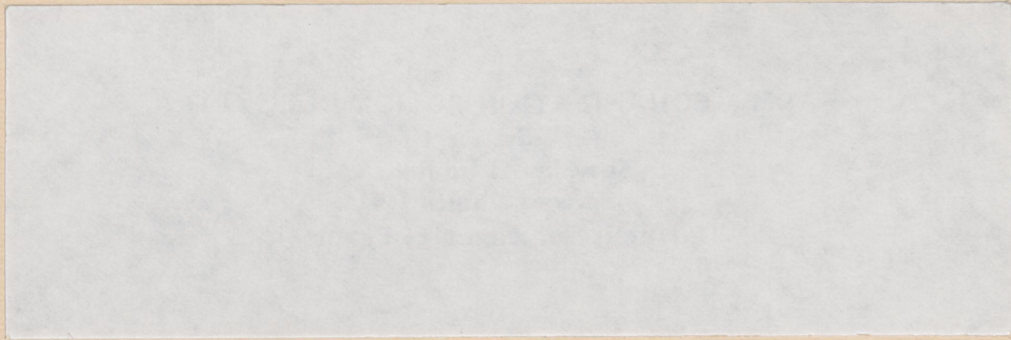
**University of Zagazig, Egypt**

GIANNINI FOUNDATION OF  
AGRICULTURAL ECONOMICS  
LIBRARY

JUL 18 1983

*Econ.*  
**WORKING PAPER**

**SUA/EGYPT** 



**FARM MECHANIZATION POLICY IN EGYPT**

**By**

**Shawky A. Imam**

**Morad Khalil**

**University of Zagazig, Egypt**

Assistance from the Agricultural Development Systems Project of the University of California, Egyptian Ministry of Agriculture, and USAID, is gratefully acknowledged, but the author is solely responsible for the views expressed in this paper.

**Economics  
Working Paper Series  
No. 118**

**Note:** The Research Reports of the Agricultural Development Systems: Egypt Project, University of California, Davis, are preliminary materials circulated to invite discussion and critical comment. These papers may be freely circulated but to protect their tentative character, they are not to be quoted without the permission of the author(s).

**January, 1983**

**Agricultural Development Systems:  
Egypt Project  
University of California  
Davis, Ca 95616**

## Farm Mechanization Policy In Egypt

By

Dr. Shawky Imam

Zagazig University - Faculty of Agriculture

Dr. Morad Khalil

Zagazig Univer.- Inst. of Productive Efficiency

1. Introduction: Farm mechanization is a complicated process. The economic and social factors play a vital role beside the technical aspects. Recently, farm mechanization has been stimulated by the strong demand for labor in other sectors and foreign (arab) countries, as the latter have been drawn workers from the land by high rates of wages. In fact farm mechanization has been motivated by "urban and arab pull" and "rural push". In general, the agricultural policy has three objectives in this concern : firstly to increase agricultural output, secondly to create employment opportunities, thirdly to reduce rural poverty and promote more equity in income distribution. One of the most important means of that policy is farm mechanization.

Farm mechanization policy, which will be discussed in this paper, includes many items as follows:

1. Targets and stages.
2. Expansion and replacement policy.

3. Distribution system.
4. Machinery import policy.
5. Machinery price policy
6. Fuel price policy
7. Hiring services policy
8. Comments on machinery subsidies policy
9. Machinery credit policy
10. Repair and maintenance policy
11. Spare parts policy
12. Foreign projects for mechanization

1. Targets and stages:

The main features of the agricultural policy relating to mechanization is gradual expansion in using the farm machinery specially tractors, pumps, winnowers, and threshers. The target for that policy is to reach 100 feddans for one tractor, 30 feddans for pumps, and 75 feddans for threshers. There are three stages to achieve these targets:

1. During the first stage animals are to be excluded from working in the field. They are to be replaced by tractors, small agricultural tools and electric power. The target is to achieve full mechanization of primary tillage, and seedbed preparation to raise the level of mechanization particularly for

irrigation, pest control and threshing. And introducing new method for transportation and hoeing, and small implements to overcome the bottlenecks of seasonal labor. According to the plan of the ministry of agriculture this stage comes to an end by 1985.

2. During the second stage (1985 - 1990) full mechanization is to be used for some operations which need a great number of laborers such as hoeing, harvesting of wheat and rice cutting fodder and seeding. That is means freeing liberate the human labor from the agricultural work.
3. During the third stage (1900 - 2000) full mechanization is to be achieved for all operations in the main crops (cotton - grains - fodder- and vegetables, and to electrify means of irrigation with completion of rural electrification. It must be mentioned that the achievement of these targets requires agricultural consolidation, training programmes for laborers, expanding and improving repair and maintenance shops and availability of spare parts. To achieve these and stages, the ministry of agriculture set the following five principles:
  1. Planning and evaluating the mechanization projects taking into consideration the objective circumstances of the Egyptian agriculture, Establishing

bank for information using the computer facilities to insure the consistency between the projects to set up the suitable plan for agricultural mechanization.

2. Establishing center based in Alex for field research and improving mechanization.
3. Establishing repair and maintenance units at the governorate level, these units deal mainly with the private sector. There are L.E. 6 million as loans for the mechanical shops owners, for purchasing tools and improving maintenance operation.
4. Land improvement unit with us \$ 7 million for purchasing sub soil ploughs, and to raise draing efficiency.
5. Extension unit for mechanization, including mechanical service station (services, and training) in Menufia (completed), Giza and Gharbia (extended)

## 2. Expansion and replacement policy

The policy of expansion and replacement relates to tractors 9 pumps and threshers. There are many aspects of such policy during last decade as follows:

- A. Tractors: Table (1) shows that there are an increase in number of tractors in the private sector

during the period 1966/67 - 1977 from 12901 to 19227 unit by annual rate 4.07%. The percentage of increase is about 49% (13.72% for replacement and 35.28% for expansion). Table (2) shows that the expansion in the private sector concentrates in 55-65 HP category. The number of tractors in this category represents 80.6% from the net change in the year 1974/75, and 90.2% in the year 1976/77. whereas the number of tractors in small horsepower categories (less than 35 HP) decreased.

Table (1) shows that the number of tractors in the public sector increased from 2499 in the year 1966/67 to 3241 in the year 1971 by annual rate 2.63% and percentage of increase is 30% .

It means that the rates of increase in the public sector less than these in the private sector. Table (2) shows that new tractors (taken out). In the year 1974/75 the number of new tractors was 295 while the number of taken out tractors was 392. Whereas in the year 1976/77 the number of new tractors was 291 and the number of taken out tractors 747. These figures show that the policy concentrated on the partial replacement without any expansion in all HP categories except 65 HP and more) category (just 44 tractors increase)

B. Irrigation pumps The dominant kinds of pumps in the Egyptian agriculture are fixed (old) and mobile (new) pumps.

1. Fixed pumps: There is a tendency for decreasing the number of such pumps in private sector. The rate of decreasing is 0.22% annually during the period 1966/67 - 1977. In the same period, the numbers of fixed pumps in the public sector increased by 10.2% annually, this increase may be due to the expansion in using such kinds in new reclaimed land.

2. Mobile pumps: There is a tendency for increasing mobile pumps in the private and public sectors. The rate of increase in first sector is 1.11% annually, and 3.73% in the second one. Table (6) shows that the number of mobile pumps in the private sector represents 80% of the total number. 50% of the private pumps concentrated in 10-15 HP category - with increasing rate 1.62% annually-, the other 50% distributed among the other categories. The same table shows that the number of 25-30 HP pumps (108) units represents only 3% of the total number of pumps, with highest rate of increase (28.2% annually). The statistical analysis indicates that there is a significant increase in the total number and capacity of Mobile pumps during the period 1967-

1977 as it shown in table (4).

C. Threshers: The number of threshers in public sector increased from 1459 in the year 1967 to 214 in the year 1977, with annual rate of increase 3.93%, as shown from table (7) . In the year 1977 79% of threshers concentrated in the 3-5 F<sup>3</sup> category, 14% in the category less than 3 f<sup>3</sup> and 8% in the category more than 5 F<sup>3</sup>, with annual rates of increas 1.64%, 37.8% and 33.4% for these categories consequently. Table (4) indicates that there is no statistical significance increase in number of threshers between 1967-1977, whereas the increase in capacity is statistically significant.

3. Machinery distribution System: There are many channels for distributing farm machinery among the farmers. Naser social Bank, Agricultural development bank, and many companies have their system to sell machines and tools. For example NASCO sells tractors to anybody who can put down payment in advance. Delivery may be up to 12 months, but the price is fixed at the time of ordering. Most sales are to dealers but NASCO does not deal in tractor spare parts and the dealers are not accredited agents as in other countries. Many dealers have showrooms (as for cars) in the big cities only and clearly can give no maintenance service.(1)

---

(1) SEMA, IDCAS, Agricultural Machinery, Egypt, January, 1978, p. 46.

Dealers in imported tractors are also importers and naturally are based at ports and in Cairo. They are obliged by their suppliers to give spare parts service and to set up for marketing and maintenance services some form of distribution net work in the country towns. However, such distributors are not to be found in the hundreds of small villages and no dealers provide field maintenance service. Other machinery is sold directly by the makers or importers. Excepting only Helwan Diesel company which runs a nationwide maintenance service network for its pump (and other) diesel sets, no spares or maintenance services are given by makers or importers.

4. Machinery Import policy: The main sources for tractors and other farm machinery are imports and local assemblage. There are many organizations and companies which deal with importing machinery, without any coordination, so there are tremendous numbers of different kinds and types. The most important importers are the General Agricultural cooperative society, the agents of foreign companies, the private companies, NASCO, and the individuals. The local assemblage runs on the same basis. The number of tractors assembled locally during the period 1967 - 1977 is 13374 units, and their distribution are as follows:<sup>(1)</sup>

---

(1) ERA 2000, Further Mechanization of Egyptian Agriculture, AID Contract Report, Gaithersburg, Maryland, 1979.

Distribution of Tractors Assembled  
Locally

Type	Kind	Number	Percentage of the total %
Yugoslavian	IMR	1421	10.6
Yugoslavian	IMR 60HP	4213	31.5
Romanian	UT65HP	6834	51
Italian	Fiat 3-Cyl	505	3.8
UK	MF 165 65 HP	241	1.8
USA	MF 265 65 HP	160	1.2
Total		13374	

Till 1976, most tractors must be paid for in hard currency while this was an additional problem for farmers, needing bank assistance and an exchange premium. One result of the "Open door" trade and investment policy is that dollars are readily available at not premium, and this could increase tractor imports along with many other imported items.<sup>(1)</sup> Many of the importers still facing many problems and obstacles, relating to the customs. Sometimes they pay different rates for the same item, thus causes many losses and discourages the importers. It must be mentioned that the custom-rates are considered as important instrument for supporting agriculture. These rates are 7% for tractors imported by the agricultural cooperative societies, 25% for other importers (for 45-70 HP tractors), 2% for small tractors, nothing for other farm machinery. Also, there is some sort of protection for local assemblage.

5. Machinery Price Policy: A dual pricing system for tractors has prevailed over the last years. The official rate (us \$ = L.E. 39) was applied to tractor imports from "clearing currency areas", mostly Eastern European countries, and the parallel market rate (US \$ 1= L.E. 0.70) to imports from other areas. As a result of this rate structure imports at the official rate cleared the market easily while imports at the parallel rate faced a sluggish market. Recently, tractor

---

(1), SEMA, IDCAC, Opcit, p. 46.

imports from clearing currency areas have been stopped and all tractors will in future be priced at the parallel rate. Thereby eliminating the dual system.<sup>(1)</sup>

The difference between the official and parallel exchange rates indicates that import purchases converted at the former rate will cost 43% (us\$ 1 = L.E. 0.70) and 53% (us \$1 = L.E. 0.83) of the true cost measured at the shadow rate of exchange.

The subsidy accruing through the fixing of dealers<sup>(2)</sup> margins and transport and handling charges may be measured as the difference between the estimated full cost of these services and the actual amounts charged. The former is estimated at about 30% of the landed import price, given that dealers' commissions are regulated by law at five percent, and that a further 70% is added for transport and handling, a remission of 15% of cost is implied.

---

(1) The world Bank, Agricultural Development Project (Menafia Sohag), May 31, 1978, P.9.

(2) The world Bank, (william cuddihy), Agricultural price Management in Egypt , 1980, P. 74.

6. Fuel Price Policy: The petroleum sector is state-controlled, and the ministry of finance determines consumer prices at levels which are below border price equivalents and also below the cost of production at domestic prices. Diesel oil and gas oil as fuel for tractor and pumps received per unit subsidies of 19% and 15% respectively in 1976. This subsidy has been paid by reimbursing the supplying companies for the difference between domestic sales and the total cost, including an appropriate profit margin.

The subsidy estimates based on the opportunity costs (by Valuing fuel at official or shadow exchange rates, and comparing this with border prices) will be greater than those based on internal reimbursement formula, so, the subsidies for diesel oil and gas oil will be 68% and 72% respectively.<sup>(1)</sup>(Table 8 )

The effects of fuel subsidies are seen in a reduction in the cost of machine operation relative to labor costs, leading to a substitution of capital for labor and acting as a stimulus to farm machinery investment.

Hence, the distributional effects have been in favor of highly-mechanized farms comparing with labor intensive units.

---

(1) Cuddihy, Williams, Opcit, p. 65.

7- Hiring Services Price Policy: Machinery hire charges for customs work done by the cooperatives are typically set by the ministry of agriculture at a price level that does not cover full costs, imposing a tax on cooperatives and providing a subsidy for farmers using hiring services.

The transfers involved may be illustrated with respect to 60-65 hp tractors. The hourly cost of operation of these tractors to cover all costs including depreciation with a profit margin of 10% and valuing tradables at world prices, is calculated at LE 3.5 per hour.

Private rental firms typically charge LE 2.7 per hour (where their costs are calculated at internal prices), and cooperatives charge LE 2 per hour, and cooperatives charge LE 2 per hour, apparently because no depreciation allowance is included in their rental rates.

The implied subsidy in rental of this type of machine is thus some 42% when hired from a cooperative and 22% when hired from a private firm.

8- Comments on Machinery Subsidy Policy: Farm machineries are subsidized in number of ways:(1) Purchase of imported machines and equipment has been possible at the official exchange rate rather than at the more realistic parallel exchange rate.

- (2) Purchase of capital equipment may be financed with subsidized credit.
- (3) Margins on machinery are fixed at levels below those which would prevail in a free market.
- (4) Operating costs of machinery are reduced through subsidies on fuel, Oil and lubricants.
- (5) In cases where machinery is rented from cooperatives, hiring rates may be subsidized.
- (6) Removal of customs duties on farm machinery and tractors.

The use of subsidies for machines and equipment purchase and operation distorts the price of a capital relative to other factors, and directs investment capital to avenues where its productivity at the margin may not be the highest.

The distributional consequences of price distortions in the capital equipment market generally favor larger producers who are able to dominate the use of cooperative tractors to the exclusion of small farmers.

Allocation of the services of cooperatively owned machinery is done on the basis of the fixed hire rate (below cost) plus an unofficial gratuity to the driver and the accompanying cooperative official. Such payments ensure continuation of an inequity that the system was designed to remove.

Larger farmers seem to be benefiting more from the income support programs designed to help the poor.

Subsidies on labor displacing capital (with restricted job-creating capacity) seem inconsistent with a full-employment policy.

Dualism the taxing of a backward subjects to subsidize a foreward subsector seems unlikely to maximize the stated social welfare function.

9- Machinery Credit Policy: The Bank for Development and agricultural credit carries out the implementation of the credit policy. The Bank provides special loans for machinery purchasing, with facilities, varied according to the machine type and the amount of the credit. All the machinery loans are short-term loans.

The terms of machinery loans are as follows:

For tractors, the Bank provides 75% from the total value of the tractor, as credit. The farmer repays this credit by five installements. The farmers pays only 25% from the value of the tractor in advance. The farmer must has 10 feddans at least to be capable to get this credit.

For other loans for pumps, sprayers and other tools, the Bank provides LE. 100 for each feddan from owned land. The Bank pays all the value of the machine, the farmer pays nothing.

It is clear that the land is the guarantee to get the credit. This means that the landless holder cannot get these loans. Also, the owner for less than 10 feddans cannot get loan for tractor. The small owner (less than feddan) cannot get any kind of credit.

The interest rate, on medium-term loans, was 6% per-annum up until 1977, when it was raised to 9%. However, reduced rates for special purpose have been common. For instance, prior to 1977 loans to cooperatives to purchase tractors imported at the dearer parallel exchange rate have been advanced for medium-term periods at interest rates of only 3.5% as a direct subsidy on the purchase price.

10- Repair and Maintenance Policy: The companies in the public sector have mechanical shops in Alex, Cairo, Mansora and Tanta, for repairing tractors and other mechanical tools. There are some agents for these companies in other governorate for spare parts supplies. Few mechanical shops exist in agricultural reform areas and state farms, in Delta and new lands, but they are deteriorating due to labor migration abroad. In each governorate, there is a mechanical unit for repair and maintenance for sprayers and transport means. These units belong to "Local administration" Officially, and the ministry of agriculture technically. In the past the technical units were repairing tractors and their attachments for cooperatives (gamayat), now this job has been assigned to the cooperatives. Each one has options for repairing machinery in mechanical units

or public companies or private shops. It must be mentioned that repair costs in public companies are very expensive comparing with the real cost. They charge LE 500 instead of LE 150 to repair a tractor<sup>(1)</sup>. There is an acute shortage of rural repair mechanics, as a result of "urpan and arab pull". Consequently, the farmers must wait 3-6 months for repairs. In such an environment, farmers retain their work animals as "spare parts"<sup>(2)</sup>

11- Spare Parts Policy: Shortage of spare parts is considered as a big problem facing machinery owners. Local manufacturers do not maintain an inventory of parts, but rather manufacture them on demand. Also, the foreign manufacturers do not produce spare parts required for Egypt. On one hand the agreements do not be held in proper time, on other hand, supply sources are numerous and diversified.

Public companies import spare parts with financial facilities provided by ministry of agriculture. These companies sell spare parts with extravagant prices rather than international high prices. They keep in hand a great amount of spare parts to inforce users to make repairs at their shops. The repair costs raise in such case from LE. 300-400 to LE 600-100. The regional agents deal with the rest amount of spare parts without any control. This situation creates a black market in spare parts.

---

(1) Abd El Motaal, Fahmy, Agricultural Mecanization and its impacts on agricultural production and employment, Food Security conference, Agricultural syndicate, Cairo, 24-26 September, 1977, p. 13.

(2) Richard, Alan, Agricultural Mechanization in Egypt, Davis, November, 1979. (Working paper No. 137).

12- Foreign Projects for Mechanization: There are two kinds of foreign agricultural mechanization projects in Egypt, international organization's projects and bilateral agreements projects; some of these projects as follows:

- 1- Egypt agricultural development project (Credit 830-EGT)  
The project would finance investments during 1979-82 in farm mechanization and water lifting for irrigation in the governorates of Menufiya and Sohag, pilot farms and rural stores in these areas, and technical assistance for establishing project monitoring and evaluation, and toward strengthening of the agricultural extension service, cooperatives and agricultural credit system; initiate measures towards financial rehabilitation and planning for development of the agricultural credit system; and finance project preparation.

The agreement with the International Bank for Reconstruction and Development held in July 24, 1978. The total loan is US\$ 32 Million with 10 years permission and to be repaid on 40 years. The rate of interest is 75% annually. The project started in February 20, 1979.

- 2- Agricultural Mechanization Project (AID Proj. No. 263-0031). Egyptian MOA/USAID): The main objectives of the project are introducing appropriate mechanization more efficiently on large scale, taking into consideration type of soil and kind of plants, training new generation of mechanics, and establishing repair units for the new machines.

This project financed by AID with US\$ 40 million as a grant. The project will be executed in 5 years.

- 3- Small-scale Machinery Project: The project aims to introduce a new technology for small farmers, especially in threshing, winnowing and hoeing by using small-scale machinery. The project financed by US\$ 1.75 million as a grant, starting from June 4, 1979.
  
- 4- With Romania: Regarding the establishment of 61 renting services centers for agricultural tractors and farm machineries in Egypt to be established within the zones proposed by the Ministry of Agriculture, having the following main objectives
  - a- Supporting farmers in performing, by mechanical means, the main agricultural works.
  - b- Repair and maintenance of the own stock of tractors and farm machineries and, as far as allowed by the available work capacities, the farmers, tractors and machines.
  - c- Getting the farmers accustomed with the mechanical works in agriculture and training the technical staff in the field of proper use and maintenance of the tractors and agricultural equipment, aiming to obtain better yields.
  
- 5- With Japan: Japan held 3 agreements with Egypt. The first one is 4.6 million grant for agricultural implements. The second is \$ 3 million grant for improving rice production by mechanization, mainly for transplanting, cutting and threshing. The third one is for establishing extension center.

Table ( 1 ): Number of farm equipments in A.R. of Egypt, according to types of machine and sectors of activity.

Year	Private Sector					Public Sector						
	Tractors		Pumps		Threshers	Tractors		Pumps		Threshers		
	No.	H.P.	No.	H.P.	No. C.F.	No.	H.P.	No.	H.P.	No.	C.F.	
Avg.												
66/1967	12901	561194	9608	230991	-	-	2499	125200	1138	28142	1459	5840
30.6.1971	13903	631293	10593	254791	-	-	3663	187183	2433	74932	1829	7488
31.12.75	17192	831108	10144	247297	-	-	3697	196958	2406	74198	1876	7920
31.12.77	19227	967178	9797	141075	-	-	3241	173230	2307	77475	2145	8477

Table (1) Number of farm equipments (Cont.)

Year	Land reclamation sector						Total					
	Tractors		Pumps		Threshers		Tractors		Pumps		Threshers	
	No.	H.P.	No.	H.P.	No.	C.F.	No.	H.P.	No.	H.P.	No.	C.F.
Avg. 66/1967	1808	135600	172	3388	47	183	17208	821994	10918	262521	1506	6033
30.6.1971	1840	119735	225	6887	48	187	19406	938211	13251	336601	1877	7675
31.12.1975	1816	119211	234	7310	54	256	22705	1147277	12784	328805	1930	8176
31.12.1977	1818	120860	252	7760	54	256	24286	1261268	12356	326310	2199	8733

Table ( 2 ): Total number of tractors (new supplies and taken out) in private and public sectors, according to the horse power, in the last years.

Year	Item	Tractors in private sector										Total Number
		Categories of horse power										
		Less than 30	30-	35-	40-	45-	50-	55-	65-	75-	Not known	
1974/ 1975	Supply of New Trac	42	85	45	83	92	154	225	563	14	-	1303
	Tract.taken out	57	39	27	46	73	83	11	12	6	-	354
	No. of not change	-15	+46	18	37	19	71	214	551	8	-	949
1976/ 1977	Supply of New tract.	6	2	20	77	175	570	750	1203	47	1	2851
	Tract-taken out	150	25	83	67	103	271	74	43	-	-	816
	No. Net change	-144	-23	-63	10	72	299	676	1160	47	1	2035

Table ( 2 ): Total number of tractors (new supplies and taken out) in private and public sectors, according to the horse power, in the last years. (Cont.)

Year	Item	Tractors in Public Sector										Total Number
		Categories of horse power										
		Less than 30	30-	35-	40-	45-	50-	55-	65-	75-	Not known	
1974/	Supply of New Trac.	2	34	11	30	44	40	20	112	2	-	295
	Tract. taken out	11	87	28	55	72	89	21	21	8	-	392
1975	No. of net change	-9	-53	-17	-25	-28	-49	-1	91	6	-	-97
1976/	Supply of New Tract.	2	1	3	10	18	106	16	115	20	-	291
	Tract. taken out	2	127	20	27	80	303	66	71	51	-	747
1977	No. net change	-	-126	-17	-17	-62	-197	-50	44	-31	-	-456

Table (3): Number of tractors and pumps in operation in public and private sectors of agricultural activity in the last period.

Year	Arable area fedd.	Ttractors		Fixed pumps		Mobil pumps		Total H.P. of pumps	Avg. area for one		
		Total No.	Total H.P.	Total No.	Total H.P.	Total No.	Total H.P.		Tractor fedd/ trac.	H.P. fedd/ H.P.	H.P. of pumps fedd/ H.P.
Avg.											
66/1967	5690971	12901	561194	6720	190848	2888	40143	230991	441.0	10.1	24.6
30.6.1971	5747049	17566	818476	8493	263130	4533	66583	329713	327.2	7.0	17.4
31.12.75	5845933	20889	1028066	8228	257609	4322	63886	321495	279.9	5.7	18.2
31.12.77	5800854	22468	1140408	8030	251211	4074	60215	311506	258.2	5.1	2.5

Table (4): Statistical analysis for numbers of machines (tractors, pumps, threshers) and its capacity in horse power in the private, public and land reclamation sectors.

	Tractors	Capacity	Pumps	Capacity	Threshers	Capacity
$\chi^2_C$ statistic	445.02	45239.2	423.41	20830.3	1.73	7.86
$\chi^2_T$	10.65	10.65	10.65	10.65	6.25	6.25
degrees of freedom.	6	6	6	6	3	3
Cumulative distribution function	4.3146		8.7741	1.88	.37	

Table (5) : Number of Fixed Pumps, According to type, Horse Power and Sector

Year	Horse Power According Sectors																Total According Sector		Total
	Less than 10		10-		20-		30-		40-		50-		60-		70-		PRIV	PUBL	
	PRIV	PUBL	PRIV	PUBL	PRIV	PUBL	PRIV	PUBL	PRIV	PUBL	PRIV	PUBL	PRIV	PUBL					
66/67	64	23	2155	155	2086	80	1006	57	698	64	711	171	-	-	-	-	6720	550	
70/71	127	11	2193	449	2205	172	1002	130	743	151	455	222	125	27	177	304	7027	1464	
31.12.1975	107	12	2076	455	2148	167	969	125	731	150	446	221	122	26	166	308	6764	1464	8228
31.12.1977	96	12	1996	450	2100	172	949	125	710	146	441	222	118	26	161	306	6571	1459	8030
Change %	50	-47.8	-7.4	190.3	.67	115	-5.7	119.3	1.72	128.1	-37.9	29.8	-5.6	-3.7	-9.0	.66	-22	10.2	
rate p.a	4.14	-6.3	-7.76	11.25	.07	7.96	-5.8	8.17	.17	8.6	-4.7	2.6	-9.6	-6	-9	.11	-2.22	10.2	

Table (6): Number of mobile pumps by type, horse power and sectors.

Year	Horse power according sectors												According sector	TOTAL	
	Less than 10		10-	15-	20-	25-	30-								
	PRIV.	PUBL.	PRIV.	PUBL.	PRIV.	PUBL.	PRIV.	PUBL.	PRIV.	PUBL.	PRIV.	PUBL.	PRIV.	PUBL.	
66/67	412	32	1377	253	987	249	50	16	9	5	53	33	2888	588	
1970/71	604	138	1784	373	815	291	168	63	108	11	87	91	3566	967	
1975	571	136	1687	379	767	268	165	61	108	9	82	89	3380	943	4322
31.12.1977	562	113	1617	347	695	243	163	57	108	7	81	81	3226	848	4074
change %	36.4	252.1	17.4	37.2	-29.6	-2.4	226	2562	1100	40	52.8	145.5	11.7	44.2	
Rate p.a	3.15	13.4	1.62	3.2	-3.4	-.24	12.5	13.5	28.2	3.4	4.3	9.4	1.11	3.73	

Table (7): Number of threshers according to capacity in public sector.

Year	The capacity of cubic feet				Total
	Less than 3	3-	5-	Other	
1966/67	11	1438	10	-	1459
1970/71	17	1663	103	46	1829
1975	27	1671	132	46	1876
1977	274	1692	129	50	2145
Change %	2390	17.66	1190	8.7	47.0
rate p.a.	37.9	1.64	29.13	1.2	3.93

Table (8): Exchange rate effects on  
farm machinery prices, 1978<sup>(1)</sup>

	import price US\$ <sup>(1)</sup>	Price	Converted at	
		official exchange rate LE	parallel exchange rate \$1=LE0.68	exchange rate \$1=LE0.83
Tractor, 65 HP.	6800	2652	4624	5644
Mould board plow 3x14"	1700	663	1156	1411
Leveller, 2m	700	273	476	581
Furrower, 3 row	900	351	612	747
Thresher, 600 kg/hr	5600	2184	3808	4648
Thresher/winnower <sup>(2)</sup>	2575	1004	1751	2137
Sprayer, 600 litre PTO	1000	390	680	830
Diesel pump, 5HP	950	370	646	789

(1) Cif Alexandria.

(1) The World Bank, Agricultural Price Management in Egypt, 1980, p. 75.

(2) Catholic Relief Services, Small Scale Machinery for the Nile Valley. p. 7.

Table ( 9 )  
The Ideal Number of Tractors (Quantity And Value) To be  
stored (Quantity and Value) to be stored

	Minimum	Estimated	Maximum	No.	Avg. Unit's Price in L.E.	Total value in L.E.
Horse power per feddan	0,16	0,18	0,22			
Total No. of tractors till 1985	33,000	37,000	45,000			
No. of tractors to be stored 1979	3,500	4,300	4,900	2,500	6,000	15,000,000
No. of tractors to be stored 1980	3,600	4,200	5,000	2,500	6,500	16,250,000
No. of tractors to be stored 1981	3,500	4,000	5,100	2,600	6,700	17,420,000
No. of tractors to be stored 1982	3,600	4,000	5,300	2,650	6,900	18,285,000
No. of tractors to be stored 1983	4,200	4,500	5,500	2,750	7,000	19,250,000
No. of tractors to be stored 1984	4,200	4,800	5,900	3,000	7,100	21,300,000
No. of tractors to be stored 1985	5,100	5,500	7,100	3,500	7,200	25,200,000
Total No. (1979-1985)	27,700	31,300	38,800	19,500		131,705,000

Source: Ali M. Al-Hossary, Agricultural Mechanization in Egypt, Present and future, Scientific Seminar about "Agricultural Mechanization for food security, Cairo, 1979, (in Arabic).

Table (10)

THE NUMBER OF TRACTORS NEEDED TILL 1985 (QUANTITY, CAPACITY AND VALUE)

Year	No. of tractors needed		Total	HORSE POWER NEEDED			Total value of tractors in LE.	
	for replace	for expansion		Less than 50 HP.	51-60	61-70		More than 70 HP.
1978	1900	2500	4400	320	934	2948	198	22,500,000
1979	1600	2700	4300	360	848	2838	254	25,800,000
1980	1700	2500	4200	380	776	2730	294	27,300,000
1981	1500	2500	4000	420	660	2560	360	26,800,000
1982	2000	2000	4000	440	620	2520	420	27,600,000
1983	2900	1600	4500	480	690	2790	540	31,500,000
1984	3400	1400	4800	530	694	2928	648	34,080,000
1985	4700	800	5500	550	825	3300	825	39,600,000

Source: Ali M. Al-Hossary, Agricultural Mechanization in Egypt, Present and Future, Scientific Seminar, "Agricultural Mechanization for food Security, Cairo, 1979, (in Arabic)

REFERENCES

- Ali M. Al-Hossary, Agricultural Mechanization in Egypt Present and Future, Seminar: "Agricultural Mechanization for Food Security, Cairo, 1979, ( in Arabic).
  - Abd El-Motaal, Fahmy, Agricultural Mechanization and its impacts on Agricultural production and Employment, 1972.
  - Bahgat, A.A., & Koval, A.J., Problems of Mechanization in the Traditional Irrigation Areas of the Nile Delta. International DL 6-symposium, Hannwer, West Germany, September 15-17-1980.
  - Bins Wanger, Hans P. "The Economico of Tractors in South Asia", Agricultural Development Council, New York, 1978.
  - Cuddihy, B., "Egypt: Farm prices, Taxes and Subsidies" The World Bank Working Paper No. 388, April, 1980.
  - Dyer, Wayne, Agricultural Mechanization And Agricultural Development in Egypt, Stanford University April., 1977. USAID Contract No. NE-147-77-8.
  - ERA 2000, Inc., Further Mechanization of Egyptian Agriculture, April, 15, 1979.
  - Goodwin, P.R., Agricultural Machinery, Egypt, SEMA, IDCAS, Metra Consulting Group, January, 1978.
-

- Imam, Shawky A., The Economics of farm Mechanization in Egypt, ADS. EGYPT, CALIFORNIA Project Economics Policy Workshop March 28-31-1981.
  
- Merle L. Esmay, Carl W. Hall, Agricultural. Mechanization in developing Countries.
  
- The World Bank, Agricultural Development Project, (Menufia, Sohag), May 31, 1978.
  
- USAID, IRRI, The Consequences of small farm Mechanization on Rural Employment, Incomes, and Production in selected countries of Asia, A workshop Report September 11-13, 1978.

.....

