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The Perspectives and Chances of Modern Agricultural Mechanisation in Africa

Establishing food security in Africa has long been an important topic. As long as malnutrition, starvation and hunger persist in Africa, using only limited mechanization to replace manpower can no longer be advocated. Furthermore, the sustainability of the African food supply is unattainable with only manpower, as long as the African population continues to grow exponentially and agriculture is practiced conventionally. In the following the insights and analyses are proposals for achieving suitable, economically profitable, sustainable and modern agricultural mechanization.

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Literatur

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Many centuries ago, the use of manpower in different regions of the world resulted in inefficiency of production increase and response to food demand, therefore mechanisation of agriculture has been considered.

Agricultural production will need to double by 2025 in order to nourish the world's population. The development of the African population as indicator for the increase of the food demand is shown in *Figure 1*. In another one, recent literature indicated losses of about 10 millions ha/year in the tropics, only due to bad practices of soil management that include tillage and harvesting systems, which consequently resulted in decreasing yield. Inappropriate harvesting systems and methods contribute to huge cereal and grain losses in Africa and often to yields devastation by locusts and rainfalls. Burning practices, ploughing and soil tillage are in opposition to sustainable land use in the tropics and subtropics and therefore traditional farming practices have to be changed [1, 2].

Under Mechanisation we fully understand, the scientific application of engineering helps and means for less farm work's drudgery, increased production, processing, storage and sales channels of agricultural products that increase profitability and efficiency, and sustain land and environment.

It is not merely the use of tractors, combine harvesters and motorized equipment in farming, but rather a process of improving and modernising farming operations and farm structures by the use of hand-powered tools, animal powered implements, engine-powered equipment and other technological devices. Mechanisation inputs that farmer require must be available in the market through established and consistent commercial supply channel. Adequate and timely provision of farm power, is essential for the agricultural production process to be efficient. Thus, with this in mind, the perspectives of modern mechanisation in Africa should focus on selective use of power to increase yield through a profitable and sustainable farming, where appropriated.

Objectives

The present study focuses on the analysis that contribute to create debate about the perspectives and chances for a modern agricultural mechanisation in Africa through developing private commercial network for mechanisation inputs with a consistent supply chain for import and supply, make, sale and delivery of a satisfactory after sales service for equipment and machines that have proven acceptance by farmers for profitability and preservation of soil fertility and environment.

Background

The role of mechanisation within the development process of the agricultural sector is still being discussed controversially. A long series of weak points and risks revealed by former failed mechanisation attempts has even developed adverse attitudes towards

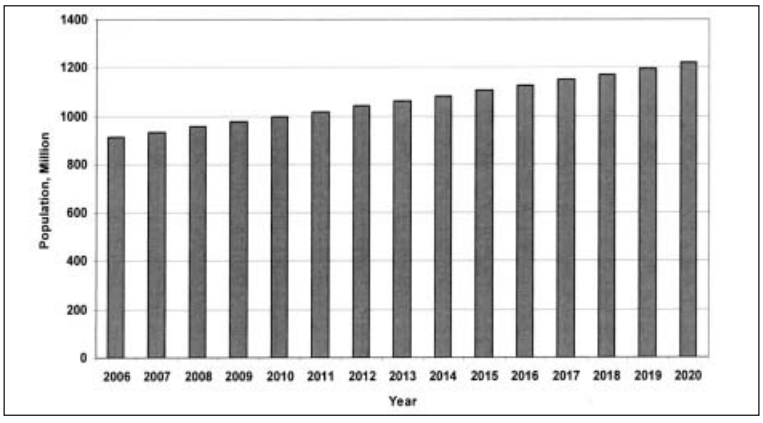

Fig. 1: The development of population in Africa from 2006 till 2020. Source: U.S. Census Bureau, International database, 2006.

mechanisation [3]. In some african countries, mechanisation has been for decades blamed for exacerbating rural unemployment and contributing to other social concerns and problems [4].

The development of the so-called appropriated or adapted equipments was one of favourite themes for research organisations, extension experts and development agencies. According to the world bank and FAO, almost 45 billions US dollars have been spent in different agricultural projects in Africa during the last three-four decades and the agricultural situation in Africa has not yet improved. It is an unfortunate fact that only very few agricultural mechanisation projects have so far been claimed successful.

Pieri [5] cites FAO statistics that indicate for Africa to meet its food needs, increased production will have to come from increased yield per hectare (51%), rather than from expanded cultivated areas (27%), or from more than one crop per year on the same land (22%). There is a growing challenge for Africa to develop and implement new agricultural production systems, extend equipments and machines that do not have negative consequences on tilling the soil. Recent literature indicated a positive development of no-till. It has been concluded that conservation agriculture and especially no-tillage appear to be the production systems of the future that can replace the traditional practices in small, medium and large-scale agriculture, leading to sustainable land use in the topics and subtropics [1, 2].

Food and derived agricultural products should be affordable for consumers and prices in line with free market's low. All involved actors for the mechanisation inputs within the vicious and vital circle of chain (*Fig. 2*) should get intensive training in order to manage efficiently and profitably; importantly the farmer must earn money, otherwise the technology will not gain acceptance, and the supply chain will collapse within a short period of time. A certain awareness of the dependence one from another should be cultivated and must prevail within the chain to ensure a long-term agricultural modern mechanisation in Africa.

Table 1: Level of mechanisation, worldwide [3]

Level of Mechanisation	I	II	III	IV
Africa	X	X		
Southern America	X	X	X	
Southern and Eastern Asia	X	X	X	
Europe and North America			X	X

I Hand tools, II Draught animal power
III Simple motor mechanization
IV Sophisticated agricultural technology

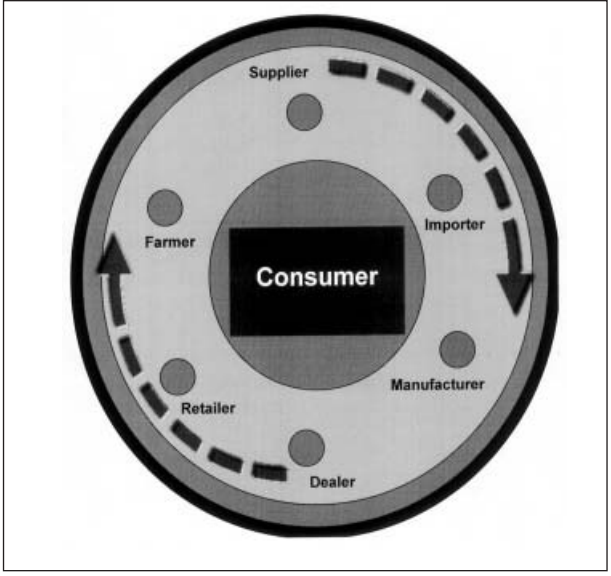

Fig. 2: Perspectives for agricultural mechanisation and a sustainable supply chain

Level of mechanization

Present and historical patterns prove that, there should be no exception that farms in Africa will in the future be mechanised neither uniformly across all operations nor across all farming situation. Thus, there is no reason why the selective use of new power source, particularly of tractors or combine harvesters, should be considered as inefficient or irrational for Africa.

Table 1 shows Africa as an attractive pool for a modern agricultural mechanisation. About more than 80 % of active African population practice agriculture whereby in Europe only 10 % and less than 3%, in North America. In contrast, Europe and North America suffer of overproduction whereby Africa is still unable to feed its population and often has to rely on United Nations food programmes and various aids from donors abroad.

The perspectives of agricultural mechanisation in Africa

We admit there is a significant difference within African countries and importantly with these located in the Sub Saharan Africa, characterised by poor level of mechanisation.

Application of identified agricultural technologies, methods and systems, locally manufactured machines and equipments that increase yield without negative consequences on the soil and environment should be considered as perspectives for the mechanisation of agriculture in Africa in one hand. In another one, imported inputs for the mechanisation of agriculture that are not locally available but in line with farmer's desire and choice to optimise profit should be considered as perspective for the mechanisation of agriculture in Africa, as long as it favours learning, contact, exchange of experiences, cooperation, technological and know-how transfer, investment, fair partnership, joint-venture, entrepreneurship and management culture, awareness, responsibility, creation of confidence and trust, intercultural and mankind comprehension. However for that, appropriated training centres on the machine or equipment and a secured service for after sales and spare parts channel for replenishment must be established.

Appropriated education and corresponding training are the key elements that will drive the future mechanisation of agriculture in Africa. In the mechanisation process, customer (consumer), farmer/peasant, dealer/retailer (including after sales services), manufacturer, importer/supplier and importantly government are involved (*Fig. 2*). Management of the function of the supply chain remains key task for the success of mechanisation in Africa.

Consumer will address food demand in Africa according to the availability, need, social status, habit and awareness. The more the Africans attend schools the more the food demand will be selective and specific. Consequently, the market for farmer may be rising accordingly. Thus, farmer will decide on the choice of the power to be used in order to run efficiently and profitably his business. The choice made will result on which machine, equipment, technology, farming system, crop, and agricultural operation to be mechanised. But to make such decision, farmer may require assistance and consultancy from expert on the ground. The government, not showed on the chain has the role of mediator and regulator of agricultural mechanisation inputs; and will enable in a transparent way the support and transfer of the chain to the private sector and provide conditions and infrastructure for farmer to sell products to consumer.

The Chances

follow the perspectives for agricultural mechanisation in Africa. The globalisation, information technologies, education and training, the establishment of a sustainable supply chain and the access to the world trade organisation for African producers are significant factors that will foster the chances for a modern agricultural mechanisation in Africa.