



Advancing Agricultural Mechanization (AM) to promote farming & rural development in Africa

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Introduction

Farm machines have revolutionised agriculture and continue to do so today. Some of the single biggest increases ever observed in Total Factor Productivity (TFP) in farming have been achieved thanks to the introduction of agricultural machines.¹ Agricultural Mechanization (AM) is a central indispensable pillar for making farm operations efficient and productive in so far as it determines much of the efficiency and productivity of all the other inputs used in crop production such as seeds, fertilizer, water, labour, and time. In short, modern agriculture would be impossible without advanced machinery solutions.

However, the use of machinery in farming still differs hugely across the globe. The United Nations Industrial Development Office (UNIDO) has defined 12 different levels of Agricultural Mechanization: the highest levels of mechanization (levels 9–12) can typically be found in the USA and Western European countries. By contrast, exceptionally low levels of mechanization persist in many developing countries, particularly in Africa, which remains the most challenging region for mechanization. Here, average mechanization levels range from 5 (Morocco), 4 (Botswana) to merely 1 in Cameroon.² In Sub-Saharan Africa (SSA), land productivity is among the lowest in the world, and Agricultural Mechanization has either stagnated or retrogressed in recent years. In SSA countries:

- over 60% of farm power is still provided by people's muscles, mostly from women, the elderly and children
- only 25% of farm power is provided by drudge animals
- less than 20% of mechanization services are provided by engine power.³

Sustainable Agricultural Mechanization – a potentially beneficial, yet widely neglected element in agriculture-for-development agendas

The ultimate objective of Agricultural Mechanization Strategies (AMS) in developing countries is to help increase the welfare of farm households and create positive dynamics and opportunities for economic growth in rural areas.⁴ Agricultural Mechanization can contribute to reaching this objective by:

¹ The Impact of Mechanization on Agriculture, J.F. Reid, *Agriculture and Technology* 41(3), 22-29.

² *Agricultural Development and Mechanization in 2013 – A Comparative Survey at a Global Level*, S. Böttinger, R. Doluschitz, J. Klaus (University of Hohenheim) & C. Jenane, N. Samarakoon (UNIDO).

³ *Mechanization for Rural Development: A review of patterns and progress from around the world*, J. Kienzle, J.E. Ashburner, B. G. Sims, FAO 2013.

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- Increasing the efficiency of agricultural production and thus productivity
- Reducing post-harvest losses
- Increasing value added to agricultural raw materials
- Maintaining the integrity and quality of farm products⁵

Agricultural Mechanization is thus well placed to address many of the most fundamental farming challenges in developing countries in a profound and comprehensive manner. Provided that suitable technology solutions are employed, Agricultural Mechanization “removes the drudgery associated with agricultural labour, overcomes time and labour bottlenecks to perform tasks within optimum time windows and can influence the environmental footprint of agriculture leading to sustainable outcomes.”⁶ In light of the persistently low mechanization levels in many developing countries and the tremendous progress and benefits that can be achieved with the help of Agricultural Mechanization there is widespread consensus that international actors and governments should “continue to encourage farmers to use agricultural machinery through development programmes and through the provision of incentives.”⁷

However, the current levels of commitment and encouragement by international actors and governments to promote agricultural mechanization in developing countries are comparatively low. In fact, notwithstanding its fundamental importance and potentially beneficial role, Agricultural Mechanization, in the words of the FAO, is “the neglected waif” of agricultural and rural development in developing countries.⁸

In most reports by international development actors which deal with the question of how to promote agricultural technologies and advance farming in developing countries, the element of machinery and Agricultural Mechanization is almost entirely absent. In fact, the list of agriculture-for-development reports in which the aspect of AM is missing altogether is long.⁹ While Agricultural Mechanization is a complex subject, excluding this fundamental aspect when discussing farming and rural development in developing countries appears to be a serious shortfall given the central, indispensable role it has played in making farm operations efficient and productive. **It is therefore time to review these shortfalls and re-integrate AM aspects more firmly again into agriculture-for-development agendas and development policy, particularly for Africa.**¹⁰

⁴ *World Development Report 2008 – Agriculture for Development*, World Bank 2007.

⁵ Towards sustainable agricultural mechanization in Indonesia – A conceptual model of innovation technology, S. Handaka, *TECH MONITOR* 2009, 38-43.

⁶ *Sustainable Agricultural Mechanization Strategies*, Regional framework report, FAO & UNESCAP 2011.

⁷ *Ibid.*, p. 30

⁸ FAO (2013), p. xxiii.

⁹ See for instance: *Agricultural Technologies for Developing Countries*, STOA 2008.

¹⁰ While a certain institutional focus on mechanization has been established in the Asia-Pacific Region with the UN’s regional Centre for Sustainable Agricultural Mechanization (CSAM), such an institutional framework does not yet exist for Africa.

Towards a tailored, inclusive and integrated approach: embedding sustainable AM strategies in development & agricultural policies

Pursuing Agricultural Mechanization in developing countries as an isolated, one-off strategy has proven inappropriate. Past examples have shown the inherent risks and shortfalls of such approaches.¹¹ Instead, and in order to be successful and sustainable, policies for AM development must be tailored to local needs and must be firmly embedded in broader agricultural policy approaches. Importantly, they should also include cooperation and partnership schemes between public-sector and private-sectors agencies and actors.¹² As summarised in the 2008 joint FAO-UNIDO report *“if agricultural mechanization efforts are to succeed in Africa, there is an urgent need for all concerned, be they farmers, supporters, planners or policy-makers to understand and contribute to agricultural mechanization efforts across the entire farming system and with a value chain perspective.”*¹³

In order to be successful, AM strategies need to be:

- **Tailored:** in order to enable farmers to adjust and adopt suitable technologies for their farm businesses the type of mechanization must be tailored to local/regional conditions and needs. This means that different aspects are considered such as the local farming system and farm practices, existing farm infrastructure, as well as the broader socio-economic situation of farmers.
- **Inclusive:** AM strategies should be devised in inclusive ways that provide benefits to farm holdings of different types and sizes and benefit the overall rural community.
- **Integrated:** AM strategies cannot succeed when focusing on single actors, be it in government or in the agri-food production chain. A broader, integrated approach is needed which foresees public-private partnerships and the active participation and support of farmers and other key agri-business stakeholders such as food processors, industry producers, and financial institutions.

The successful examples of, for instance, Bangladesh and Indonesia demonstrate that whenever AM strategies have been tailored to local needs and integrated into broader agricultural policy approaches, they have proven successful in supporting farming and rural development.¹⁴

¹¹ Inappropriate mechanization approaches bear the risk of placing ‘pressure on fragile natural resources by increasing soil erosion and compaction, promoting overuse of chemical inputs and encouraging farmers to open lands that currently serve as valuable forest and rangelands.’ *Sustainable Agricultural Mechanization Strategies*, Regional framework report, FAO & UNESCAP 2011.

¹² *Agricultural mechanization in Africa...Time for action*, UNIDO & FAO 2008, p. 14.

¹³ *Ibid.*, p.11

¹⁴ Towards sustainable agricultural mechanization in Indonesia, S. Handaka; Status Agricultural Mechanization in Bangladesh A. Wohab, <http://www.unapcaem.org/Activities%20Files/A1112Rt/bd.pdf>; Farm Mechanization for Sustainable Agriculture in Bangladesh: Problems and Prospects, S. Islam, <http://www.un-csam.org/Activities%20Files/A09105thTC/PPT/bd-doc.pdf>.

Overcoming key barriers to agricultural production and rural development

In order to be successful, agricultural mechanization needs to be pursued together with broader strategies that address key barriers which have been found to hold back the development of agricultural production in developing countries. Key aspects include:

Providing a supportive overall policy framework for agricultural production

National governments need to work on an overall policy framework that creates a favourable environment for agricultural production and rural development:

- In so doing, governments should engage in a mutually supportive cooperative endeavour with other public institutions and industry (so-called 'Triple Helix Model').
- Governments should make sure that related policies such as agricultural, tax and trade policies as well as questions of technical regulation (e.g. standardisation) are aligned with, and are structurally supportive of, the objectives of national agricultural development strategies.

Addressing socio economic barriers

Low agricultural productivity commonly results in a low purchasing ability of farmers. This means that the capital investment needed for purchases such as machinery can often not be made, particularly when the size of the landholding is limited and fragmented. It is therefore important to:

- Promote agro-processing at community level: this will make sure that more value is added to farm outputs locally
- Stimulate investment in broader agricultural infrastructure, particularly irrigation and roads
- Encourage the establishment of cooperative schemes that enable joint purchases and ownership structures
- Support the provision of contractual services for certain field work (e.g. seeding, fertilizing, harvesting). Such a step can make sure that farmers, particularly smallholders, can benefit from advanced technologies even if they do not (yet) have direct ownership of e.g. a machine. Remuneration for contractual services should be devised in an equitable and fair way (monetary or in kind, e.g. percentage of yield) to ensure an inclusive approach.

Building a suitable framework for rural finance

Financial services are important in any development activity. Facility for credit is often limited in rural areas. Microfinance Institutions (MFIs) can rarely provide the mainstay of rural finance. While MFIs work well for high-turnover activities such as small livestock and horticulture they have shown to work less well for crop farming.

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- Rural or agricultural credit mechanisms are important to provide the finance to farmers to buy the equipment they need. These mechanisms need to be strengthened or, where they are absent, put in place.¹⁵
- Reform public agricultural banks: state-owned agricultural banks are unlikely to function in a commercially sustainable manner and serve the needs of small-scale farmers, unless they undergo a radical transformation in governance arrangements that prevent them from political capture.¹⁶

Fostering education & training

Training is of vital importance to ensure that machines are used in a safe and correct manner.

- Training and capacity building schemes need to be strengthened at local level. This can be done in the form of regular farmer field schools and/or on model training farms where farmers can be familiarized with specific types of machinery.
- Advisory service schemes should be established on sustainable agricultural mechanization and related farming skills.

Building up service & maintenance support

Successful mechanization requires the building up of a supporting infrastructure in the form of repairs services, parts supply, fuel and lubricants.

- Increased investments are needed from national governments and the private sector to develop an adequate regional coverage of essential spare-part and maintenance services as well as replacement facilities.

Conclusions & Call to Action

Mechanization remains a somewhat neglected element of agricultural and rural development policies in developing countries, particularly in Africa. In line with this, only limited progress in agricultural mechanization has been achieved in terms of increased number of machines and market expansion in Africa in the past years. Nonetheless, the predictions for the next years are structurally positive.

In light of this and the positive role that mechanization can play in making farm operations more efficient and productive, CEMA calls on international and national actors in African development policy – both public and private – to maximize this window of opportunity and:

- Reintegrate Agricultural Mechanization Strategies more firmly again into agriculture-for-development agendas and development policy for Africa

¹⁵ *Agricultural mechanization in Africa...*, p. 19.

¹⁶ *Agricultural Technologies for Developing Countries*, p. 63.

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- Devise Sustainable Agricultural Mechanization Strategies (AMS) that follow a tailored, inclusive and integrated approach
- Jointly work to remove key barriers that have been found to hold back the uptake and use of agricultural machines in developing countries

In particular, CEMA calls on:

- Key international agencies and actors such as FAO and UNIDO to reinforce their work on Sustainable Agricultural Mechanization Strategies (SAMS) in Africa;
- International financial institutions such as the World Bank (WB), the African Development Bank (ADB) and the International Fund for Agricultural Development (IFAD) to address the funding needs of future SAMS;
- The UN to establish a regional Centre for Sustainable Agricultural Mechanization for Africa (CSAMA) along the lines of the UN's existing regional Centre for Sustainable Agricultural Mechanization (CSAM) in the Asia Pacific Region;
- The EU to integrate Sustainable Agricultural Mechanization Strategies (SAMS) more firmly into their development policy and pursue them as part of the work of existing EU-Africa cooperation platforms such as the Technical Centre for Agricultural and Rural Cooperation (CTA);
- International agencies and the EU to develop new cooperation schemes on mechanization with the private sector to achieve inclusive and sustainable growth in agriculture and agribusiness in developing countries as outlined in the European Commission's 2014 Communication on *A Stronger Role of the Private Sector in Achieving Inclusive and Sustainable Growth in Developing Countries*.¹

About CEMA – European Agricultural Machinery

CEMA is the European association representing the agricultural machinery industry. For more than 50 years CEMA has acted as a network of national associations and provides services, advice and a common European industry view on relevant topics. The industry represented by CEMA includes 4,500 manufacturers of agricultural equipment employing directly 135,000 persons and indirectly in the distribution and service network another 125,000 persons. The companies are mainly small and medium-sized manufacturers according to the EU definition and in 2011 had a total turnover of 26 billion euro. www.cema-agri.org