



Food and Agriculture
Organization of the
United Nations




SUSTAINABLE AGRICULTURAL MECHANIZATION

A FRAMEWORK FOR AFRICA

Synopsis





*“Our goal is to send
the hand hoe to the museum
and liberate the African farmer
from the backbreaking drudgery
of tilling the land by hand.”*

–Dr Nkosazana Dlamini Zuma, Chairperson,
(2012 to 2017), African Union Commission

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Food and Agriculture Organization of the United Nations
and African Union Commission
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The Sustainable Agricultural Mechanization: A Framework for Africa¹ (SAMA) was developed in response to a request by the African Union (AU) and endorsed by the AU Specialized Technical Committee (STC) on Agriculture, Rural Development, Water and Environment meeting in October 2017. It responds to both the Malabo Declaration and AU Agenda 2063 and is a result of discussions with policy-makers and experts from AU member states, the AU Commission, FAO and key partners. It offers a detailed look at the history of machinery in Africa and points the way towards addressing challenges and creating new opportunities to assure the successful adoption of mechanization.

The long version of this report² presents a framework for sustainable agricultural mechanization strategies in Africa, with a menu of priority elements for countries to consider in developing their strategies for sustainable agricultural mechanization (SAM).

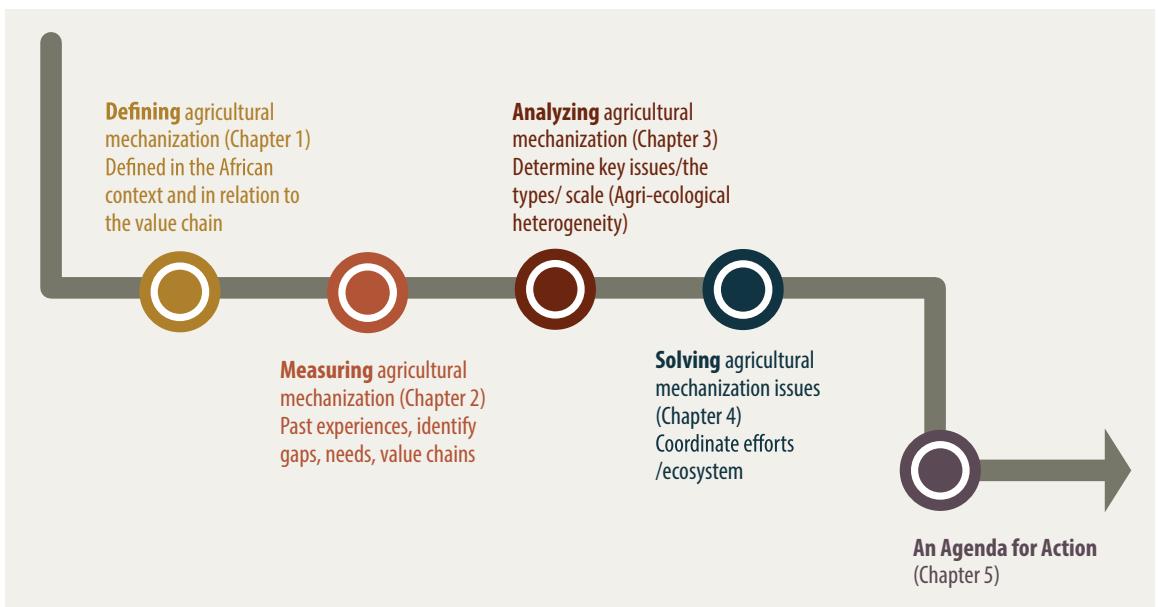


Figure 1: SAMA framework

“... We at the African Union Commission view Agricultural Mechanization in Africa as an urgent matter, which should receive all the attention it deserves at the highest level.... [to support] the campaign to relegate the hand-held hoe to the museum and replace it with tillers, a symbolic effort to drum home the importance of removing the drudgery from agriculture, and thereby improving labour productivity, especially for women.”

– H.E. Josefa Leonel Correia Sacko, commissioner for Rural Economy and Agriculture of the African Union Commission.

1 Throughout this document, “Africa” refers to sub-Saharan Africa (FAO terminology) and Africa south of the Sahara (AU/ UNECA terminology).

2 The original document is available at <http://www.fao.org/3/CA1136EN/ca1136en.pdf>

AASR	Africa Agriculture Status Report
AfDB	African Development Bank
AFS	Agrifood systems
AGRA	Alliance for a Green Revolution in Africa
AMT	Agriculture Mechanization Technology
AU	African Union
AUC	African Union Commission
DREA	Department of Rural Economy and Agriculture
FAO	Food and Agriculture Organization of the United Nations
FTE	Full-time equivalent
IPUMS	Integrated Public Use Microdata Series
REC	Regional Economic Community
SAM	Sustainable agricultural mechanization
SAMA	Sustainable Agricultural Mechanization in Africa
SME	Small and medium enterprises
UNECA	United Nations Economic Commission for Africa
UNIDO	United Nations Industrial Development Organization

1. WHAT IS SUSTAINABLE AGRICULTURAL MECHANIZATION?

Agricultural mechanization is broadly defined as the application of tools, implements and powered machinery and equipment to achieve agricultural production. Three levels of power sources are involved: manual (with entire reliance on human labour), animal and motorized power (both fossil fuel and electrical). Agricultural production encompasses that of crop and livestock, as well as apiculture and aquaculture.

Mechanization covers all levels of farming and processing technologies, from simple and basic hand tools to more sophisticated and motorized equipment. It eases and reduces hard labour, relieves labour shortages, improves productivity and timeliness of agricultural operations, increases resource-use efficiency, enhances market access and contributes to mitigating climate-related hazards. Sustainable mechanization considers technological, economic, social, environmental and cultural aspects when contributing to the sustainable development of the food and agricultural sector.

“The provision of mechanization services in the 21st century must follow some core principles: It has to be built along the entire agricultural value chain for increased systemic competitiveness; it must also be private sector driven, therefore, it must make business sense; it must be affordable especially to small-scale farmers who constitute the bulk of African farmers, and it must target women who bear the brunt of African agriculture.”

– H.E. Josefa Leonel Correia Sacko, commissioner for Rural Economy and Agriculture of the African Union Commission

Source: FAO, 1981 (adapted)



Figure 2: Agricultural mechanization value chain

2. WHY IS SUSTAINABLE AGRICULTURAL MECHANIZATION IMPORTANT FOR AFRICA?

Sustainable agricultural mechanization is essential to Africa's structural transformation and job creation. Agriculture is crucial to Africa's development, but the sector is performing well below its potential. Today, about 60 percent of Africa's population depends on agriculture for jobs and livelihoods, yet its contribution to the gross domestic product was a paltry 21 percent in 2016 (AfDB, 2016).

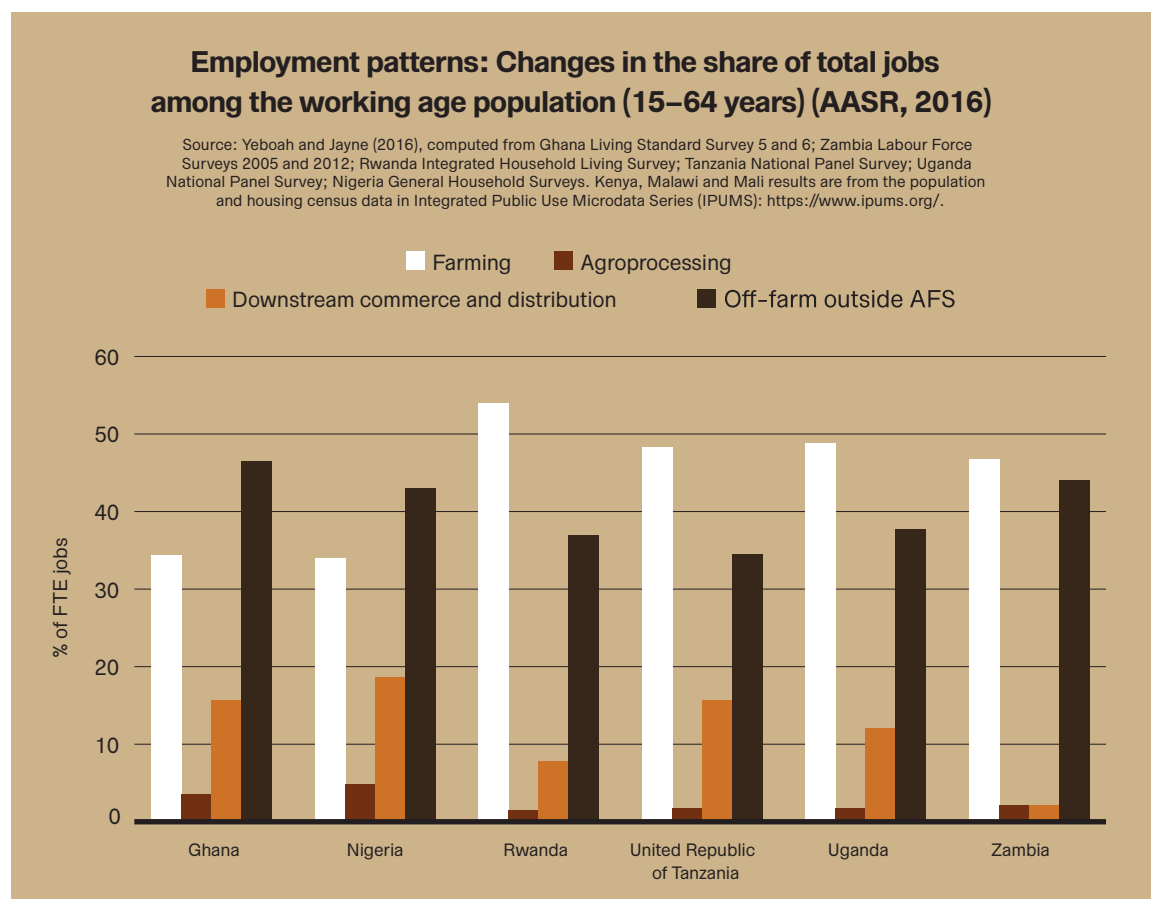
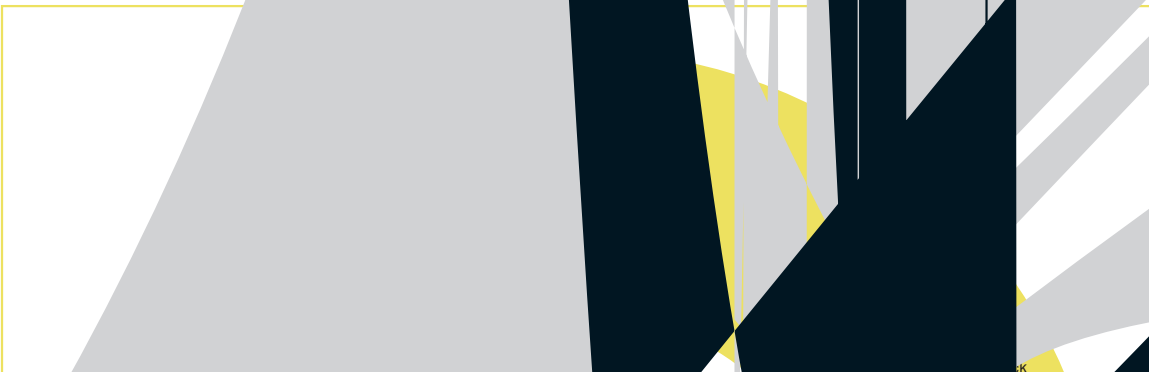


Figure 3: Employment patterns

The potential role of agriculture in Africa is similar to the role it played in the economic transformation and industrialization of economies in Asia (FAO, 2008, 2015). For agriculture-based economies in Africa, its role becomes even more important. Furthermore, if agriculture is linked to manufacturing through mechanization across the value chain, it can lead to the economic transformation of many countries in Africa and job creation (AfDB, 2016; ACT, 2017).

Reducing the yield gap is essential for Africa to reach its goal of Zero Hunger by 2025.

Mechanization is also an important component for Africa to meet its goal of ending hunger by 2025. Africa has the highest area of uncultivated arable land (2 million ha) in the world, which is only 2 percent of the global total, its productivity lags far behind other developing regions. In addition, yields in Africa are only 56 percent of the international average (African Development Bank, 2016; Jerome, 2016). To meet the food demand of a growing population, yields must increase substantially over the coming decades to keep pace with population growth and rapid urbanization in Africa. Mechanization directly and indirectly affects the yield gap by reducing both harvest and post-harvest losses and is the key to unlocking the potential of Africa's vast uncultivated arable land. Reducing the yield gap is essential for Africa to meet its goal of Zero Hunger by 2025.



The situation in other parts of the developing world was different. While the number of tractors in use in Africa in 1961 was more than in both Asia and in the Near East regions (172 000 versus 120 000 and 126 000 units, respectively), it increased slowly thereafter, peaking at 275 000 by 1990 before declining to 221 000 units by 2000. In essence, agricultural mechanization stagnated in the region during the last quarter of the twentieth century. Beginning in 2005, there was renewed interest in agricultural mechanization in Africa. However, limited action was taken to try and reverse the situation.

Number of tractors per country – Sustainability and viability of agricultural machinery franchises

Source: FAOSTAT and World Bank STAT, 2010.

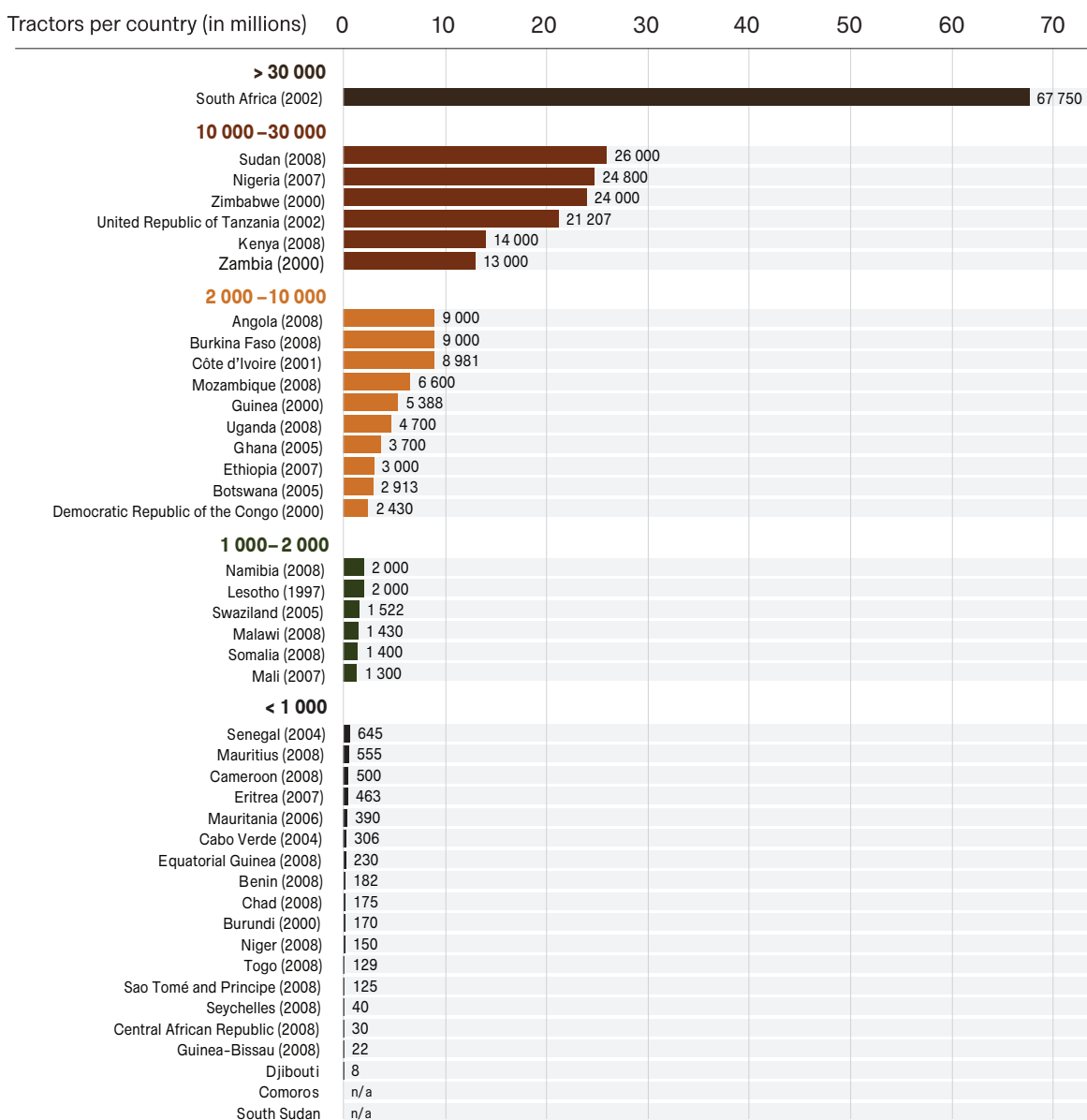


Figure 4: Number of tractors per country

3. HOW CAN SUSTAINABLE AGRICULTURAL MECHANIZATION BE ENTRENCHED IN AFRICA?

Although mechanization strategies and policies might be country specific, national strategies are best formulated when guided by insights and parameters identified within a framework that factors in regional and global perspectives. Many aspects related to policy formulation and strategy development could benefit from a common framework. With an overarching, strategic long-term vision and a solid institutional foundation for cooperation, it was agreed that SAMA should be anchored on three pillars of sustainability: **commercial**, **environmental** and **social**.

The ten elements of SAMA

Source: FAO, 2018.

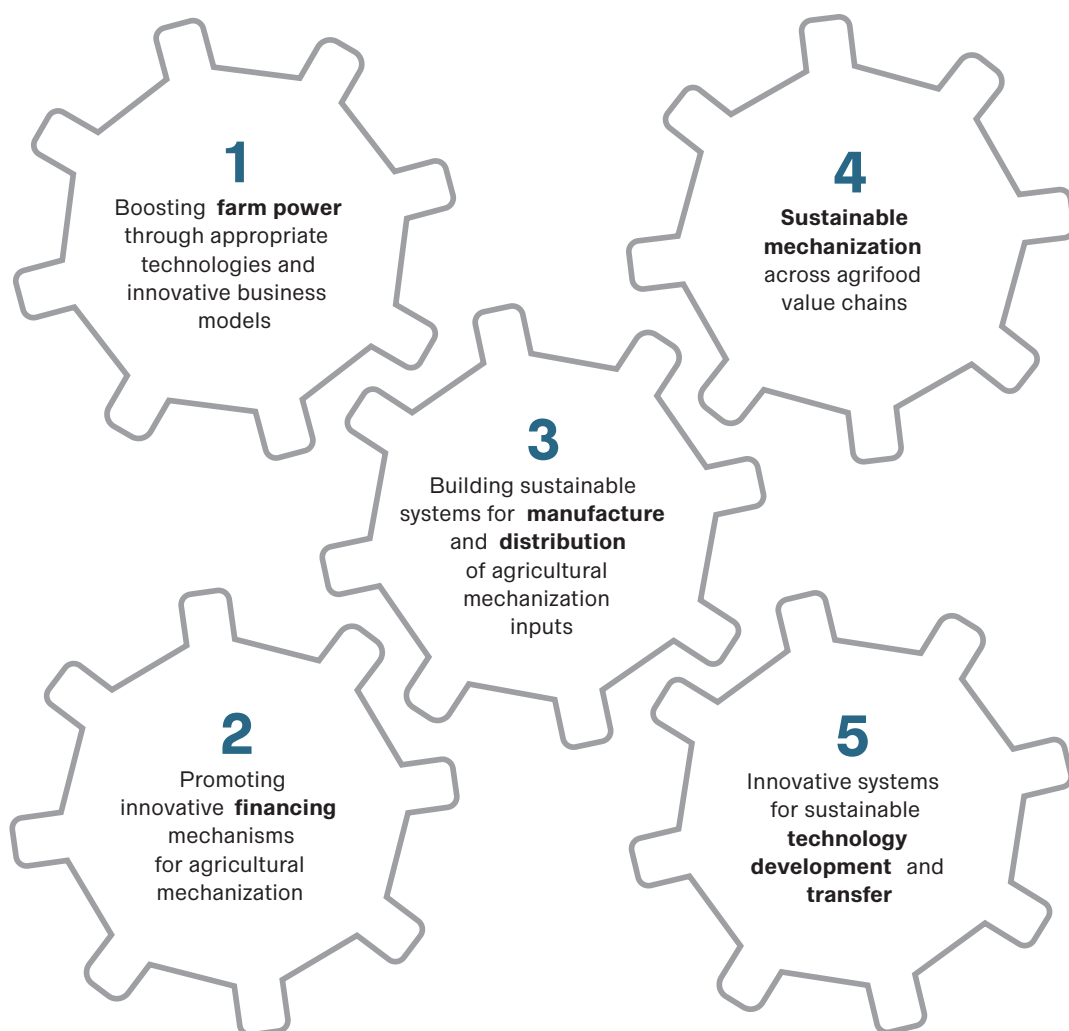


Figure 5. The ten elements of SAMA

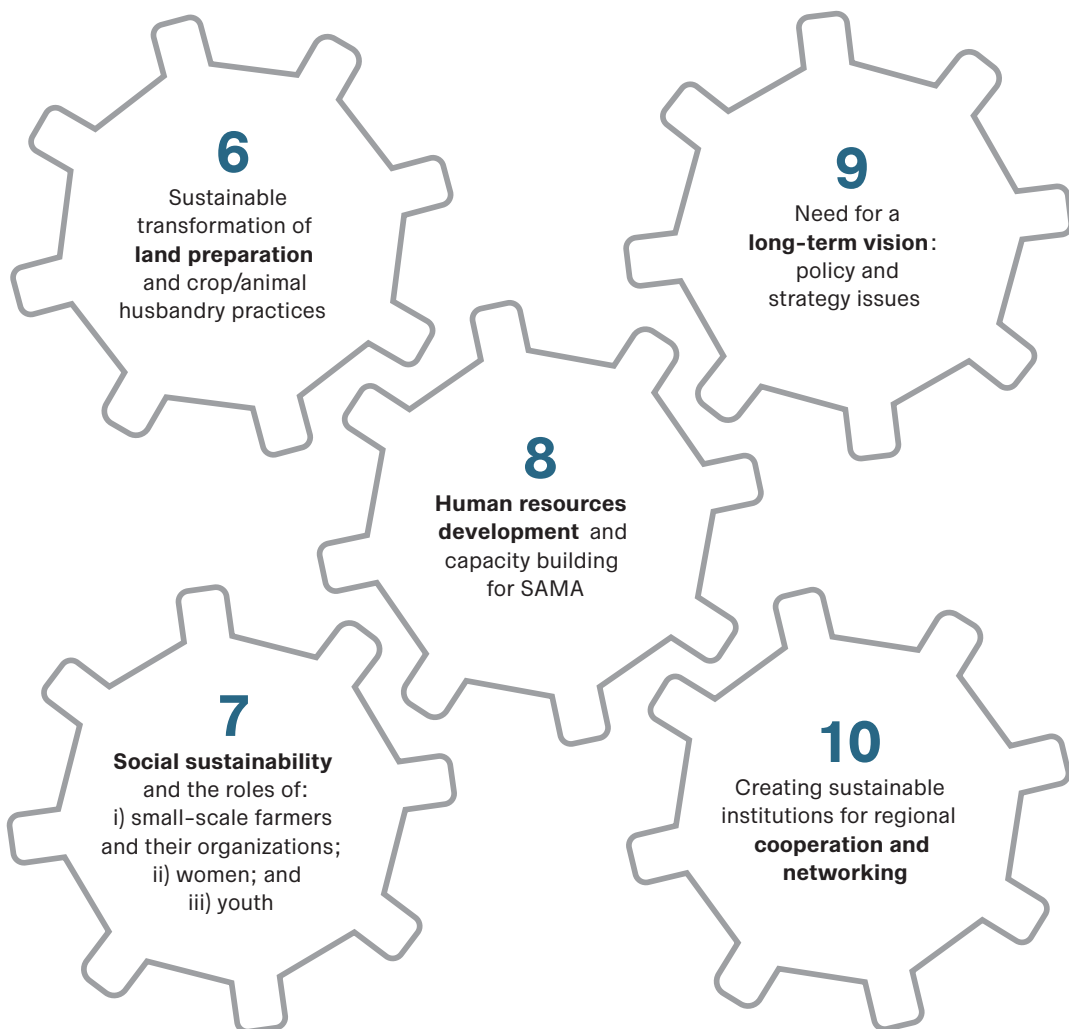


Figure 5. The ten elements of SAMA (continued)

3.1 MAKING SUSTAINABLE AGRICULTURAL MECHANIZATION COMMERCIALY SUSTAINABLE IN AFRICA

Element 1: Boosting farm power through appropriate technologies and innovative business models

Options to be considered:

1. National assessments of current and future farm power requirements conducted. Assessments need to consider different agro-ecologies, farm sizes, demographic trends (including urbanization and the ageing agricultural population), gender and youth issues, the need for transformation and improvement, and any technical support requirements.

2. Establishment and operation of different business models to provide mechanization services: farmer-operated mechanisms and systems, and machinery hire services offered by SMEs or larger companies, including suppliers of agricultural machinery.
3. Introduction of mechanisms to attain higher utilization rates for agricultural machinery and lower unit costs of tractor hire services, including multi-farm use, across different agro-ecologies and districts or regions.
4. Regional trade barriers for mechanization services identified and relaxed. Attention to the manufacturing capacity; servicing, repair and maintenance; and trade of farm power equipment (tractors, power tillers, pumps, threshers, hammer mills, motors, etc.) and implements (ploughs, seeders, conservation agriculture equipment, etc.) in the context of regional trade, import tariffs, testing and standards, given the current low demand in many countries in Africa.
5. Enhancement of extension services and farmers' capacity to operate and maintain the new equipment efficiently in order to make sustainable use of it, meeting crop and soil demands towards more efficient and sustainable production.
6. Development of specialized programmes for capacity building of potential mechanization hire service providers, strengthening South–South and triangular cooperation, as well as North–South collaboration, through partnerships and mutual support.

Element 2: Promoting innovative financing mechanisms for agricultural mechanization

Options to be considered:

1. Development of financing mechanisms to facilitate the procurement of machinery and equipment by smallholder farmers, within the context of sustainability of these interventions. Tailored and sustainable subsidies should be considered especially where they can catalyse the initial procurement of mechanization inputs, with the provision that viable and sustainable farming enterprises ultimately emerge.
2. Improvement of access to economic resources for entrepreneurs, established artisans and technicians specialized in the repair and maintenance of agricultural equipment, in order to facilitate the development and upgrading of their business.
3. Consideration of collaterals for credit for financing the procurement of agricultural mechanization inputs. Land tenure, for example, plays an inordinate role in this regard.
4. Objective studies on the financing modalities and credit mechanisms (including subsidies) used by different countries for financing through both the private and public sectors. An inventory of best practices and lessons learned from past successful and failed mechanization projects is important for countries in the region developing their own Sustainable Agricultural Mechanization Strategy.
5. Development of cross-country financing mechanisms – especially if machinery is going to be used across national boundaries.
6. Provision of financial incentives for innovative equipment complying with the sustainable intensification paradigm. On the other hand, equipment known to be harmful to soils may be restricted.

Element 3: Building sustainable systems for manufacture and distribution of agricultural mechanization inputs

Options to be considered:

1. Establishment of mechanization supply chains and dealer franchise networks across the subregions. A key issue is how to assist manufacturers to establish supply chains and dealer franchise networks and to cater for areas where profit margins may initially be small or non-existent. Supply chains must be established not only for power sources, but also for other implements and post-harvest equipment, especially in countries where the current demand for machinery and implements is low.
2. Creation of regulatory frameworks by governments, to facilitate the operation and management of mechanization supply chains and franchises through the coordination of chambers of commerce and business associations, which may also operate across national boundaries and offer services at the subregional level. It will be necessary for the Regional Economic Communities to play a leading role in catalysing action in this regard.
3. Establishment and sustainable financing of testing centres for the certification and development of technical standards on a subregional basis. It is important that such centres command the respect of member countries and instil confidence in key stakeholders. In the light of current trends, urbanization and emerging concerns regarding increased food trade as well as quality and safety – government intervention is important at the individual country level and/or subregionally. Countries with low levels of machinery use require assistance in identifying equipment of good quality and having manufactured machinery and implements regionally validated.
4. Development and implementation of mechanisms to harmonize testing protocols across the subregions/regions and create testing centres recognized by all countries. This is important to facilitate regional and global trade in agricultural machinery and implements and to reach a manufacturing capacity that meets the demands of a (sub)regional market.

Element 4: Sustainable mechanization across agrifood value chains

Options to be considered:

1. Consideration of the entire agrifood value chain – from farm inputs through to farming outputs reaching the consumer. By addressing the entire value chain, it is possible to factor in the investments required and appreciate who should pay to ensure sustainability of the agricultural sector. Reduction of post-harvest losses, strengthening of logistics and transportation, improving access to markets, value addition and product safety are all important issues and need to be accorded high priority in the development process; adequate agricultural mechanization can play a critical role in tackling some of these problems.
2. Factoring in the environmental impacts of mechanization technologies both on-farm and off-farm and in processing operations. It is necessary to consider emerging environmental global issues (e.g. climate change and greenhouse gas emissions and how they are related to overall farm production) and food safety, in particular mechanization technologies for the application of herbicides and pesticides.

Element 5: Innovative systems for sustainable technology development and transfer

Options to be considered:

1. Strengthening research and development capacity at the national and regional levels. The focus must be on common agricultural practices and needs, determining what works best under prevailing conditions in the countries and subregions.
2. Enhancement of technology development, testing, transfer and extension systems. These systems will play an invaluable role as SAMA requires new technologies all along the value chain: from systems and sustainable and efficient use of farm power resources, through new sustainable land preparation and crop husbandry techniques, to harvesting, post-harvest handling and processing.
3. Subregional collaboration for the development and transfer of technologies in order to avoid duplication of efforts and, where necessary, to achieve economies of scale and scope.
4. Provision of support for public- and private-sector collaboration, including developing and enforcing systems for regional patenting and licensing of technologies and innovations. It could be effective to begin by establishing an open inventory of “who, where and what” technologies and expertise are available in the subregions.
5. Linking of national and regional research efforts with what is being done elsewhere in the world to determine technologies that have worked well and which could be adapted for use in agrifood chains in the Africa region to develop suitable technologies for small-scale farmers, youth and women, with attention to areas, crops and other factors that have been neglected.

3.2 MAKING SUSTAINABLE AGRICULTURAL MECHANIZATION IN AFRICA ENVIRONMENTALLY SUSTAINABLE

Element 6: Sustainable transformation of land preparation and crop/animal husbandry practices

Options to be considered:

1. Undertaking assessment and analysis of current land preparation and crop husbandry practices in the region, in particular with regard to the types of implements used. It is important to consider their long-term environmental impact and sustainability, including transformation required to make them more environmentally friendly.
2. Short-, medium- and long-term planning. If Africa is to succeed in converting conventional tillage techniques to more sustainable land preparation and crop husbandry practices such as conservation agriculture (AC) on most of its cultivated land, planning is essential. It is vital to understand the implications of the change, including the costs involved in the short, medium and long term, and the impact on food production and productivity.
3. Adoption of sustainable land preparation techniques. Most stakeholders in the agricultural sector are used to conventional practices and technologies that have been adopted for decades or even centuries. Farmers must be convinced that such practices are no longer sustainable, that there is a need to go through a learning process, invest in new and affordable minimum or no-till implements and develop and learn new land preparation and crop husbandry practices.

3.3 MAKING SUSTAINABLE AGRICULTURAL MECHANIZATION IN AFRICA SOCIO-ECONOMICALLY SUSTAINABLE

Element 7: Socio-economic sustainability and the roles of: i) small-scale farmers and their organizations; ii) women; and iii) youth

i) Smallholder farmers and their organizations

Options to be considered:

1. Promotion of custom hiring services for sustainable mechanization of farming operations in agrifood value chains. Custom hiring is an important mechanism through which most smallholders can access agricultural mechanization services. Many services can be availed to smallholders on a custom hiring basis – from crop establishment to harvesting, crop processing and irrigation. Such services are efficiently provided by the private sector, hence the need for a suitable regulatory framework and support policies to encourage investment by the private sector and rural entrepreneurs. The cost of hiring machinery in Africa is high in several countries – equivalent to the market price of 100–500 kg of maize at the peak of the season. Costs need to be lowered by fomenting competition and access to custom hire services.
2. Learning from business models involving interaction between medium-scale and small-scale farmers. Business linkages may be between medium-scale farmers who own farm machinery and can provide mechanization services to neighbouring small-scale farmers, or with entrepreneurs who can be incentivized to establish enterprises to provide mechanization services to small-scale farmers, among others.
3. Development of evidence-based policies (e.g. for credit, land tenure and technology) to support small-scale farmers to access mechanization inputs and services. Schemes include government-supported programmes that help smallholders procure mechanization services from private entrepreneurs. Others involve the production of cash crops (e.g. tea, coffee, cocoa and cotton in Eastern, Central and West Africa) or livestock production (beef in Southern Africa, dairy in Eastern Africa). Invaluable lessons about mechanization can be drawn from these programmes.
4. Promotion of different models of farmer groups, organizations and cooperatives which could be empowered to access mechanization services through local development and community-driven approaches. In addition, it is important to provide support for capacity building and preferential access to institutional credit to procure mechanization inputs.
5. Consideration of welfare and industrial policies to facilitate the mechanization adoption process. Experience from Asia shows that this is possible. In China, for example, the introduction of large tractors had a positive impact on the employment situation. Labour shifted from working on the farm to working in the agricultural machinery and mechanization services industry, with a considerable impact on rural industrialization (Wang, 2013; Renpu, 2014). In India, farm labourers have been employed in massive government-funded rural infrastructure programmes, resulting in a dramatic reduction in poverty (Singh, 2013). Similar welfare programmes exist in Africa to transfer resources to the poor and these programmes can be used to facilitate mechanization.

ii) Women and agricultural mechanization

Options to be considered:

1. Collection, compilation and analysis of gender-disaggregated data (labour, income, decision-making, access to assets and control of resources) to increase awareness among bank managers, research and extension leaders, and policy-makers in order to reduce gender inequalities in access to resources and economic opportunities related to mechanization services.
2. Implementation of legislative changes to assure property rights of women to farm machinery and other related assets. Legal entitlement to land would also facilitate women's access to institutional credit.
3. Ensuring that mechanization positively contributes to the empowerment of women by increasing their labour productivity and reducing the drudgery associated with on-farm and post-harvest operations. Specific attention should be paid to ensuring that women are not displaced and do not lose their sources of income and employment in more traditional systems due to the introduction of mechanization technologies.
4. Design and development of gender-friendly mechanization technologies, capacity-building programmes and support systems for the provision of mechanization services.

iii) Youth and agricultural mechanization

Options to be considered:

1. Provision of targeted training programmes designed to build the capacity of young people to gain access to mechanization technologies and to operate and maintain equipment effectively and profitably.
2. Introduction of vocational education. Given the shift to more knowledge-intensive farming and post-harvest handling operations in Africa, vocational education is imperative in order to train youth to take on critical roles in the emerging commercially competitive agriculture and value-adding activities. Increasing the capacity to offer such training is critical to SAMA.
3. Encouragement and development of a cadre of pioneering young farmers and entrepreneurs. It is necessary to provide appropriate capacity and assistance through programmes such as those offered by several universities and local banks in the region to encourage young university and college graduates to get started in farming. International development agencies should be called on to facilitate such programmes.

Element 8: Human resources development and capacity building for SAMA

Options to be considered:

1. Capacity development throughout Africa, in terms of both human resources and institutional set-up for SAMA. A major challenge is strengthening the capacity of private- and public-sector technology development and transfer organizations, as they play a key role in the process of developing and transferring SAM technologies. Capacity building must involve ministries (of agriculture, education and science and technology), trade and industry, farmer organizations, and private- and public-sector agrifood supply chain stakeholders, in addition to those working in the agricultural machinery and implements supply chains.
2. Establishment of subregional and regional training programmes where economies of scale and scope command. Training programmes must be planned and made available, especially at the subregional level.
3. Revision of curricula of programmes offered by higher education and training institutions and organization of refresher courses for lecturers and instructors on innovative SAM technologies. Machinery manufacturers could be encouraged to attend courses and to bring their new equipment to be used in training.
4. Implementation of targeted training programmes, including vocational training, short courses and evening courses designed to build the capacity of stakeholders involved in mechanization supply chains (sales, repair, maintenance, etc.).
5. Establishment of centres of excellence – endorsed by the public and private sectors– at the regional and subregional levels to carry out capacity development, research and technology transfer.

“...agricultural mechanization needs to [...] be private sector driven, environmentally compatible and climate smart, affordable, friendly to smallholder farmers, and inclusive of the interests of women and youth.”

3.4 OVERARCHING ELEMENTS FOR SUSTAINABLE AGRICULTURAL MECHANIZATION IN AFRICA

Element 9: Need for a long-term vision: policy and strategy issues

Options to be considered:

1. Coordination of the inputs and actions of various stakeholders towards the successful formulation and implementation of SAMA at the national, subregional and regional levels. Coordination is fundamental within the public and private sectors, which encompass a wide range of stakeholders including farmers, managers of agrifood supply chains and their organizations.

2. Translation of element 9 into actionable programmes at the country level. Action may be coordinated by international organizations such as FAO, UNECA, AfDB and AUC, as well as member countries and their RECs.
3. Definition of the priorities of SAMA, within countries and for different farming systems. Efforts should be directed to ensuring that SAMA is focused and consistent with the purpose of agricultural mechanization that countries have identified for their long-term agricultural and economic development plans. Priority areas for different agroecologies and farming systems need to be identified to ensure focused intervention on mechanization at the country level.
4. Development of industrial and trade policies for agricultural machinery and implements, the manufacturing of equipment locally and regionally, and the transfer of know-how, etc. Policies require close coordination within governments, with the involvement of ministries of agriculture, trade and industry, finance and planning, environment and energy.
5. Documentation of past lessons and case studies to assist countries in the planning process and in scaling up their SAM activities. It is necessary to set up adequate and reliable databases of agricultural machinery and implements in use, including those locally manufactured and imported.

Element 10: Creating sustainable institutions for regional cooperation and networking

Options to be considered:

1. Implementation of a study on the capacity and resources of current institutions and organizations dealing with agricultural mechanization in Africa.
2. Review of existing and past models for regional collaboration between the abovementioned institutions and of modalities of financing joint programmes.
3. Implementation of a feasibility study on the establishment of a regional coordinating mechanism (e.g. centre or network) on sustainable agricultural mechanization in Africa.
4. Development of projects and programmes for the involvement of RECs in spearheading SAM initiatives across subregions, including fostering more intercountry programmes.
5. Strengthening the capacity of regional actors to provide support to member countries in the planning and implementation of programmes under SAMA (regional and subregional units of FAO, United Nations Industrial Development Organization [UNIDO] and UNECA as well as the Alliance for a Green Revolution in Africa [AGRA] and AfDB).
6. Fostering of South–South collaboration, in particular to create and support a Centre for Sustainable Agricultural Mechanization for Africa based on the successful Centre for Asia and the Pacific established in Beijing.

4. WHAT NEEDS TO HAPPEN NOW?

At national level:

Detailed guidelines should urgently be developed to help member countries design and formulate policies and strategies for SAMA, covering all three aspects of sustainability of agricultural mechanization interventions: commercial, environmental and socio-economic.

In addition, when developing national strategies, countries need to prioritize policy environments that support the establishment and operation of viable and sustainable businesses. The environment must feature timely and efficient services that increase the farm power available to farmers.

Another pressing requirement involves the development of mechanisms for increasing the flow of financial resources for agricultural mechanization investments from commercial banks and other financial institutions. This would make loans available to emerging small- and medium-scale commercial farmers and entrepreneurs. Only when local financial institutions get actively involved in lending for the mechanization of African agriculture can it be regarded as sustainable.

Profitability is an imperative. If farms are not profitable before mechanization, the likelihood of them becoming profitable as a result of mechanization is low. For this reason, countries should target a few priority commodities that can be easily mechanized, such as cereals like maize, wheat and rice that can lead to substantial increases in total factor productivity.

At regional level:

Strengthening the national, subregional and regional institutional infrastructure that support the development of agricultural mechanization is essential, specifically for research and innovation, standards and testing, manufacturing and trade in agricultural machinery and implements, technology transfer and extension, capacity building in all its aspects, and more. This would require the establishment and/or strengthening of centres of excellence and coordinating mechanisms at national, subregional and regional levels.

Given the small size of many national markets for agricultural machinery and implements and the lack of critical mass in human capacity in many national systems, regional cooperation is necessary – not only for the attainment of economies of scale and scope, but also to share experiences and create sustainable organizations and institutions. In this regard, and as has happened in other regions of the world, the involvement of national, regional and international organizations, including multilateral institutions, governments, private sector and farmer associations, is critical to the success of SAMA.



PHOTOGRAPHY: CREATIVE COMMONS CC0

New technologies such as drones can transform the agricultural landscape.



PHOTOGRAPHY: © CIMMYT/F. BAUDRON

Two-wheel tractor with a direct seeder implement for Conservation Agriculture.



Practical training on the basic technical components of agricultural machinery in Zambia.



Baling in a mechanized system in the Enkangala grasslands of KwaZulu-Natal (South Africa).

5. ACTION POINTS

“...this framework document will have no impact if it remains on the shelf after its finalization. We need to move quickly towards mobilizing the necessary support for implementation.”

– H.E. Josefa Leonel Correia Sacko, commissioner for Rural Economy and Agriculture of the African Union Commission


- 1. SOW and prepare the ground and foundation for sustainable agricultural mechanization**
 - a. Promote and ratify policies, regulations and laws that encourage SAM.
 - b. Support machinery-leasing schemes.
 - c. Encourage sustainable mechanization across the value chain.

- 2. GROW networks, partnerships and transformative initiatives**
 - a. Bring key partners to the table to learn how they can support or partner with existing SAM efforts across the continent.
 - b. Promote cross-border movement of machinery to increase utilization rates across different agro-ecologies.
 - c. Develop subregional standards, strategies and agriculture mechanization technology (AMT) innovation and testing centres.
 - d. Develop progressive trade partnerships that protect the African consumer.

- 3. BUILD the capacity of critical sustainable agricultural mechanization actors**
 - a. Train farmers, including women and youth, on good SAM practices.
 - b. Build the capacity of small-scale mechanization service providers.
 - c. Build technical capacity for design, production, operation and maintenance of AMTs.
 - d. Capacitate mechanization research centres and knowledge institutions.

- 4. REAP the benefits of sustainable agricultural mechanization**
 - a. Encourage schemes to support smallholder farmers to access SAM.
 - b. Prioritize strategic value chains that can help pave the way for successful SAM.
 - c. Invest in funds and guarantee mechanisms that work exclusively on SAM.

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This document is a synopsis of

Sustainable Agricultural Mechanization: A framework for Africa.

The framework presents ten interrelated principles/elements to guide Sustainable Agricultural Mechanization in Africa (SAMA). Further, it presents the technical issues to be considered under SAMA and the options to be analysed at the country and subregional levels. The analysis in the framework calls for a specific approach, involving learning from other parts of the world where significant transformation of the agricultural mechanization sector has already occurred within a three-to-four decade time frame, and developing policies and programmes to realize Africa's aspirations of Zero Hunger by 2025.

This approach entails the identification and prioritization of relevant and interrelated elements to help countries develop strategies and practical development plans that create synergies in line with their agricultural transformation plans. Given the unique characteristics of each country and the diverse needs of Africa due to the ecological heterogeneity and the wide range of farm sizes, the framework avoids being prescriptive.