



**TOGETHER**  
*for a sustainable future*

## OCCASION

This publication has been made available to the public on the occasion of the 50<sup>th</sup> anniversary of the United Nations Industrial Development Organisation.



**TOGETHER**  
*for a sustainable future*

## DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

## FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

## CONTACT

Please contact [publications@unido.org](mailto:publications@unido.org) for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at [www.unido.org](http://www.unido.org)

08864

Distr.  
LIMITED  
ID/WG. 282/91  
13 October 1978  
ENGLISH



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

---

# INTERNATIONAL FORUM ON APPROPRIATE INDUSTRIAL TECHNOLOGY

New Delhi/Anand, India 20–30 November 1978

.....  
**WORKING GROUP No.7**

**APPROPRIATE TECHNOLOGY  
FOR THE PRODUCTION OF AGRICULTURAL  
MACHINERY AND IMPLEMENTS**

.....  
AGRICULTURAL MACHINERY INDUSTRY AND RURAL INDUSTRIALIZATION  
IN THE SUDAN

Background Paper

AGRICULTURAL MACHINERY INDUSTRY  
AND RURAL INDUSTRIALIZATION  
IN THE SUDAN

by

M. Abdelkarim Redri  
UNIDO consultant

The description and classification of countries and territories in this document and the arrangement of the material do not imply the expression of any opinion whatsoever on the part of the secretariat of UNIDO concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries, or regarding its economic system or degree of development.

The views and opinions expressed in this document are those of the author(s) and do not necessarily reflect the views of the secretariat of UNIDO.

Mention of firm names and commercial products does not imply the endorsement of the secretariat of UNIDO.

The document is reproduced in the form in which it was received and it has not been formally edited.

TABLE OF CONTENTS

	<u>Page</u>
0. FOREWORD	1
1. GENERAL DATA	1
2. ECONOMY OF THE SUDAN	2
TABLE No.1	3
TABLE No.2	4
3. MECHANIZATION OF AGRICULTURAL PRODUCTION	6
3.1 IRRIGATED FARMING	6
3.2 RAIN-LAND FARMING	7
3.2.1 Traditional Rain-Land Farming	7
3.2.2 Mechanized Rain-Land Farming	7
4. DEVELOPMENT OF THE INDUSTRIAL SECTOR	8
4.1 INDUSTRIAL SECTOR IN THE SUDAN	8
4.2 MANUFACTURING INDUSTRIES IN THE SUDAN	8
4.3 THE PRESENT POLICY OF THE GOVERNMENT	9
4.4 THE QUANTIFIED TARGETS OF THE SIX YEAR PLAN	10
4.5 POLICIES TO ACHIEVE OBJECTIVES OF THE PLAN	10
4.6 MEASURES TO IMPLEMENT GOVERNMENT POLICIES	11
5. AGRICULTURAL MACHINERY INDUSTRY	11
5.1 Present Status	11
5.2 Technical Institutions	12
5.2.1 The Department of Agric. Engineering Sudan Gezira Board	12
5.2.2 The Agricultural Engineering Administ- ration - Ministry of Agriculture	13
5.2.3 The Agricultural Engineering Department Faculty of Agriculture, UNIV. of Khartoum	13
5.2.4 The Mechanized Farming Corporation, Ministry of Agriculture	13
5.3 The Problems of Mechanization of Agriculture in the Sudan	14
6. THE FUTURE DEMAND FOR TRACTORS AND AGRICULTURAL MACHINERY	14
7. FUTURE PROJECT OF FARM MACHINERY INDUSTRY. THE JOINT VENTURE PROJECT WITH MASSEY-FERGUSON	16

	<u>Page</u>
5.2.4 The Mechanized Farming Corporation, Ministry of Agriculture	13
5.3 The Problems of Mechanization of Agriculture in the Sudan	14
6. THE FUTURE DEMAND FOR TRACTORS AND AGRICULTURAL MACHINERY	14
7. FUTURE PROJECTS OF FARM MACHINERY INDUSTRY. THE VENTURE PROJECT WITH MASSEY FERGUSON	16
7.1 Linkages	17
7.2 Economics of The Project	18
7.3 Distribution And After Sale Service	19
7.4 Execution And Start of Production	19
7.5 Training And Research	19
7.6 Credit To Farmers To Purchase Tractors And Machinery	19
8. COOPERATION AMONG DEVELOPING COUNTRIES IN INDUSTRIAL DEVELOPMENT	21
8.1 Industrial Progress in Developing Countries And its Problems	22
8.2.1 Local Problems Facing Industrial Progress	22
8.2.2 International Problems Hindering Industrial Progress	22
9. COOPERATION BETWEEN DEVELOPING COUNTRIES.	23
9.1 Regional Cooperation	23
9.2 Approach To Industrial Cooperation	23
9.2.1 Cooperation For Achievement of Indust- rialization and The Whole Industrial Operation	23
9.2.2 Cooperation For The Sake of Expansion And Diversification of Industrial Production	23
10. THE SUDAN'S MODEL IN COOPERATION. THE SUDANESE EGYPTIAN ECONOMIC AND TECHNICAL INTEGRATION PROGRAMME	25
10.1 General	25
10.2 Pre-Programme Activities	25

	<u>Page</u>
10.2.1. Data And Information Collection	25
10.2.2. Exchange of Visits	25
10.2.3 Technical And Economic Joint Committee	26
10.2.4 Implementation	26
11. CONCLUSIONS AND RECOMMENDATIONS	26
12. ANNEX 1	29
13. BIBLIOGRAPHHY	38

\*\*\*\*\*

0. Foreword

This paper was prepared on request of UNIDO to be presented to the expert panel on agricultural machinery to be held in New Delhi, India between 20th. and 25th. of November 1978. The paper will deal with the present status and future development in agricultural machinery Industry in the Democratic Republic of the Sudan. Both technical and economic aspects relating to the issue of agricultural machinery industry will be discussed. Present policy of the Sudan Government and technical and institutional measures necessary for its realization will be presented. The Sudan, being one of the leading African Countries is always trying to find avenues of cooperation with other African Countries resulting in mutual benefits. Such cooperation and its areas will be presented.

1. General Data

The Sudan is the largest country in Africa with an area of approximately one million square miles (2.5 million square kilometres) equivalent to about 600 million feddans (one feddan = 4200 square metres = 0.42 Hactare). About 200 million feddans (84 million ha) are suitable for habitation; at present only 17 million feddans (7.1 million ha) are cultivated of which 4 million feddans (1.7 million ha) are cultivated by irrigation from the Nile River and its tributaries and 13 million feddans (5.5 million ha) by rain. All land is owned by the Government and about 40% of the total cultivated area is managed by the State Corporations, and this includes nearly all of the irrigated areas and part of the rainfed mechanized Farms.



The cultivated area will increase to about 21 million feddans (8.8 million ha) by the end of the present six year plan for the economic and social development by 1982/1983. Table No.1 shows land utilization in the Sudan 1975. The Sudan lies between latitudes  $33^{\circ}$  and  $22^{\circ}$  North and longitudes  $21^{\circ} 45'$  and  $28^{\circ} 30'$  East. The Northern one third of the country North of Latitude  $19^{\circ}$ N, is an arid desert with very little rainfall and agriculture is only possible on a narrow strip of irrigated land along the banks of the Nile. The more humid climate of the Southern Region with heavy rainfall ranging from 800 to 1500 mms per year is suitable for a wide range of tropical crops. The central plain lying between  $10^{\circ}$  and  $15^{\circ}$  North has been the main area for traditional farming and is now the most suitable part for modern development in irrigated and rain-fed mechanized agriculture with rainfall ranging from 400 to 900 mms per year. Crops grown in this area include cotton, sorghum, wheat, millet, groundnuts, sugar cane and sesame being the most important crops. The population of the Sudan according to 1955/56 census was 10 millions. The results of the last census were not published but today it is estimated that the population is about 17 millions, with an average of 16 persons per square mile; very thinly populated.

2. Economy of the Sudan

According to U.N. publications and studies, The Sudan is considered among the hard core least developed countries in the world. The criteria adopted in these reports relate to per capita

TABLE 1 - LAND UTILIZATION IN SUDAN 1975

AREA IN 1,000 FEDDANS

1-	Total area ... ..	.....	.....	596,621		
	1.1 Land Area .....	.....	.....		565,714	
	1.2 Area Under Water .....	.....	.....		30,907	
2-	Agricultural Area .....	.....	.....	200,000		
	2.1 Cultivated .....	.....	.....		18,685	
	2.10 Cropped .....	.....	.....		16,685	
	2.102 Irrigated .....	.....	.....			3,725
	2.102 Unirrigated .....	.....	.....			12,960
	2.11 Fallow .....	.....	.....			2,000
	2.2 Cultivable Waste .....	.....	.....		181,315	
3-	Pasture Land .....	.....	.....	57,143		
4-	Forests ... ..	.....	.....	217,857		
5-	Other Uncultivable .....	.....	.....	90,714		

N.B. Cultivated area - 3.3% of total land area or 9.3% of total cultivable land

TABLE No.2 - EXPORTS OF AGRICULTURAL COMMODITIES AND SHARE OF AGRICULTURE IN TOTAL EXPORT OF SUDAN 1975

COMMODITY	UNIT OF QUANTITY		Value L.S. (00)
	Quantity	Value	
Cotton Long Staple	116,271	M. Tons	57,328
Cotton Others	27,668	M. Tons	8,367
Gum Arabic	14,937	M. Tons	7,226
Sesame	56,694	M. Tons	12,240
Groundnuts	205,936	M. Tons	34,312
Dura	47,940	M. Tons	2,366
Dukun	2,967	M. Tons	133
Pulses	4,106	M. Tons	513
Wheat Bran	-	M. Tons	-
Karkadeh	954	M. Tons	329
Sheep and Lambs	77,221	Heads	1,095
Cattle	1,852	Heads	142
Meat	264	M. Tons	93
Hides and Skins	4,754	M. Tons	2,913
Cotton Seeds	-	M. Tons	-
Castor Seeds	13,602	M. Tons	1,132
Water Melon Seed	13,017	M. Tons	1,913
Cotton Seeds Oil	10,523	M. Tons	3,531
Other Oils (a)	7,135	M. Tons	+1,152
Cake & Meal (b)	156,495	M. Tons	3,914
Other Agricultural (c)	2,840	M. Tons	1,311
Other Livestock (d)	1,818	M. Tons	161
Total Agriculture			140,151
Total Exports			147,650
AGR. As % of total Exports			95.1

(a) Composed of sesame oil and groundnuts oil b) composed of cotton seeds, sesame and groundnuts cake and meal. c) composed of Donnuts, saled fish senapods, onins flakes, mango, chillies and beeswar d) composed of camels (not on hoof), and Zoo animals and pets.

income, literacy and the related share of the manufacturing sector in total output. The Sudan being one of the least developed countries, exhibits the same general features in its economy as the others. It is a poor country with low rates of capital formation, a low level of savings and high indebtedness.

The economy of the Sudan is predominantly agricultural and pastoral, with about 80 to 90% of the population depending on agriculture for their living. The total export earnings of the country come mostly from agricultural products. Table No.2 shows the relative importance of agricultural products in the total value of exports in 1975. Agricultural products provide between 96 and 98% of the total export earnings of the country. In contrast about 6 to 7% of the country's total imports per year have a direct bearing on the basic productivity of the agricultural sector. These include items as fertilizers, insecticides, herbicides and agricultural tractors and machinery.

In 1971/72 agriculture contributed 38.17% to G.D. P. at factor cost. Today this figure exceeds 40%.

The industrial sector plays a relatively minor role in the economy of the Sudan. Its contribution to the G.D.P. is small, about 8-9% in 1971/72. Industry has always been less fortunate than agriculture. Generally speaking and up to 1959 most of the industries are light ones and concentrated basically in Khartoum, Omdurman and Khartoum North (The Three Towns forming the capital) and depend largely on imported raw materials.

The industrial sector today is a great deal better than before and it plays an important role in the development of the country although its contribution to the G.D.P. is still low, around 10%.

There are a lot of factors hindering its progress such as lack of skilled manpower, lack of basic infrastructure, shortage of capital and lack of technology.

So, the Sudan's economy has always been agricultural due to the vast potential of good fertile land and availability of water and the presence of a huge livestock wealth. Beside, the capital investment in agriculture is generally lower than in industry.

### 3. Mechanization of Agricultural Production

Agricultural production in the Sudan can be classified into two main sectors as far as the method of irrigation is concerned and these are:-

- a- Irrigated Farming.
- b- Rain-land Farming.

#### 3.1 Irrigated Farming

The total irrigated area is 4 million feddans (1.7 ha) and is irrigated from the Nile River and its tributaries. Crops grown include medium and long staple cotton, wheat, groundnuts, sorghum and Sugar Cane. Production of these crops was mainly dependent on hand labour up to 1960, even ploughing and ridging was done by animal drawn implements. Today all seed bed preparation operations, insecticides, herbicides and fertilizer applications, for all these crops are fully mechanized.

Wheat, is combine harvested, so it is completely mechanized, sorghum is partly combined and partly threshed after heads are cut by hand. Sugar Cane is mechanized except for harvest which is done by hand. Mechanical harvesting trials are going on. Cotton is mostly planted, weeded and picked by hand, however introduction of mechanical planted weeding is being carefully planned and applied whenever conditions are favourable. Mechanical picking of cotton is under trial and evaluation. Introduction of machinery in production of these crops was dictated by sound reasons which included:-

- a) Shortage of farm labour at planting and harvest times. Most of the labour migrated to the cities and the new industrial projects.

- b) Labour wages increased to such an extent that the farmers economic returns decreased a great deal.
- c) Mechanization allowed timeliness of operations and decreased losses.

### 3.2 Rain-Land Farming

The total rain-land area is 13 million feddans (5.5 million ha) distributed through the central rain belt of the Sudan with rainfall ranging from 400 to 900 mms per year.

This sector is further divided into two sub-sectors according to methods of crop production and practices, and these are:-

- a) Traditional farming.
- b) Mechanized farming.

### 3.3 Traditional Farming

Traditional farming covers an area of about 4 million feddans (1.7 million ha) and all agricultural operations are either done by hand or by primitive hand tools usually used for breaking the soil and weeding. This is a subsistence level agriculture and holdings are very small ranging from half a feddan to three feddans, except when owner can afford to hire enough labour, then the area can increase. All of the millet, Karkadeh and most of the groundnuts and sesame and some sorghum are produced by this sector.

### 3.4 Mechanized Farming

The mechanized farming sector an area of 9 million feddans (3.8 million ha) and all crop production is completely mechanized. Holdings here range from a minimum of 1000 feddans (420 ha) to 500,000 feddans (210000 ha) or more depending on the financial and technical capability of the investor. Again, it is obvious why this sector must be completely mechanized. It is the only way to develop these millions of hectares of good land with enough rainfall and located far away from from cities and towns and cannot support big numbers of humans because of lack of transport, food and water for domestic use. Besides, the use of tractors and machinery is the only way to develop such big holdings.

#### 4. Development of the Industrial Sector

4.1 The Industrial Sector in the Sudan is formed of four subsectors namely:-

- a) Manufacturing.
- b) Mining.
- c) Construction
- d) Electricity and Water

In this paper we will deal with the manufacturing sub-sector in general and the manufacture of tractors and agricultural machinery in particular.

This sub-sector has always contributed over 50% of the total industrial production. On the eve of independence in 1956 the contribution of the industrial sector to G.D.P. (gross domestic product) was 2% whilst that of the agricultural sector was about 61%. At that time industrial production was limited to the manufacturing of simple consumer goods which, with the exception of cement, did not involve complicated processes. In the post independence period and up to 1969. The situation did not show a great improvement. The contribution of the industrial sector to G.D.P. did not exceed 8% and the manufacturing sub-sector registered a growth rate of only 5%. The rise of the industrial sector's contribution to G.D.P. came as a result of the extended five year plan (1971/1972 - 1976/1977) which gave more attention to industry through provision of more foreign funds for importing spares, modern machinery and materials and through improvement of technical know-how.

These in the end led to more efficient use of resource and reduction of costs and improvement of capacity utilization. By 1976/1977 the contribution of the industrial sector to G.D.P. reached 14% and the manufacturing industries recorded a growth rate of more than 5%.

4.2 The Manufacturing Industries in the Sudan comprises the following five main industrial sectors:-

- a) Food Industries
- b) Textiles
- c) Chemical
- d) Leather
- e) Engineering.

The engineering sector is the least developed sector. The establishment of the Khartoum central foundry is considered as the first step in the direction of development of engineering industries. There are other smaller foundries in Government Corporations (Railway, Mechanical Transport, River Transport) and smaller ones in private workshops. The main engineering industries in the country are light ones and mostly of assembly nature. There is a great deal of sheet metal fabrication in privately owned workshops and production is based on orders and there are no regular production lines. Assembly and part manufacture include items such as refrigerators, air coolers, air conditioners and batteries. Tractors and agricultural machinery are imported in P.K.D. form and locally assembled in workshops belonging to the equipment distributors.

#### 4.3 Present Policy of The Government

The present policy of the Government is stated in the economic and social development plan of country with the first phase extending for 6 years from 1977/1978 to 1982/1983, with a total allocated funds of 335.4 million Sudanese Pounds. Some of the most important objectives of the plan are:-

- a) Development of those industries where the Sudan has a comparative advantage.
- b) Development of agro-industries based on local agricultural production to achieve self-sufficiency and have surplus for export.
- c) Production of agricultural inputs eg. cement, insecticides, fertilizers, agricultural machinery and spare parts.
- d) Development of small scale industries based on local materials and improve and modernize rural industries to check the drift to urban areas.
- e) Achieve a balanced distribution of industries in the different regions of the country.
- f) Development of the basic infrastructure, such as power, and specially hydroelectric power, and the building and construction industries.
- g) Encourage participation of both the foreign and national private sectors, in the industrial development of the country.



4.4 The Quantified Targets of the Six Year Plan are as follows:-

- a) Contribution to G.D.P. of the industrial sector to increase from 14% to 16% in 1982/83.
- B) Annual rate of growth for the industrial sector to be 9.3% and for the manufacturing sub-sector to be 9.5%.
- c) Contribution of manufacturing to G.D.P. to increase to 10.0% in 1982/83.

4.5 Policies Required To Achieve Objectives

Some of the important policies required to make possible the achievement of the objectives set out above are as follows:-

- a) Foster and encourage those industries in which the Sudan has a competitive advantage over other countries.
- b) Give priority to agro-industries.
- c) Encourage the development of industries utilizing the by-products of other industries.
- d) Establish industries whose out put will be directed towards supplying inputs to the agricultural sector eg. Fertilizers, animal feed and agricultural machinery.
- e) Encourage industrial activity in rural areas.
- f) Encourage the private sector to invest in industry.

4.6 Measures To Implement Policies

The government will take some measures to implement its policies and to achieve the declared objectives of the plan.

In doing so, the government will :-

- a) Undertake an industrial survey to ascertain the industrial potential of the country, market needs, study of production problems and solutions, projection of future industrial requirements for manpower and the training needed and definition of the types of projects needed to achieve the the planned growth rate in terms of labour and capital intensity.
- b) Establishment of quality control systems throughout industry.

- c) Strengthen all government project appraisal units.
- d) Strengthen the information and statistic collection centres in government units. Efforts will be made to strengthen and develop the Project Preparation unit and the industrial statistics Department within the Ministry of Planning.
- e) Improve basic infrastructure eg. power and transportation.
- f) Develop small scale rural industries through provision of machinery and equipment on hire purchase and the creation of central marketing body and the establishment of suitable industries in regions where basic services are available.
- g) Provide training for intermediate skills and review the wage structure.
- h) Encourage private sector to invest in industry by providing material incentives and improvement of industrial legislation and expansion of industrial credit to finance high priority projects. The Industrial Investment Act of 1974 will include special concessions for industries which uses local raw materials and those which will be located in rural areas.

#### 5. Agricultural Machinery Industry

In our discussion of the agricultural sector it was clear that there is a pressing need for agricultural machinery of different types to mechanize the production of the various crops grown in the different parts of the country.

The six year plan for the economic and social development has set our goals for the agricultural sector which include both horizontal and vertical expansion in agricultural production. It stressed the increased use of agricultural machinery as an important factor in achieving this goals specially in rainland mechanized and farming areas and the development of traditional farming.

To achieve this during the present six year plan, the industrial sector will have as one of its objectives among which is agricultural machinery.

#### 5:1 Present Status

At present we can safely say that there is no agricultural machinery industry in the country.

However there are a lot of repair workshops for tractors and machinery in all the production areas operated by private and public sectors. Some of the simpler implements could be easily manufactural in these workshops with little extra investment and training eg. toolbars, mounted ploughs and discs and hand tools.

At present all tractors and machinery are imported in P.K.D. and S.K.D. forms and assembled in workshops in Khartoum belonging to the different machinery distributors. Some are assembled on site. This assembly operation is being done with the technical help of the supplying companies. There is a limited manufacture of irrigation pipes, fuel and water tanks, small canal ditchers and agricultural trailers of different sizes and for different purposes. They are made to order and there is no regular assembly line operation. Axles, wheels, tyres and sheet metal are imported. Welding electrodes, liquified gas and paint are locally produced in factories in Khartoum.

In rural areas all over the country a lot of small hand tools are made in small blacksmith shops using scrap iron. These include hand hoes, weeding hoes, planting sticks (selluka) and animal drawn wooden plow with metal tip (Beladi Plough).

## 5.2 Technical Institutions

In discussing the present status of agricultural machinery manufacture, we cannot ignore the mention of some of the technical institutions who are at present contributing a little towards this industry but could play an important role in its future development. These are namely:-

### 5.2.1 The Department of Agricultural Engineering of The Sudan

Gezia Board is engaged in research, development and modification of agricultural machinery to suit the conditions of crops grown in the Gezira.

They work in close contact with the National Institute of Agricultural Engineering at Silsoe, Engalnd. They have so far developed a tractor mounted cotton stalk puller, fertilizer and herbicide spreader and groundnut washer.

They modified a groundnut digger and a combination of disc, rotavator and ridger with the cooperation of Howard Rotavator. The future looks very bright for this organization, but so far they have confined their activity to modification of some machines and development of prototypes and have not been involved in any manufacturing. Besides this work they run trials of mechanization trials, testing of run equipment and giving technical advice and assistance to the farmers.

5.2.2 The Agricultural Engineering Administration of the Ministry of Agriculture is the official government body for testing all tractors and machinery introduced into the country to assess their suitability for work in Sudan conditions. Besides, they are responsible for training and technical advice to all agricultural corporations and production units. They are also responsible for the modernization of the traditional sector and the centres for training of agricultural mechanics, tractor drivers and machine operators.

5.2.3 The Agricultural Engineering Department of The Faculty of Agriculture, University of Khartoum carries some field tests of machinery and limited mechanization trials. The department offers an optional major in agricultural machinery and mechanization to agricultural students. Recently in cooperation with the Faculty of Engineering they offered a B.Sc. degree in Agricultural Engineering. The first graduates will complete their course of study in 1979/1980.

5.2.4 The Mechanized Farming Corporation of The Ministry of Agriculture is responsible for the development of all the mechanized rainfed agricultural projects including both private and public sector projects. Besides reclaiming the land and developing infrastructure and providing advice to Farmers, they carry mechanization trials and developments of new methods and practices to help increase yields and reduce cost. The corporation gets regular loans and help from the World Bank and they just concluded negotiating the third loan for \$17 million for the development of mechanized farming.

The corporation runs its own workshop in the different production areas of the country which are made available for the Farmers at cost.

5.3 The Problems of Mechanization of Agriculture in The Sudan

The problems of mechanization of agricultural production in the Sudan are not different from those of most developing countries. We could mentioned the following as the most important:-

- a) Lack of well trained engineers and operators.
- b) Poor maintenance and repair facilities and lack of skilled repair mechanics.
- c) Insufficient spare parts most of the time due to lack of foreign exchange.
- d) Absence of research and trials for developing special purpose machinery and improving mechanization techniques of different crops in different areas.
- e) Unavailability of enough tractors and machinery due to lack of foreign exchange.
- f) Generally poor infrastructure.

6. The Future Demand for Tractors and Agricultural Machinery

The extended 18 year development plan (1977/78 to 1994/95) starting with the first phase of six years 1977/1978 to 1982/1983, gives top priority to the agricultural sector. Agriculture is the major source of exportable commodities, accounting for more than 90% of the countries foreign exchange earnings. The economic activities of other sectors of the economy, specially the transport and industrial sectors, are critically linked with those of the agricultural sector. Both in the present six year plan and the extended long term plan there will be a stress on the vertical and horizontal development of agriculture. This would include among other things, the intensive use of tractors and machinery in production of the different crops. The park size of tractors and machinery up to 1976 is given in attached tables in Appendix No.1. The size of the park today can be estimated as follows:-

Agricultural tractors 65-77 HP	12,000
Self Propelled combine harvesters 14-16 ft.	1,300
Trailed combine harvesters 8 ft.	170
Different implements	14,000

The total cultivated area today is about 17 million feddans (7.1 million ha) of which about 12 million feddans (5.05 million ha) could be mechanized.

Assuming an average horse power of 70 HP per tractor, the level of mechanization today for the Sudan is 0.17 HP/ha or 0.071 HP/Feddans. This figure is very low if compared with 0.20 HP/ha for Asia and 0.27 PH/ha for Latin America. To achieve full potential for high yield in large scale Farming 0.5 HP/ha which is equivalent to nearly 0.25 HP/feddans, are generally required. So, from the above figures the average area for each tractor today in the Sudan taking the areas that could be mechanized is in the range of 800-1000 feddans. This figure is very high specially if we consider the intensive production in the future. According to proper mechanization figure of 0.25 HP/feddans, the 70 HP/Tractor should be used for an area of 280 to 300 feddans. This is an unrealistic for the Sudan because it assumes very high level of mechanization. So, let us take an intermediate figure, lower than the Asian and Latin American Figures; something like 0.15 HP/Feddans which is twice the present figure for Sudan. In this case the number of tractors required for mechanizing the present area of 12 million acres is about 24,000 to 30,000 tractors of 65-75 HP. including replacements, and the area per tractor will be 560 to 600 feddans which is reasonable. Beside this increasing requirements for tractors and agricultural machinery due to increased level of mechanization in the present cultivated area, there is more need for the new areas planned to be cultivated in the coming six years. By 1982/1983 the total cultivated area will be about 21 million feddans (8.8 million ha) according to the six year plan. It is expected that the Arab Funds will allocate over 2 million U.S. dollars for the next 25 years for agricultural development in the Sudan. The last market source for the need of the Sudan for tractors and agricultural machinery was carried towards the end of 1976. The survey show the following, giving products quantities and short specifications, showing total park in 1982/83 and yearly requirement in 1982/83:-

	<u>1982/83</u>	<u>Total by 1983</u>
a) Tractors 70-77 HP	4000	25,000
b) Combine Harvesters 14-16 ft. self propelled	700	4,200
c) Chisel Plough mounted or trailed 10 tires 2.44 m or more ... ..	200	2,200

	<u>1982/83</u>	<u>Total by 1983</u>
d) Wide level disc + seeder + trailed 15 ft. 18 inch discs	1600	11,500
e) Toolbar with ridger 2-2.44 m 4-6 bottoms of 22 in-mounted	1000	7,000
f) Planters, 4-6 row + fertilizer attachment mounted ... ..	200	800
g) Heavy disc plough, 4-5 discs mounted ... ..	200	1,800
h) Seed drill 3 m wide, mounted + fertilizer box ... ..	50	260
i) Offset disc harrow 9 ft. trailed	40	300

7- Future Projects of Farm Machinery Industry

The present six year plan (1977/78 - 1982/83) and the long term plan (1977/78 - 1994/95) have as one of their important objectives for the industrial sector, the establishment of industries that provide inputs for the agricultural sector. These industries include agricultural machinery and supporting industries besides fertilizers and insecticides. The Government have set up in 1972 a joint committee from all concerned ministries and departments to study the establishment of agricultural machinery industry in the Sudan. The committee made a census for available equipment carried out market surveys, drew up specifications suitable for Sudan conditions and finally evaluated offers recieved from several International Machinery Companies. A mission from UNIDO helped in the evaluation and negotiations (their report on Sudan Agricultural Tractor Project, World Bank/UNIDO Cooperative Programme, Vienna Austria, October 1976). The tractor and machinery project will be established with the cooperation of the Massey-Ferguson Company holding 25% of the shares Sudanese Development Corporation holding 24% and the Sudan Government 51%. The complex will include manufacturing and assembly facilities, training centre and other auxilliary facilities. When completed it will cost nearly 90 million U.S. dollars. Products include tractors, combine harvesters and agricultural implements. In the fourth year of production, the factory will reach its maximum production capacity operating on one shift basis per day for 250 working days per year. Products quantities and specifications will be as follows:

- a) Agric. Tractor, MF285 HP standard execution  
25-40% local content ..... = 3000/4000/  
Year
- b) Self Propelled Combine Harvester MF520B  
Bagger type 14-16 ft. 110 HP Perking  
Diesel Engine 15-20% local content = 400/year
- c) Wide level disc harrow with seed + ferti-  
lizer MF360, 15 ft. trailed discs 18 in = 1400/year
- d) Toolbar carrier MF80, 2.44 m, with 4-6  
ridger bodies 22 inch mounted = 1200/year
- e) Heavy Duty Disc Plough MF90 = 300/year
- f) Cotton/Groundnut Planter with fertilizer  
attachment, MF37, 2.44 ft., 4-6 rows = 200/year
- g) Chisel Plough, MF129, trailed = 350/year

Local content for implements will range from 50% to 80% in the fourth year of production. Other implements like offset disc harrow, seed drill and others will be included in the manufacturing programme if the volumes prove feasible. The proposed location for the factory is around the city of Wad Medani or Sennar or in the Gezira Province, the centre of agricultural areas and the site of the great Gezira Scheme.

#### 7.1 Linkages:-

7.1.1 The project will most probably be located in the Gezira Province. This will give the industry a closer contact with most of the important agricultural institution such as :-

- a) The Gezira University at Wad Medani.
- b) The Head Quarters of the Sudan Agricultural Research Corporation at Wad Medani.
- c) The Head Quarters of the Sudan Gezira Board and its Agricultural Engineering Research Unit at Barakat.
- d) The Mahad Project, on the West Banking. The Gezira Province.
- e) The Agricultural Machinery Training Centre (FAO Project) at Wad Medani and other secondary technical Schools.

7.1.2 The project would create about 500 Jobs on the basis of one shift operation per day and the extent of local content assumed above at the end of the fourth year of production.

7.1.3 Additional linkage is established with Khartoum Centre Foundry (K.C.F.) on existing Foundry which will be strengthened and developed along with the establishment of the project to



supply it with castings. The Massey-Ferguson Company was asked by the Government to prepare a programme for such development.

Linkages with other industries are expected eg. Battery, Paint manufactures.

7.1.4 In future, assembly and part manufacture of diesel engines will be undertaken. Other products might be included to share common technology, facilities and management.

7.1.5 Transfer of technology to the industrial sector and the development of engineering skills is considered very vital for the future development of heavy industry in the country. Such a project is the first step towards acquiring this.

7.1.6 As the project develops, some ancillary industries must develop to fulfill part of the required items. The Government's policy has always been to encourage such industries. Sub-Contracting for metal fabricated parts and simple machinery Jobs will help develop the local workshops and improve their standards. This can apply to small foundries in the area.

## 7.2 Economics of the Project

This project is essentially one of import substitution with very little real local industrial contribution. However the Government's policy toward the tractor project is to increase volume of tractors and agricultural machinery and expand mechanized agriculture. This agricultural productivity should increase both horizontally and vertically.

In brief the project will realize the following economic effects when it reaches full capacity production:-

- a) Foreign exchange saving of 7.4 million dollars per year on spending 30 million dollars on importing C.K.D. components.
- b) The internal rate of return for the project would be 28% which is very good. It even goes higher to 38% when the production is doubled through a second shift operation.

- c) The project will provide Jobs for over 500 people and potentially 800 when it operates on two shifts.
- d) The project will have great spread effects on existing industries such as batteries, paint, break lining and existing workshops, machine shops and foundries and Khartoum Central foundry.

7.3 Distribution and After Sale Service

The yearly production of the complex in its first stage operating on one shift basis will be three times the annual imports of the Sudan now. The present imports are distributed and serviced by over ten distributors branches and workshops all over the country. However, with the exception of three distributors, the rest do not have good enough facilities to render good and efficient after sale service. This the joint venture company will inspect and approve each distributors' facilities before allowing him to distribute their products. This would require a good investment for establishing good workshops and repair and spares centres all over the country besides providing well trained and skilled engineers and mechanics. This would equally apply on all distributors including the Massey-Ferguson distributor who is at present a State Corporation. If enough well equipped distributors are not available who can meet with the company's requirements, then the company would consider establishment of its own distribution and servicing organization.

7.4 Execution and Start of Production

The project is now in its final stages of negotiations and it is expected that the founders agreement and other contact documents and agreements would be finalized and signed by the partners before the end of this year. Execution will start immediately after signature of contracts and registration of the joint venture company. It is estimated that the establishment of the complex will take two years from the date of getting all the finances ready. The complex will reach its maximum capacity by the end of the fourth year of production on a one shift basis per day.

7.5 Training And Research

Agricultural engineers, skilled agricultural mechanics and machine operators are in great shortage in the Sudan.

In the near future the demand for them will increase tremendously, specially when the complex starts marketing its products.

The Sudan Government is well aware of the situation and taking the necessary measures to alleviate the shortage.

- 7.5.1 The Tozi Training Centre in the Blue Nile Province (AID project 1973) trains tractor drivers and machine operators. It has been expanded to take 120 drivers per year and will be further expanded during the six year plan to take 240 operators per year.
- 7.5.2 The Wad Medani Agricultural Machinery Centre trains agricultural mechanics (FAO Project). It will be expanded during the six year plan.
- 7.5.3 Two new training centres will be establishing during the six year plan for training tractor drivers operators and mechanics. One will be located in Malakal in Upper Nile Province and the other in Wau in Bahr El Ghazal Province. Other Centres in other parts of the Country are being planned.
- 7.5.4 The Government is negotiating now with French authorities to establish a modern agricultural engineering centre in the former pilot Farm of the Rahad Project at Tambul in the West Bank of the Nile in the Gezira Province. The centre will deal with mechanization trials and research test of equipment. Development of new implements, modifications and training of operators and mechanics.
- 7.5.5 Negotiations are going on with FAO to establish a mobile testing station which could be used in different parts of the country. The station will help in machine evaluation, testing and training.
- 7.5.6 The joint UNIDO/IDCAS mission on the establishment of Regional Pilot Project for Development of Agricultural Machinery And Implements To Suit the Particular Conditions of the Arab Countries, has visited The Sudan in 1976 and gave a very comprehensive account of the situation of agricultural mechanization in the country. (Their report of November 1976. In this report the mission recommended that the proposed regional organization for the development of Farm Machinery, in The Sudan. In particular they agreed to the suggested Site of Wad Medani or the Gezira along side the future tractors and machinery complex.

Besides it will be closer to the Gezira Board H.Q. and the H. Q. of the Agricultural Research Corporation. This organization will serve the manufacturing project a great deal specially in development of engineering designs capabilities and development of technical manpower.

7.6 Credit To Farmers To Purchase Tractors And Machinery

The basic customers or end users are the agricultural State Corporations and other government units, do not generally purchase equipment on credit.

The agricultural corporations and cooperatives buy on credit extended to them by local banks and the central cooperatives association at generally low interest rates. The Government has approved the establishment of the first cooperative bank to advance loans to the different cooperatives at very low interest rates.

The Agricultural Bank of Sudan is the main importer of tractors and machinery to fulfill the needs of the country. This is not the main function of the bank; it is intended to extend loans to the Farmers to purchase equipment, fertilizers, spares, Jute bags and other inputs. The new plan for the bank is to assume its natural role after the joint venture company starts its production. In the six year plan the farmer will be able to get loans from the bank with easier terms than before. The farmer gets the tractor and equipment on hire purchase basis without putting up collateral and at an interest rate of 6% per year rather than the 9% which was the going rate.

8. Cooperation Among Developing Countries in Industrial Development

8.1 General

The developing countries form 70% of the World's population and produce less than 7% of the world's industrial production. Most of these countries and particularly the African countries have been for a long time and still are the big farms and mines which supply the developed countries with raw materials.

On the other hand they have been still are the largest importers of finished goods and machinery. In both cases they are holding the short end of the stick, selling their raw materials at the lowest prices and importing finished goods at very high prices. This situation plus the increasing inflation have resulted in great deficits in the balance of payments of these countries, thus leaving them completely at the mercy of the developed industrial countries.

## 8.2 Industrial Progress in Developing Countries And Its Problems

Industrial development in developing countries did not achieve any noticeable progress inspite of the great exerted efforts by most of them. This is due to many interrelated factors some of which are due to the international situation and some are local.

### 8.2.1 Local Problems Facing Industrial Progress

In the local scene, these countries are faced with lack of or absence of technical personnel and absence of industrial technology. It is important that a clear industrial policy be developed that clearly defines objectives and priorities depending on its own resources. The industrial development must be part and parcel of the country's economic and social development plan. The lack or absence of infrastructure and managerial and technical personnel have increased the dependence of developing countries on developed countries. The low per capita income and low savings and great indebtedness to industrial countries have slowed industrial development. Lack or absence of planning and poor implementation of industrial projects together with the absence of plans for maximum utilization for natural resources and raw materials have contributed towards low progress rates and increased product costs.

### 8.2.2 International Problems Hindering Industrial Progress

The International economic crisis and increasing inflation costs, of basis equipment, industrial inputs and transport costs from developed to developing countries. The higher interest rates on loans and high cost of imported technology and experts, have all had adverse impacts on the development of industry in developing countries.

The interests of the developed countries lie mainly in continuing to get adequate supplies of low cost raw materials for their industry. They may exert international economic pressures and take all possible measures to assure the continuous supply of these relatively less costing raw materials from developing countries.

9. Cooperation Between Developing Countries

To face this unfavourable world situation and for certain political and national considerations, the developing countries had to come together to be in a better negotiating position with the industrial developed countries. This way can help each other instead of following the old policies of each standing alone in the fight which helped the developed countries more than it did the developing countries themselves.

This stresses the importance of cooperation between the developing countries at different levels.

9.1 Regional Cooperation

On the regional level cooperation permits the developing countries living in one region to share strategies and make use of each others experiences and technical knowledge. It will also bring them closer to each other and allow them to understand each others problems. This closer cooperation will eventually enable them to stand as one community to face international relations and trade and stronger than ever. Even the industrial developed countries saw the importance of such regional cooperation. The European Common Market is a very good example. Other similar regional organizations exist in Eastern European countries, Asian countries, The Commonwealth countries, and The Arab League and the Organization of African Unity. To bring about the idea of cooperation between the developing countries to life and practice, these countries must play the basic role to create such cooperation. On the other hand they can ask the help of specialized World Organizations like the UNIDO, The African Economic Commission, IDCAS and others to ease ways of contact and cooperation between the developing countries themselves and between them and developed and Industrialized Countries.

## 9.2 Approach To Industrial Cooperation

The Sudan, as one of the leading countries in Africa plays an important role in effecting regional cooperation between developing countries in Africa. The Sudan looks at the regional and International cooperation from two complementary sides:-

### 9.2.1 Cooperation for Achievement of Industrialization and the Whole Industrial Operation.

This takes two directions; the first is the cooperation between the developing countries themselves to know their industrial potential and capabilities and to help the transfer of industrial production elements between them to get the best utilization of their raw materials and resources.

The countries in the region would have to put a programme of work developing technical cooperation between them through exchange of developing technology to suit their particular industrial conditions. They would exchange technical information and industrial development. They can also make use of experience of other developing countries who imported and adapted advanced technology and technicians, to suit its own conditions. The UNIDO has played an important role in organizing and developing such cooperation between developing countries by establishing a separate section to deal with cooperation between developing countries. Particular attention should be given to choice of development of infrastructure and choice of technology that suit each country. Imported advanced technology is not always the solution for the industrialization problems. On the other hand, modified or simplified versions of it might be the solution. Developing countries must cooperate in this technology transfer with industrialized developed countries and with other advanced developing countries who have had the experience before. The developing need to exchange technical information and experiences. This could best be achieved through establishment of information banks, which will have other benefits in helping development of industry in these countries.

### 9.2.2 Cooperation For The Sake of Expansion And Diversification of Industrial Production

All developing countries, and Africa in particular, have been for a long time the farm and mine that supplies developed

industrialized countries with raw materials, and have been the largest importers of finished goods from these countries. These countries must break this chain and develop their own resources to give their people better life and higher per capita incomes. This, they can do through cooperation between them. Cooperation in this case must start with studies of type of industrial production and methods to be applied, so they can complement each others production. For example the Sudan has great agricultural potential and agro-industries could easily produce surplus for export to other countries. The Sudan could exchange this surplus with other countries in the region who have surplus commodities the Sudan needs. This type of cooperation needs the full support on the regional and international levels.

One of the major problems of industrialization in developing countries is the relatively smaller local market. This where regional cooperation could play an important role. The industrial production in one country would not be for its own needs alone but to cover needs of other cooperating countries and neighbours. This would increase the capacity of factories to full potential reduce production on other markets. Eventual establishment of regional marketing organizations industrial associations, the developing countries can have better negotiating powers to get more for their raw materials or semi finished goods. They can also coordinate import policies and production and price policies for their products. Relatively richer and more developed countries within the developing countries have a greater and for more important role to play in advancing the cause of industry than others. They can invest in development plans of developing countries and can supply them with relatively less expensive and less complicated but relatively advanced technology. Preference should be given to imports of industrial products from these relatively industrialized developing countries within the region. This will encourage industrial development within the region.



10. The Sudan's Model In Cooperation.

The Sudanese-Egyptian Economic And Technical Integration Programme.

10.1 General

The Sudan has always recognized the importance of regional cooperation between the African Countries. A provision in The Development And Encouragement of Industrial Investment Act of 1974 stipulates that the particular investment or project shall contribute in achieving the aims of economic cooperation and integration with Arab and African States. Based on this and on the need of both countries for one another, The Sudan and Egypt entered into an economic and technical programme which will serve their mutual interests and needs for agricultural and industrial products.

The Sudan will get great help from the relatively advanced Egyptian technical and managerial know how. Egypt will get all its food shortage supplied from the rich Sudanese resources. This integration will increase markets for different products; develop existing industrial and agricultural projects and create new economic activity and new advanced industries.

10.2 Pre-Programme Activities

After the need for such a programme for economic and technical integration have been established and agreed upon, the next step was to start its implementation.

10.2.1 Data and Information Collection

This was the first step taken to make available as much reliable information as possible in the fields of agriculture and industry. This will be the base for detailed studies that will lead to sound decisions on the best ways to achieve the maximum possible benefits from the available resources in the two countries.

10.2.2 Exchange of Visits

The data collection step overlapped with intensive exchange of visits by experts and responsible people on the different agricultural and industrial fields. This gave the experts the chance to observe the progress reached in all fields and compare it with what they have. In this way a complete picture of the situation in each country was formed before any discussions took place.

10.2.3 Technical And Economic Joint Committees

The next step was the formation of joint technical and economic committees covering all specialized activities in agriculture and industry. The committees held meetings in both countries with the objective of evaluating the existing projects and how they could be developed and better run to reach their maximum output. They also made feasibility studies for modernization of existing projects and creating new ones.

In the first stage of their activity and proposals to help the Sudanese industry based on the Egyptian experience and advanced technical knowledge. They gave priority to agro-industries existing in Sudan. Such as sugar industry, food industries, textiles and hides. Proposals in cooperation and integration in the fields of mining, railways, chemicals and petroleum industries were included.

Joint agricultural projects for production of oil seeds and animal food were proposed to be established in Sudan.

10.2.4 Implementation

The proposals submitted by the different economic and technical committees were studied by the Joint Ministerial Committee. The findings of the Ministerial Committee and its recommendations were raised to the presidents of both countries for final approval before implementation.

Several projects are now under execution and more than two Joint venture companies in mining and agricultural activities have been formed and commenced their activities.

11. Conclusions and Recommendations

11.1 The Sudan's economy is predominantly agricultural and pastoral. The present six year development plan gives top priority to the agricultural sector.

11.2 The industrial sector is relatively less important than the agricultural sector and its development on the manufacturing sub-sector caters for agro-industries and other industries that provide inputs for the agricultural sector eg. Fertilizers and Agricultural Machinery.

- 11.3 There is no agricultural machinery industry in the country at present. This resulted from lack of technology, technical skills, infrastructure and absence of research and development in this industry.
- 11.4 Proper research and development in agricultural machinery does not exist. There is limited development and modification work and the Workshops of the Sudan Gezira Board in cooperation with the British N.I.A.E. The Government is negotiating the establishment of a proper research centre that will include training and testing activities. The UNIDO/IDCAS programme is considering the establishment of a regional organization for the development of agricultural machinery in the Sudan which will have branch centres in some Arab Countries. The Ministry of Agricultural with the help of FAO is planning a mobile testing station.
- 11.5 The demand for tractors and agricultural machinery is increasing year after year, and so is the need for engineers, trained mechanics and operators and well equipped service and maintenance centres and workshops.
- 11.6 The Government is now finalizing negotiations with Massey-Ferguson to establish a Joint Venture Project to manufacture tractors, combines and agricultural machinery in sufficient numbers to meet the needs of the six year plan. The Government has planned some technical and institutional measures to assure the realization of the project and the proper distribution and service of its products. The help of UNIDO, IDCAS, FAO and some friendly Governments and institutions is being negotiated.
- 11.7 The Sudan encourages and supports the concept of cooperation and integration between developing countries in the fields of agriculture and industry. Such cooperation could start between countries in one region or on bilateral basis. The Sudan has entered into such an economic and technical cooperation and integration programme with Egypt.

Egypt is relatively advanced in technology and management in industry and the Sudan has great agricultural potential.

The integration programme is well on its way and is serving the mutual interests of both countries.

- 11.8 The Sudan is reviewing the encouragement laws and act for investment in agricultural and industrial projects to attract more investors both local and foreign. Special preference will be given to for investment in rural areas. Other developing countries should do the same.
- 11.9 Developing countries should create and strengthen existing organizations that advance loans for agricultural and industrial development in rural areas such as cooperative, industrial and agricultural banks.
- 11.10 Developing countries should seek the economic and technical integration with relatively more advanced and development countries among the developing nations.
- 11.11 As first steps in regional cooperation and integration, developing countries should turn to their neighbours who have closer ties with and who are relatively advanced.
- 11.12 Developing countries should seek the help of friendly developed countries and would organizations in making surveys and feasibility studies and developing their infractucture.
- 11.13 Developing countries should plan long terms training programmes to have the necessary technical and managerial personnel and skilled technicians and labour.
- 11.14 Developing countries must make a start to develop their own technology with bilateral or regional help while depending now on imported technology.

\*\*\*\*\*

ANNEX 1  
IMPORTS OF TRACTORS, COMBINES AND  
AGRICULTURAL MACHINERY  
1962 - 1976

117

Period 1962 - 1976  
BY MAKE

Imports of Agricultural Tractors

Import Make & Model	1962	1970	1975	1974	1975	1976	Total
	to 1969	to 1972	1975	1974	1975	1976	
Massey Ferguson 35, 135, 165, 180, 200, 230	1917	1979	1109	377	336	1250	6150
Ford, 4000, 5000,	893	80	15	454	218	62	1722
International Harvester B.275, B.450	600	-	-	-	-	-	600
Huffield 384, Leyland 270, 272	603	211	275	600	160	200	2129
Beylar's M1Z 50, 52, Super	415	0+0	-	30	-	-	1091
John Deere, 3020, 2020, 2030	46	-	-	587	-	-	633
Zetter 50, 5511	100	450	-	-	-	-	550
I. M. R.	145	15	-	-	-	2	160
Universal	18	-	-	-	-	-	18
I.M.T., Allis chalmers, same, Z4 5000	10	8	-	-	-	-	18
Steyr, 540, 760, 870	-	2	20	130	130	40	322
Boirarros (Chrysler Spain)	-	-	-	-	1	-	1
Fiat	-	-	-	1	1	362	384
Ebro 470, 684	-	-	-	-	-	2	2
David Brown 1210	-	-	-	-	-	1	1
Deutz D-7006, D-6006	-	-	-	2	-	-	2
Antar 70, 80	-	-	1	-	6	-	7
Australian	-	-	-	-	-	1	1
Fendt	-	-	-	-	-	1	1
Steiger	-	-	-	-	-	1	1
TOTAL	4027	2987	1016	2171	572	1940	12773

The Democratic Republic of the Sudan  
Imports of Agricultural Tractors

Period 1962 - 1976

BY MAKES

Year	MF	Ford	L.H	Ruffield	DeLarans	J.D.	Zottor	Steyr	Hiat	Other	Total
										Makes	
1962-1969	1517	893	600	683	415	46	100	-	-	173	4427
1970-1972	1575	80	-	211	646	-	450	2	-	23	2987
1973	1105	15	-	275	-	-	-	20	-	1	1416
1974	347	454	-	600	30	587	-	130	1	2	2151
1975	336	218	-	160	-	-	-	130	1	7	852
1976	1250	82	-	200	-	-	-	40	382	6	1940
<b>Total</b>	<b>6130</b>	<b>1722</b>	<b>600</b>	<b>2129</b>	<b>1091</b>	<b>633</b>	<b>550</b>	<b>322</b>	<b>384</b>	<b>212</b>	<b>13773</b>

OTHER MAKES INCLUDE THE FOLLOWING MAKES

I.M.R., UNIVERSAL, I.M.T., ALLIS CHALMERS, SILE, ZT-3000,  
EBRO, BEIRAROS, DAVID BROWN, DEULZ, AGGAR, AUCERILLAN,  
FENDT, STAGAR.

the Democratic Republic of the Sudan

Imports of Combines Harvesters

Period 1962 - 1976

By Make

Import make & model	1962 to 1969	1970 to 1972	1973	1974	1975	1977	Total
Massey-Ferguson 400-509	20	40	-	-	-	-	76
John-Deere, 530, 630, 360	87	10	-	-	1	1	98
Matador Mercator super	511	180	146	110	120	200	1095
Kansomes 902, 100,	21	-	-	-	-	-	21
Z M A J 780	50	-	-	-	-	-	50
Russion CKM-4	57	45	65	43	-	-	210
Dania, D-1200, Trailed	-	1	8	1	-	-	10
Fortschritt E-512	-	1	-	-	-	-	1
Arbos - 780	10	-	-	-	-	-	10
Clayson M-135	1	-	-	-	-	1	2
International 3 - 41	4	-	-	-	-	-	4
Case 600	4	-	-	-	-	-	4
Gloria & C - 12	1	-	-	-	-	-	1
J.F. (Danish) Trailed	-	-	-	100	-	-	100
Fahr M 100	-	-	1	-	-	30	31
Laverda	-	-	-	-	-	1	1
Allis chalmers	-	-	-	-	-	1	1
Total	574	293	279	254	421	253	1753

Some of the figures were not clear or the original submitted by the donor.



The Territory of Newfoundland of the British  
 Import of Agricultural Implements  
 Period 1962 - 1972  
 BY QUANTITY

Implement make and model	1962 to 1969	1970 to 1972	1973	1974	1975	1976	T o t a l
<u>Disc Plough</u>							
Massey-Ferguson 705	232	177	-	100	3	150	608
Ransomes To, 17, 18, 23	170	48	40	35	150	-	473
John Deere	21	-	-	-	2	3	26
Napier	-	79	15	10	18	-	122
Yugoslave	15	20	-	-	-	100	135
Eberhardt	17	-	-	-	-	-	17
International Harvester	26	1	-	-	-	-	27
E b r o	-	-	-	-	-	2	2
<u>T o t a l</u>	481	325	55	145	172	255	1440
<u>Tool Bar and Rider</u>							
Massey - Ferguson 80	1500	500	-	309	-	-	2309
Ransomes GS3, C68	811	135	40	-	250	50	1286
John Deere	5	-	-	-	2	-	7
Napier	-	100	7	-	8	-	115
Yugoslave	100	25	-	-	-	-	125
International Harvester	170	1	-	-	-	-	171
Kongskilde (Danish)	-	-	-	-	-	400	400
B u r c h	-	-	-	-	-	72	72
<u>T o t a l</u>	2500	761	47	309	260	517	4480

The Democratic Republic of the Sudan  
Import of Agricultural Implement  
Period 1962 - 1972

FY 1973

Implement Make & Model	1962 to 1969	1970 to 1972	1973	1974	1975	1976	T o t a l
<u>Offset Disc Harrow</u>							
Kansomes HR 35/70, 30/69, 33/60	15	10	10	-	-	-	35
John Deere 225	2	6	-	-	-	4	6
R o m e	33	-	-	-	-	-	33
B u r c h	30	-	-	-	-	-	30
Yugoslave	60	-	-	-	-	-	60
Napier	-	23	35	48	48	-	154
Towner	4	-	-	-	-	-	4
Massey - Ferguson	-	-	-	-	-	-	8
Bush Hog, O-CO	-	-	-	-	180	-	180
<u>T o t a l</u>	144	33	45	48	236	4	510
<u>Wide Level Disc with Seeder Box</u>							
Massey Ferguson 36, 360	981	600	-	-	-	62	1643
Cockshutt 234, 225	159	80	40	-	-	45	324
Minneapolis Moline	90	-	-	-	-	-	90
John Deere 1220, 1800	86	250	-	-	-	3	339
International Harvester 100, 700	530	545	7	-	565	-	1640
C o o p	-	-	-	-	500	-	500
<u>T o t a l</u>	1846	1475	40	-	1065	110	4536

The Democratic Republic of the Sudan  
Import of Agricultural Implements  
Period 1962 - 1972  
BY MAKES

Implement Make & Model	1962 to 1969	1970 to 1972	1973	1974	1975	1976	Total
<u>P l a n t e r</u>							
John-Deere 25 B	84	120	-	-	141	-	345
Massey Ferguson	14	-	-	-	-	-	14
F o r d	2	-	-	-	-	-	2
Bridger	-	-	-	68	-	210	278
<u>T o t a l</u>	100	120	-	68	141	210	639
<u>M u l t i P u r p o s e B l a d e</u>							
Massey-Ferguson 721	195	25	-	-	32	-	252
Bufford Star Garder	57	9	10	-	20	30	126
John-Deere	2	-	-	-	-	-	2
Napier	-	18	6	3	22	-	49
<u>T o t a l</u>	254	52	16	3	74	30	429
<u>A b u V I D i t c h e r s</u>							
Everman H - 6	142	100	2	100	163	-	507
John Deere	1	-	-	-	-	-	1
Massey .. Ferguson	-	-	-	-	-	-	-
<u>T o t a l</u>	143	100	2	100	163	-	508

The Democratic Republic of the Sudan  
Import of Agricultural Implements  
Period 1962 - 1972

BY M.K.S

Implement Make & Model	1962 to 1969	1970 to 1972	1973	1974	1975	1975	T o t a l
<u>Order Disc.</u>							
Napier	-	17	-	-	-	-	17
John Deere	4	-	-	-	-	-	4
Massey - Ferguson	10	-	-	-	-	-	10
B u s h Hog	-	-	-	-	18	-	18
<b>T o t a l</b>	14	17	-	-	18	-	49
<u>Land Plane</u>							
Marvin	-	-	-	-	8	-	8
Lversman	40	6	4	130	-	6	186
<b>T o t a l</b>	40	6	4	130	8	6	194
<u>Chisel Plough</u>							
Napier	-	-	-	6	-	-	6
Massey - Ferguson	-	10	-	-	-	20	30
Boxford	10	10	-	-	3	10	33
<b>T o t a l</b>	10	20	-	6	-	30	66

The Democratic Republic of the Sudan  
Import of Agricultural Implements

Period 1962 -- 1972

BY MAKE

Implement Make & Model	1962 to 1969	1970	1971	1972	1973	1974	1975	1976	T o t a l
<u>Cultivators</u>									
John Deere	2	-	-	-	-	-	-	-	2
Lilliston (Rolling type)	-	-	-	-	-	-	49	10	59
KOLSKILAC (Danish)	-	-	-	-	-	-	-	100	100
Massey - Ferguson	10	-	-	-	-	-	-	-	12
<b>T o t a l</b>	<b>12</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>2</b>	<b>49</b>	<b>110</b>	<b>173</b>

B I B L I O G R A P H Y

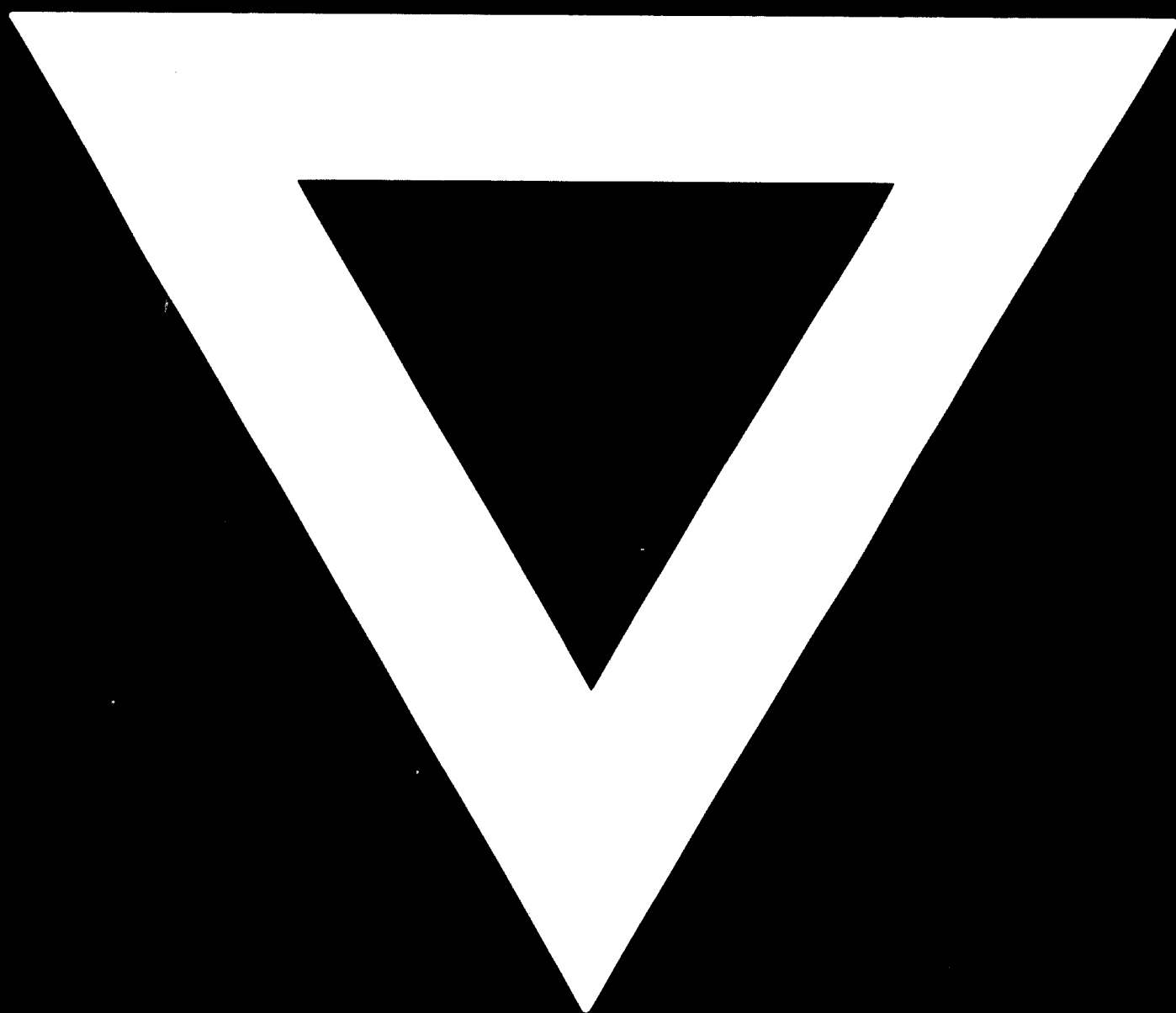
- 1- Basak A. K., Bao S., Kaschitz H.P., Sudan Agricultural Tractor Project, World Bank/UNIDO Cooperative Programme Vienna, Austria, October 1976.
2. Industrial Investment Guide In Sudan, Industrial Research And Consultancy Institute, Ministry Of Industry, Khartoum 1976.
- 3- Industrial Strategy In Africa, Seminar (In Arab), Ministry of Industry, Khartoum 20-23 August 1978.
- 4- Mowafi S., Gasparetto E., Aly M.S.D., Establishment of Regional Pilot Project For Development Of Agricultural Machinery And Implements To Suit The Particular Conditions Of The Arab Region, UNIDO/IDCAS Mission, Cairo, November 1976.
5. Study Reports And Evaluation Of the Massey-Ferguson Project For Manufacture And Assembly of Tractors And Agricultural Machinery In Sudan, Joint Technical And Economic Committees, Ministry Of Industry, Khartoum, 1975-1978.
- 6- Technical Report On Study of Assembly And Manufacture of Motor Vehicles, Tractor And Agricultural Machinery In the Sudan. Technical Committee, Ministry of Industry Khartoum, 1972/73
- 7- The Six Year Plan Of Economic And Social Development In The Sudan, (1977/78) - 1982/83), Ministry of Planning, Khartoum, April 1977.
- 8- The Yearbook Of Agricultural Statistics, 1977, Ministry of Agriculture, Food And Natural Resources, Khartoum, June 1977

\*\*\*\*\*



We regret that some of the pages in the microfiche copy of this report may not be up to the proper legibility standards, even though the best possible copy was used for preparing the master fiche.

**C-36**



**79.12.04**