

Technical Comments Letter

# Agricultural Mechanization In Sudan And How To Develop the Cooperation With China

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**Article citation:** Abdallah, FE., Penxing, P., Weimin, D. **Agricultural Mechanization in Sudan and How to Develop the Cooperation with China** *Annals of Agricultural and Environmental Sciences* 2016; 01(02):35-39.

DOI: <https://doi.org/10.20936/AEE/160204>

## ABSTRACT

In recent years, the promotion of farm mechanization, which has proven to be an effective way to increase agricultural productivity, has exerted revolutionary impact on the agricultural sector in China. The author believe that agricultural mechanization will play an irreplaceable role in increasing agricultural production in Sudan by upgrading traditional agriculture, achieving high and stable yield, and improving the quality and value-added of agricultural products. At the same time, efforts need to be made to address safety and environmental issues associated with agricultural mechanization in the course of development.

**Keywords:** farm mechanization, agricultural mechanization,

## SUDAN AGRICULTURAL MECHANIZATION

Agricultural mechanization embraces the use of tools, implements and machines for agricultural land development, crop production, harvesting, and preparation for storage, and on-farm processing. It includes three main power sources: human, animal, and mechanical. The manufacture, distribution, repair, maintenance, management and utilization of agricultural tools, implements and machines underscore the supply of mechanization inputs to farmers in an efficient and effective manner ([www.unapcaem.org](http://www.unapcaem.org)). Moreover the principle for the development of a nation is how to realize it by activation on all the necessary industries in the country. In such a case, it is very important that the modernization of agriculture as a primary industry through farm mechanization is the base to support the development of all other domestic industries.

The reason is that agricultural modernization through farm mechanization leads to a decrease in the farming population by promoting the efficiency of labor on farms and increases working population in the second and third industries.

The Government of the Republic of Sudan applied in 1964 for assistance in financing of a project for land clearance and the establishment of mechanized farms. The first "Mechanized Crop Production Schemes" (MCPS) were state farms established northwest of Gedaref in 1945. The present pattern of mechanized farming on the MCPS, however, may be traced to Government's decision, taken in 1953, to allow private entrepreneurs to develop mechanized farms<sup>1</sup>. Governmental companies and schemes that deal with agricultural tractors must concentrate on the effects of repair and maintenance costs

determination on the economic life of agricultural tractors, and therefore must keep very precise records about them, because the source of data was only personal contact<sup>2</sup>. The force required to pull an implement affects tractor power requirement and fuel consumption<sup>3</sup>. Power source in agricultural farms is of great importance in determining the level of agricultural mechanization and development, there are three sources of power for carrying out operations, the human power (about 0.07 – 0.1 kw) l, animal power and mechanical power<sup>4</sup>.

Mechanization schemes have been successful in many countries in Africa, particularly when coupled with irrigation. For example, the Gezira Scheme in Sudan has a history of mechanization that goes back to 1924 when scheme was, for a few years, the motor power before internal combustion engines took over. By the 1970s, 100 000 tenant farmers were cropping 760 000 hawith the assistance of mechanized cultivation services provided by the scheme under contract<sup>5</sup>. The Sudan has great agricultural resources; between 300 to 400 million arable lands, 135 million head of cattle, fish, forests and vast natural resources. World Food Conference held in Rome in 1974, considered the Sudan as the World Food Basket; as it could be capable to feed quarter of the world and five times population of the Arab region if agricultural potentialities of Sudan had been properly utilized, Crop production in Sudan is practiced under three patterns; irrigated

agriculture, mechanized rain-fed agriculture and conventional rain-fed agriculture.

Generally, in non-developing countries and particularly, in Sudan, agricultural mechanization has allowed an increase to the plant area, and contributed towards enhance yields and quality of farming products. Planting, caring, tending and harvesting a crop requires not only significant amount of power but also needs a suitable range of tools, equipment and farm machines. Indeed, most farmers in developing countries and also in Sudan experience a greater annual expenditure on farm power inputs than on fertilizer, seeds or agrochemicals. Sudan, for example, mapping the geographical distribution of tractors and farming machines draws out a general pattern (Fig. 1). Here, there are several regions emerge in which the soil and topography were suitable for growing rice, wheat, sorghum, corn, been nut, sun flower and cotton, one in the north called river Nile field, one in west called Kordofan and the other in the medal called Gezira Scheme.

Most residents participated in the north and medal region with a larger population provided more manpower while farms were smaller. In the opposite prevailed: the people were generally worked by owners, the population was not dense and scattered, compared to the total acreage under cultivation, and farms were larger. Achieving effective agricultural mechanization not only involves making available equipment but having the framework as well as the technology and well trained personnel to effectively use them.

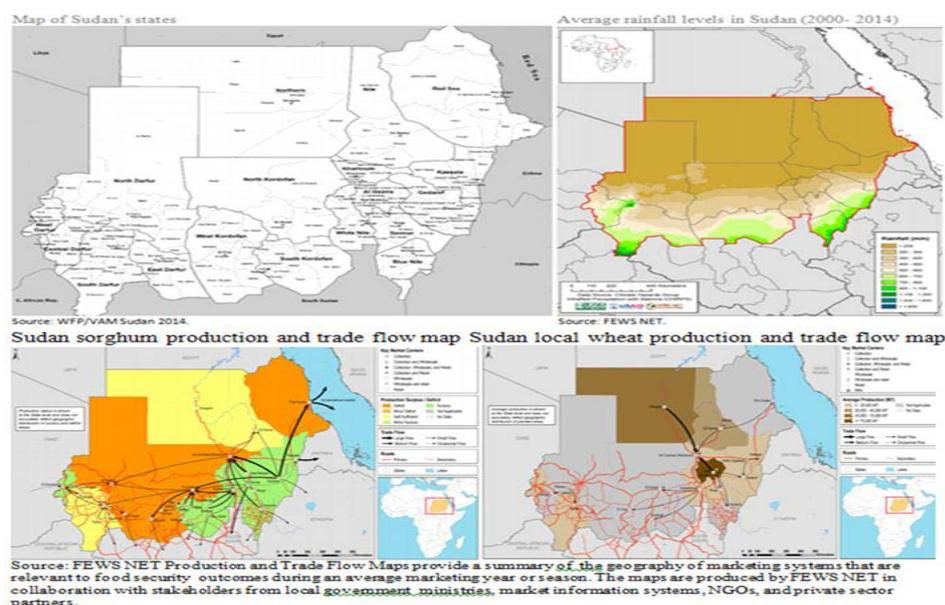


Fig. 1 Sudan, mapping the geographical distribution of tractors and main crops Production and price <sup>[6]</sup>

A careful look at the Sudanese agricultural sector shows that, these have not been properly done, hence the low level of mechanization and minimum home-grown technological methods of farming. China on the other hand has been successful in developing a highly mechanized agricultural sector.

Therefore, the agricultural mechanization in Sudan mostly develops in the capital and Gezeir regions. Agricultural mechanization entails the provision of mechanical power for undertaking the various agricultural productions (Fig. 2). The amount of mechanical power available affects the level of production as well as productivity. Sudan over the past few years has realized the need for a highly mechanized agricultural sector and this has

promoted the introduction of many forms of mechanical power into the agricultural sector.

With the most prominent one being the agricultural wheel tractor. In the year 1990 China had a mechanization capacity of 3.88 Hp/Ha, a significant rise from the 1968 was no available capacity (PCAARRD, 2009)<sup>7</sup>. There are 13 tractor manufacturers and many other manufacturers producing diesel engines and agricultural tools as well. The total power availability of this country to farm lands increased from 0.295kw/ha in 1991 to 1.231kw/ha in 2001, with an annual increase of 41.7 per cent. China ranked second in this regard. This development momentum is expected to accrue even more growth potential in the future<sup>8</sup>.



Source: Aldanga for Services and Agriculture Equipment's Company (2008-2011).

**Fig. 2** Agricultural mechanization in the A; Blue Nile State, B; North Kordufan State, C; Gezeir State, D; capital and E; North State.

Mechanization has had a revolutionary impact on the development of agriculture and the improvement of farmer's livelihood in the China. At the same time, there is a huge gap in the mechanization of agriculture due to different levels of development, lack of technology transfer and various testing standards and procedures in Sudan.

However, the agricultural mechanization is also still at the low level, not synchronous, and imperfectly such as:

- The farm power equips average about 0.3 HP per hectare which is very low comparing to the other regions in China.

- Farm machines mainly used for land preparation such as plough and planter, sorghum smash and transportation, and sorghum, wheat, sunflower, milling and processing. The mechanization level of harvesting is below 25 % and the manpower takes over 75 % for this stage. The other stages of cultivating such as planting, caring, and fertilizer feeding have implemented commonly by manpower.
- There is a little farmer might equip tractor and farm machines by himself due to low income from agriculture sector, and lack of the subsidy policy from central government.

- The ability and strength of Sudan manufacturing factories which respond for agricultural devices, tools, and equipment's are still not enough resource to produce quality products in order to make suitable machines for agriculture sector.
  - The training system for agricultural engineering also has many problems like out of date program, lack of facilities for practicum, and slowly update new technology or new equipment.
  - Sudan like any other developing country has an educational system where the technicians and engineers being trained get involved in their chosen field of study only during their tertiary education level with short periods of internship with industry. This affects their preparedness for a hand son feel of their chosen career
  - There is a gap on connecting the people from industry, research institutions, and farming. Therefore, technology transfer to final point famers- is not easy.
  - The present state of agricultural mechanization in Sudan is still far from increasing farm earnings and productivity. This is because mechanization policy has not been formulated following a well-designed, reliable and thorough analysis.
- by institutional aspects such as agricultural education, extension and research. Therefore, it is well if both China and Sudan operate a joint project to develop these aspects.
  - Enhancements the technology transfer in agricultural engineering to famers directly and on time, especially in wheat and cotton production and short-term industrial crops via short courses training operated by both China and Sudan.
  - Sudan is still the agricultural country in which nearly 80 % of population are working and living in rural areas so that Agricultural Engineering would be played as an important role for economy developing. The cooperation between China and Sudan in agricultural mechanization would promise more chances to be carried out.
  - The other equally important agricultural production sectors such as planting, harvesting, and processing to be under-mechanized. Before a highly mechanized agricultural sector can be attained, steps must be taken to provide the appropriate technology for farmers during all their agricultural production endeavors, from field preparation through planting, harvesting, processing, storage etc.
  - Finally sustainability can be ensured when during the design and construction of the agricultural machinery and equipment's by the Chinese Manufactures and Developers the Sudan conditions as well as research findings on the Sudan agricultural sector should be used. Again there should be collaboration between the Sudan and Chinese Engineers as well as the researchers so that there will be constant evaluation and improvement in the existing systems.

## AND WHAT CAN WE OPERATE TOGETHER?

Regarding the situation of Sudan agricultural mechanization, the cooperative works need to be done in agricultural mechanization between China and Sudan might focus on the following aspects:

- What is now increasingly important is to encourage sustainable private sector development that can offer farmers the right choice of technology at the right price to increase agricultural productivity, provide food security and reduce post-harvest losses. China might help Sudan farmers develop agricultural business for themselves.
- Improving the ability of manufacturing agricultural machines by transfer technology and manufactured techniques from China to Sudan Enterprises so that the tools and equipment's made in Sudan can be used for long time with low cost. Some machines might be highlights are harvesters, plant caring machines, spraying machines and fertilizer machines, and processing machines for agricultural products.
- Agricultural mechanization is not an isolated activity. Besides agronomic, technical and social aspects there is also an important role played

In recent years, the promotion of farm mechanization, which has proven to be an effective way to increase agricultural productivity, has exerted revolutionary impact on the agricultural sector in China. The author believe that agricultural mechanization will play an irreplaceable role in increasing agricultural production in Sudan by upgrading traditional agriculture, achieving high and stable yield, and improving the quality and value-added of agricultural products. At the same time, efforts need to be made to address safety and environmental issues associated with agricultural mechanization in the course of development.

**ACKNOWLEDGMENT:** The work was supported by the National Support Program of Science

and Technology (no: 2013BAD08B04). The authors wish to thank Elizabeth Lewis for the help in improving the language.

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**Source of funding: National Support Program of Science and Technology (no: 2013BAD08B04).**

**Statement of originality of work:** The manuscript has been read and approved by all the authors, the requirements for authorship have been met, and that each author believes that the manuscript represents honest and original work.

**Competing interest / Conflict of interest:** The author(s) have no competing interests for financial support, publication of this research, patents and royalties through this collaborative research. All authors were equally involved in discussed research work. There is no financial conflict with the subject matter discussed in the manuscript.

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