REPUBLIC OF KENYA

MINISTRY OF AGRICULTURE, LIVESTOCK, FISHERIES AND COOPERATIVES

NATIONAL AGRICULTURAL MECHANIZATION POLICY

2021

Map of Kenya showing Counties

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FOREWORD

Agriculture remains the backbone of Kenya's economy. It is one of the most important sectors in the economy, contributing approximately 26 percent of the Gross Domestic Product (GDP), 60 percent of the export earnings and employs 75 percent of the national labour force. Over 80 percent of the Kenyan population lives in the rural areas and derive its livelihoods directly or indirectly from agriculture. Development of agriculture is also important for poverty reduction since most of the vulnerable groups including pastoralists, landless, and subsistence farmers depend on agriculture as their main source of livelihoods. Given its importance, the performance of the sector therefore directly impacts on the whole economy. The sector is without doubt a key driver towards the realization of 10 percent economic growth annually as envisioned in the Kenya Vision 2030 and Sustainable Development Goal No. 1 and 2 with respect to reduction of extreme poverty and hunger.

Mechanization is one of the major agricultural production inputs and a catalyst for rural development. Application of mechanization technology increases power to agriculture, largely enhancing productivity of human labour. Despite mechanization being vital for agricultural production, most farming communities lack machines to undertake their operations efficiently and effectively. Currently the use of motorized power stands at 30 percent, hand and animal draught power (ADP) at 50 percent and 20 percent respectively.

The policy intends to: create an enabling environment for mechanization development, build capacity for training, research and technology development, promote mechanization for increased productivity and providing quality assurance. The policy sets out goals and directions for present and future development and management of mechanization in the country. It consists of measures and guidelines which the government shall undertake to achieve optimal development of the sub-sector and from which laws governing its administration and management shall be formulated.

Additionally, the policy aims at giving a clear direction for sustainable growth and development of the agricultural mechanization sub-sector. The proposed interventions will be supported by appropriate institutional and legal framework and stakeholders in both national and county governments for successful implementation.

The implementation of this policy will thus result in an enabling environment for a vibrant agricultural mechanization industry; and I am confident that this will lead to the realization of increased productivity, food security, income and environmental sustainability as outlined in the Kenya Vision 2030.

The Agriculture Sector Mechanization Policy takes cognizance of the obligations of each level of government with regard to its development and implementation. The policy recognizes and upholds the participation of all the relevant stakeholders including farmers and the communities in its implementation, as a national value and principle of governance.

The implementation of National Agriculture Sector Mechanization Policy will require active stakeholder participation. It will be complemented by institutional and legal frameworks and sectoral strategies, which will provide an enabling environment for orderly and rapid development of the mechanization sub-sector. The policy will further seek to stimulate and guide agricultural mechanization development through targeted technical support, intensified investment, improved research and technology, extension services and capacity building for both staff and farmer organizations, to ensure development and sustainability of the sub-sector.

Hon. Peter Munya, M.G.H., E.G.H.
Cabinet Secretary
Ministry of Agriculture, Livestock, Fisheries and Cooperatives

PREFACE

Agriculture continues to play an important role in the socio-economic development of the country by ensuring food security, creating employment for the rural population, providing raw materials to the manufacturing sector and generating income through domestic and export trade. The sector has continued to play this role in the face of mounting challenges posed by environmental degradation, climate change, unfavourable terms of trade and increased competition with other sectors for production resources.

Agricultural mechanization plays a key role in increasing efficiency and effective utilization of the productive resources. However, a number of reasons have hindered enhanced adoption of the technology along the production value chain. The environment for mechanization has in the past been unfavorable for adoption while capacity for training, research and technology development has been inadequate. The promotion of mechanization for increased productivity and provision of quality assurance are broadly insufficient.

The relatively low level of mechanization is due to a number of challenges facing the sub-sector. These include; inadequate training, research and technology development; weak local manufacturing and distribution, insufficient agricultural mechanization quality assurance, low level of investments in mechanization services, poor extension and technology adoption, and weak institutional and legal framework. The cross-cutting issues affecting mechanization include matters related to vulnerable groups, gender and youth, negative effects of environment, inappropriate land use and climate change.

The Agriculture Sector Mechanization Policy is based on views and expert opinions collected and collated through a structured all-inclusive and consultative process that brought together stakeholders drawn from the public, private and civil society organizations. The consultation process was carried out around identified thematic areas that formed the nuclei of stakeholder engagement, consensus building, workshops and submission of memoranda. Sectoral policies and strategic plans that have been developed by other Government ministries and agencies were collaborated to ensure that the policy recommendations are relevant and consistent.

The implementation of this policy will require the goodwill and commitment by all stakeholders at the national and county governments to ensure smooth implementation of the recommendations. The Government will provide an enabling policy environment through institutional and financial support.

We believe that this Policy will sustainably raise the levels of agricultural mechanization for increased productivity of the sector and income to the country.

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Special thanks are due to the dedicated team that developed this policy from the following institutions and organizations: State Department for Crop Development and Agricultural Research (SCD&AR), State Department for Livestock (SDL), State Department for Fisheries, Aquaculture and the Blue Economy (SDFA&BE), Kenya Agricultural and Livestock Research Organizations (KARLO), Agriculture and Food Authority (AFA), Universities and Kenya Farmers Association. Their commitment to the task is highly appreciated. Their commitment to the task is highly appreciated.

Contributions of the members of the Intergovernmental Thematic Working Group on Policy, Standard and Legislations, under the auspices of the Intergovernmental Secretariat, to the process are highly appreciated.

The involvement of other individuals, groups and organizations not mentioned herein is highly appreciated. Their input will go a long way towards the realization of the objectives of the policy.

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Eng. Richard M. Kanui,
Agricultural Engineering Secretary

ACRONYMS AND ABBREVIATIONS

ADP	Animal Draught Power
AFC	Agricultural Finance Corporation
AFA	Agriculture and Food Authority
AgGDP	Agriculture Gross Domestic Product
AIDS	Acquired Immuno-Deficiency Syndrome
AMS	Agricultural Mechanization Stations
AMTU	Agricultural Machinery Testing Unit
ASDS	Agricultural Sector Development Strategy
ATDCs	Agricultural Technology Development Centers
ATN	Africa Tillage Network
CBOs	Community Based Organizations
CEO	Chief Executive Officer
CGA	Cereal Growers Association
CMA	Capital Markets Authority
CMC	Cooper Motors Corporation
EAGC	East Africa Grain Council
FAO	Food and Agriculture Organization
FEUSHA	Farm Equipment Use in Small Holder Agriculture
GDP	Gross Domestic Product
HIV	Human Immuno-deficiency Virus
ILRI	International Livestock Research Institute
JICA	Japan International Cooperation Agency
KALRO	Kenya Agricultural and Livestock Research Organization
KAM	Kenya Association of Manufacturers
KEB	Kenya Engineers Board
KeBS	Kenya Bureau of Standards
KENAFF	Kenya National Farmers Federation
KEPSA	Kenya Private Sector Alliance
KIRDI	Kenya Industrial Research and Development Institute
KRA	Kenya Revenue Authority
M&E	Monitoring and Evaluation
MFIs	Micro Finance Institutions

MOALF&C	Ministry of Agriculture, Livestock, Fisheries and Cooperatives
MoE&P	Ministry of Energy and Petroleum
MOH	Ministry of Health
MoI&ED	Ministry of industrialization and Enterprise Development
NACC	National AIDS Control Council
NACOSTI	National Commission for Science Technology & Innovation
AMB	Agricultural Mechanization Board
NAMP	National Agricultural Mechanization policy
NAMS	National Agricultural Mechanization Strategy
NARS	National Agricultural Research System
NCPB	National Cereals and Produce Board
NEMA	National Environment Management Authority
NGOs	Non-Governmental Organizations
PHS	Plant Hire Services
PWD	People With Disabilities
PLWHiv	People Living With HIV
RTDCs	Rural Technology Development Centers
SAPs	Structural Adjustment Programmes
SCS	Soil Conservation Services
SDA	State Department of Agriculture
SRA	Strategy for Revitalizing Agriculture
THS	Tractor Hire Services
UNIDO	United Nations Industrial Development organization
VAT	Value Added Tax
WAFC	World Agro forestry Centre

EXECUTIVE SUMMARY

Mechanization is a key input in the agriculture sector value chains. The main types of mechanization in the country include the use of animal-drawn and motorized machinery, implements and equipment. Development and promotion of these mechanization initiatives have been carried out by the Government in collaboration with the private sector. In line with the Kenya Vision 2030 agricultural mechanization is expected to play a critical role in putting more land into agricultural production.

The country has not operated with a clearly defined agricultural mechanization policy. This, together with the existing strategies has not sufficiently addressed agricultural mechanization challenges leading to the low level of agricultural mechanization in the country. The consequences have been environmental degradation, social and economic problems including deterioration in produce quality, low agricultural production and under-utilization of agricultural land.

The past agricultural reforms coupled with the increase in population have generally resulted in diminishing size of farm units, which have negatively impacted on agricultural mechanization. Furthermore, this trend is expected to continue in the foreseeable future and hence it is imperative that the mechanization activities take cognizance of this fact.

Furthermore, the need for agricultural mechanization has been brought to the fore by the decreasing availability of farm labour, lack of interest by the youth in farming activities, adverse change in climate, and HIV and AIDS prevalence. Coupled with these, there is need for more power for effective and efficient application in modern commercial agriculture.

The objective of this policy is to sustainably raise the level of agricultural mechanization for increased productivity and income of agricultural producers. These will be achieved through training, research and technology development, local manufacture and distribution, agricultural mechanization quality assurance, investments in mechanization services, extension and technology adoption and improved institutional and legal frameworks.

The institutional and legal framework will be reformed to ensure participation by all stakeholders for sustainability. Institutions to be set up include Agricultural Mechanization Board, National Agro-fisheries Mechanization Research Institute (RIMALFA), Agricultural Mechanization Training Institute (AMTI), Agricultural mechanization Development Fund (AMDF) and Agricultural Mechanization Testing Centre.

CHAPTER 1: INTRODUCTION

1.1 Background

Agriculture is the backbone of the Kenyan economy contributing directly 34.1 percent of the Gross Domestic Product (GDP) in 2019 and another 25 percent indirectly, it accounted for 69.7 percent of total exports (KNBS, 2020). The Sector employs over 80% of Kenya's rural work force and provides more than 15.5% of formal employment (KNBS, 2018). It generates about 70 percent of raw materials for agro-industrial production and generates 45 percent of government revenue. The sector is therefore a key driver towards the realization of 10 percent annual economic growth envisioned in Kenya Vision 2030. It also has a critical role to play with respect to reduction of extreme poverty and hunger in line with the Sustainable Development Goals 1 and 2. Mechanization as a key input has not been explicit in transforming agriculture in tandem with increasing food requirements locally and globally. The key agricultural sub-sectors which require interventions in mechanization to boost productivity and enhance agribusiness are; crop, livestock and fisheries.

Crops sub-sector contribute greatly to the economy where the industrial crops contribute up to 70% of agricultural exports and these include tea, coffee, sugarcane, cotton, sunflower, pyrethrum, barley, tobacco, sisal, coconut and bixa. Tea is a leading foreign exchange earner and its export value was KES 104.1 billion in 2019 while fresh horticultural crops contributed KES 144.6 billion, (KNBS, 2020). Food crops contribute about 32% of the Agriculture Gross Domestic Product (AgGDP) and 0.5% of exports earning.

The livestock sub-sector accounts for 12 percent of the national GDP and about 40 percent of the agricultural GDP. The industry supplies the domestic requirements of meat, milk, eggs and honey products and other livestock products while accounting for about 30 percent of the total marketed agricultural commodities. The sub-sector earns the country foreign exchange through export of live animals, meat, germplasm, hides, skins and their products, dairy products and processed pork products. It also employs about 50 percent of the country's agriculture sector labour force. The sub-sector also contributes substantial earnings to households through sale of livestock and livestock products, and provides raw material for agro-industries.

The fisheries sub-sector contributes 0.8 percent of the country's GDP and about Kshs. 3 billion in foreign exchange. According to the Statistical Bulletin (2019), Kenya's fish production is dominated by freshwater capture fisheries, which account for 80 percent of national fish production. Marine waters contribute approximately 6 percent and aquaculture approximately 14 percent.

1.2 Overview of Agricultural Mechanization

Agricultural mechanization is a major production input that encompasses application of mechanical technology through the use of machinery, tools and equipment and increased power

to agriculture, largely as a means to enhance the productivity along crops, livestock and fisheries value chains. Agricultural mechanization aims at increasing the power inputs to agricultural activities hence intensified production and enhanced value addition resulting to decreased cost of production and reduction of drudgery in agricultural activities. It also improves the timeliness and efficiency of farm operations; accomplishes tasks that are difficult to perform without mechanical aids; improves the quality and value of work produced and processed products; creates employment opportunities and sustainable livelihoods; provides agriculture-led industrialization and markets for rural economic growth among others.

1.3 Global Agricultural Mechanization

According to Hans Binswanger (1986), between the 16th century and the mid-19th century, the now developed country like Great Britain saw a massive increase in agricultural productivity and net output, associated with mechanization amongst other factors.
With the rapid rise of mechanization in the late 19th and 20th centuries, particularly in the form of the tractor, farming tasks could be done with a speed and on a scale previously impossible. These advances, joined to science-driven innovations in methods and resources, have led to efficiencies enabling certain modern farms in the in Europe and America and a few other nations to output volumes of high-quality produce per land unit at what may be the practical limit.

During the early 1900s, the first U.S. factory for tractors driven by an internal combustion engine was constructed, while in 1966, Electronic monitoring devices allowed farmers to plant crops more efficiently. Attached to mechanical planters and air seeders, the devices monitor the number and spacing of seeds being planted. In 1990s, similar devices were used at harvest time for yield mapping, or measuring and displaying the quality and quantity of a harvest as the combine moves through the field. In 1994, Farmers began using Global Positioning System (GPS) receivers. Ushering in the new "precision agriculture," farmers began using Global Positioning System (GPS) receivers to record precise locations on their farms to determine which areas need particular quantities of water, fertilizer, and pesticides.
Lastly, during the 21th century, agricultural mechanization is advancing to the use of precision agriculture, GIS tools and devices, internet and unmanned tractor.

1.4 Agricultural Mechanization in Africa

Sub Saharan Africa (SSA) has the lowest uptake of agricultural mechanization in the world and largely depends on manual labour (Bymolt and Zaal, 2015). In the 1960s many countries in SSA, Kenya included established public sector operated machinery hire services with the objective of enabling small holder farmers accessing these services to produce high value crops (Ahmed, 2015). These services however, have faced several challenges and most of them are no longer operational or are inefficient (Ahmed, 2015). Farm power availability per area of agricultural land has declined or stagnated in many SSA countries over the past decades resulting on increasing reliance on human muscle power (Baudron et al., 2014; Vergnani, 2013). The number of tractors in SSA has declined from 235,000 in 1970 to 222,000 in 2000 (Vergnani, 2013). The East African countries of Kenya, Uganda and Tanzania have witnessed

a negligible improvement in mechanization over the last forty years; the situation is that of declining trend despite improvement at the global level (Keya and Rubaihayo, 2013). The three countries had more tractors than India in the 1980s, however; by 2005 India had hundred times more tractors in use than Kenya, Uganda and Tanzania combined (Keya and Rubaihayo, 2013).

1.5 Kenyan Perspective

The major sources of agricultural power available include human, animal and motorized (mechanical, electrical, and renewable) energy. The use of motorized power stands at 30 percent, manual 50 percent and Animal Draught Power (ADP) at 20 percent as at 2017 against the target of 50 percent of motorized power as per the Kenya Vision 2030.

1.6 Mechanization by Production Systems

Agricultural production consists of crops, livestock and fisheries systems. These require mechanization to increase productivity and tap the enormous existing potential. The systems consist of small, medium and large-scale farms averaging 0.5 to 5, 5 to 100, and over 100 hectares, respectively (ASTGS). There are approximately 4.5 million small-scale farmers in Kenya, including 3.5 million crop farmers, 600,000 livestock farmers and 130,000 fisher folks (ASTGS), predominantly in the high and medium rainfall areas that produce over 75 percent of agricultural production.

1.6.1 Crop Production Systems

Farmers under the large-scale system usually own specialized and custom-built equipment and keep up with recent technological advancement. Farmers in the medium scale farming system mostly hire machinery and equipment. Mechanization in the small-scale system is limited to a few farm operations such as land preparation while other operations are done manually. Mechanization services in this category are mainly availed by private service providers. Comparatively, use of machinery on small-scale systems is very low in relation to the medium and large-scale agricultural production systems.

1.6.2 Livestock Production Systems

Most of the livestock is raised in extensive systems with communal grazing and free ranging of rain-fed rangelands. Intensive production is practiced in the high rainfall areas, semi-intensive systems are found in semi-arid lands and extensively in arid areas. Use of mechanized livestock production systems is very low. However, potential for mechanization is high to meet the growing demand for livestock and livestock products.

1.6.3 Fisheries Production Systems

Fisheries production systems include capture which takes place in the marine waters, inland waters and aquaculture which can be land based in ponds or water based in cages. Mechanization has played a major role in the development of aquaculture infrastructure. Production systems in capture fisheries are categorized into artisanal fishing and semi-industrial fishing. Aquaculture systems are categorized as semi-intensive, intensive and

extensive depending on the inputs and production system. However adoption of mechanized production system in aquaculture and artisanal fishing is low.

1.7 History and Initiatives of Mechanization in Kenya

Kenya's agriculture system has undergone tremendous evolution over the last nine decades. In the colonial era (1920-1960), commercial agriculture was limited to white settler farmers. After independence in 1963, the policy focus shifted to increased participation of indigenous Africans in commercial agriculture. The large-scale farms were highly mechanized in comparison with indigenous African farms. Post-independence policies emphasized on broad self-sufficiency in agricultural products and gradual reduction of government control in the production process.

In early 1990s, upon economic liberalization both the input and output markets were opened to forces of demand and supply thus, affecting most agriculture commodities. Generally, liberalization led to increased input sources and output market channels; wide variations in both input and output prices including agricultural machinery and wide fluctuations in seasonal commodity production.

1.7.1 Agricultural Mechanization Services

Agricultural Mechanization Service was established in 1947. The service, initially known as Soil Conservation Services (SCS) involved use of heavy earth moving machinery (the Plant Hire Service (PHS)) to open up land for agricultural development in the former white highlands. Other functions included construction of soil conservation and water harvesting structures, bush clearing and land leveling. Through this, more land was brought into agricultural production.

In 1965 the Government established Tractor Hire Service (THS) whose broad objectives were to open new land for wheat production, introduce modern farming practices, stimulate and encourage private ownership of farm tractors and machinery, and train the farming community on the general techniques for good seedbed preparation. The amalgamation of THS and PHS in 1981, resulted into the creation of Agricultural Mechanization Services (AMS).

The County Governments operate Agricultural Mechanization Service (AMS) stations offering services to farmers such as dam construction and de-silting, construction of farm access roads and soil conservation structures; and opening up of new land to agriculture through bush clearing, ripping, and leveling. The services are categorized into two types namely Plant Hire Service (PHS) and Tractor Hire Service (THS) for farm tractors. By the year 2012, a total of 78 plants and 115 farm tractors were available in 24 AMS stations countrywide. At present, more plant and farm tractors are being acquired by individual Counties following the devolution of agricultural services.

1.7.2 Agricultural Machinery Testing Unit

The unit was set up in 1959 in Nakuru, with responsibility of testing and evaluating both local and imported agricultural machinery and equipment for the purpose of authorizing firms to sell their products in the country. Further, the unit was charged with continuous monitoring and evaluation for quality assurance. Its operations were discontinued during the implementation of Structural Adjustments Programme (SAPs) in the early 1990s.

1.7.3 Agricultural Technology Development Centres

They were initially set up as Rural Technology Demonstration Units to undertake demonstrations on agricultural mechanization technologies. Later the units were transformed into Rural Technology Development Centers (RTDCs) with additional responsibility of adaptive research, design and fabrication of agricultural engineering technologies.

In 2006, as part of the Ministry's strategy to revitalize agriculture, they were rebranded Agricultural Technology Development Centres (ATDC) with broad areas that included; agricultural mechanization; agro-processing, renewable energy and storage. The ATDCs are assisting the National Government in informing policy development, quality assurance and standards, monitoring and evaluation of agricultural engineering technologies in agriculture sector. The distribution of the 10 ATDC regional centers across the country is based on agro-ecological zones to address agricultural mechanization challenges among others to agricultural productivity.

1.7.4 Farm Equipment Use in Small Holder Agriculture Project

This project promoted utilization of agricultural mechanization technology amongst the small holders (up to 4 hectares) to increase production and value addition at farm gate level. In 1990, the Ministry formulated the Farm Equipment Use in Small Holder Agriculture (FEUSHA) Project to address mechanization needs especially in the production of wheat, maize, rice and beans. The project identified appropriate tools and equipment for small holder farmers and conducted adaptive trials. Most of the equipment promoted succeeded but could not be scaled up due to low capacity of local manufacturing entities (Jua Kali) to produce standardized products, promotion and commercialization of the tools and equipment.

1.7.5 Mechanization and Soil Conservation

The Soil Conservation Service in Kenya was started during the 1930s with broad objective of combating declining soil fertility and productivity in cultivated and overgrazed areas using mechanized systems resulting to soil conservation stations fully equipped with earth moving machinery. From 1937 to the end of the colonial era in 1963, it became compulsory to practice soil conservation due to the situation on soil degradation.

Throughout the late 1940s and the 1950s, soil and water conservation initiatives in the areas occupied by Africans were promoted through the African Land Development Board (ALDEV) and the Swynnerton Plan (1953-1957). The efforts of the ALDEV Ten Years Plan (1946-1955) and its subsequent endeavors up to 1963 were mainly focused on reconditioning of African

areas and settlement. Resulting from the initiatives of the Swynnerton Plan, most of the settled high medium-potential areas were terraced with the aid of rudimental hand tools, labour coercion and restrictive regulations.

The decade after independence was marked by low soil conservation activities that resulted in erosion accelerating to alarming levels with signs of decline in soil fertility. To address this challenge, the country in 1974, developed the National Soil and Water Conservation Project (NSWCP) supported by Swedish International Development Agency (SIDA). The project supported the development and acquisition of hand tools. The tools were supplied to farmers as an incentive for development of soil and water conservation structures. The project ended in 1998. Agricultural land has reverted back to serious degradation due to lack of an institutional framework to take over activities implemented by Mechanized Soil Conservation Service (colonial era) and National Soil Conservation Project (Post-Colonial) which served small holder farmers.

1.7.6 Second Kennedy Round More food for Africa Programme

The Second Kennedy Round More food for Africa programme (2KR-2013-2017) enhanced land preparation, contributed to increased area under rice production, reduced drudgery in production within the rice value chain. In addition, it also increased efficiency, productivity and profitability as well as reduced post-harvest losses in rice growing areas. This project started in 2013 and ended in 2017.The scope of the project involved training of beneficiaries in seven (7) rice irrigation schemes (Mwea, Bunyala, Ahero, West Kano, Perkerra, Hewani and Wema) and supply of assorted rice production agricultural machinery which included, tractors, combine harvester, reapers and threshers. The project stimulated the private sector to invest in combine harvesters and modern rotavators in Mwea and successfully improved mechanization in Mwea by 80 percent. This improved earnings and increased farmers profit by 40 percent. The success in Mwea was contributed to by strong management of the cooperative.

1.7.7 Climate Smart Agriculture Mechanization Program

Conservation Agriculture Sustainable Agriculture Rural Development Project (CA-SARD) in collaboration with stakeholders such as African Conservation Tillage Network (ACTN) piloted the use of conservation agriculture machinery with moderate success. Kenya Draught Animal Technology Project (KENDAT) promoted the use of animal draught conservation agriculture machinery which later, after evaluation resulted into promotion of small motorized conservation agriculture machinery. Common Market for Eastern and Southern Africa (COMESA) supported use of land preparation CA equipment. The above projects have been learning grounds for major stakeholders in the mechanization sector.

1.7.8 Incubation of SMEs in Agricultural Mechanization

The Government in collaboration with stakeholders provides incubation services to SMEs specialized in agriculture-based enterprises including machine development & fabrication as well as agro-processing and value addition. The initiative has been successful and this is demonstrated by capacity of the SMEs to undergo certification process and the availability of

products in the market. The main public institutions that offer such services include Agricultural Technology Development Centres (ATDC), Kenya Industrial Research Development Institute (KIRDI), Kenya Industrial Estates (KIE) and education training institutions such as TVETS and universities.

1.7.9 Grain Drying and Storage Programme

The Government has been implementing the Grain Drying and Storage Project since 2013 to comprehensively address grain quality issues with a view of limiting post-harvest losses, encourage grain aggregation and aflatoxin contamination control hence enhance marketing. The project components included provision of mobile grain dryers and construction of community-based medium capacity grain drying and storage facilities. A total of 36 dryers have been distributed and 11 storage facilities constructed in various grain growing regions of the country. Full utilization of the facilities is hampered by among other factors management of farmer groups, fluctuation in production levels and inappropriate business model.

1.8 Agricultural Mechanization under Devolution

After devolution in 2013, the Ministry transferred the Agricultural Mechanization Service function to the counties and since then a number of counties have operationalized the function. They have since then acquired machinery and equipment including farm tractors, dryers, cooling and processing machineries. In addition, a number of counties have acquired and distributed the equipment to producer groups and cooperatives.

1.9 Justification for Agricultural Mechanization Policy

Mechanization plays a key role in enabling the growth of commercial agri-food systems and improving the efficiency of operations along the agriculture value chains. As such, it can have a major influence on the availability and accessibility of more nutritious food, contributing to increased household food security. Agricultural mechanization covers all levels of production and processing technologies, from simple and basic hand tools to more sophisticated and motorized equipment. Agricultural Mechanization eases and reduces drudgery, relieves labour shortages, improves productivity. In addition, it also improves 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 while contributing to the sustainable development of the agricultural sector. However, in the absence of a clear policy on agricultural mechanization the transformation of agriculture in Kenya will not be realized. For this reason, the Government seeks to focus on development of a National Agricultural Mechanization Policy for long-term economic development.

CHAPTER 2: SITUATIONAL ANALYSIS

2.1 Access and Distribution of Agricultural Machinery

Access and distribution of machinery and equipment play a central role in the development of agricultural mechanization. The use of motorized power in Kenya stands at 30 percent, manual 50 percent and Animal Draught Power (ADP) at 20 percent as at 2017.Farmers, fisher folk and processers access mechanization services from private service providers and public sector institutions including Agricultural Mechanization Services (AMS) stations and Agricultural Technology Development Centers (ATDCs).The public sector institutions and cooperatives that provide agricultural mechanization services face a number of challenges which includes limited resources and capacity resulting into inadequate service delivery.

Dealers who supply machinery and equipment are mostly located in established urban centres resulting in higher costs for rural farmers and fisher folk who purchase them. Despite the government prioritizing local manufacturing, agricultural machinery manufacture is still faced with challenge of high cost of raw materials, unfavorable taxation regime, high cost of energy and labour. Additionally, farmers and other users of the machinery are disadvantaged as they pay for road fuel levy despite the fact that most of the work they do is in their area of production. This has discouraged entrepreneurs from investing in local machinery and equipment manufacture.

Mechanization in the small-scale system is limited to only a few operations such as land preparation and transportation while other operations are done manually. Mechanization services in this category are mainly availed by private service providers. Comparatively, use of machinery on small-scale systems is very low in relation to the medium and large-scale production systems.

The low access to mechanization by small-scale producers is associated with the following; high cost of agricultural machinery, low awareness, inappropriate and inadequate agricultural technology, declining land size, uncoordinated producers and poor management of producer organizations.

A survey carried out in 2016 showed that the level of agricultural mechanization varied across enterprises and operations along the value chains. Land preparation had the highest level across most enterprises with wheat at over 95 percent. Planting operation is only mechanized in a few crops such as maize at 56 percent and wheat at 95 percent. While weed control is a high labour intensive operation it has realized low levels of mechanization across enterprises with maize at 46 percent and tea at 14 percent. The highest application of mechanical weed control occurs in wheat at over 95 percent. Harvesting is another labour intensive operation that escalates production costs when done manually. Its levels are low in most enterprises except for wheat at 98 percent and paddy rice at 55 percent. Levels of use of mechanized processing and value

addition are rising significantly across enterprises due to availability of relevant machinery and equipment.

Mechanization in livestock systems is mostly concentrated in hay baling, forage and feed production and stands at between 37.5 to 40.9 percent. Mechanization in fishery systems is divided into capture and aquaculture. Under the capture system, small scale fisher-folk usually apply artisanal techniques such as non-motorized boats and nets, with use of motorized boats remaining low. Capture operations for Semi-industrial fisher-folk is fully mechanized. Under aquaculture small scale fisher-folk utilize manual labour during excavation, harvesting and pond lining while large scale fisher-folk use motorized machinery and equipment including excavators, feeders and aerators in their operations. Constraints faced by farmers and mechanization service providers include high cost and inadequate information on availability of appropriate machinery and equipment as well as insufficient operational skills.

2.2 Agricultural Mechanization Quality Assurance

The agricultural machinery and equipment are imported into the country and allowed for use without assessing their local suitability. The importation of used machinery is not regulated in terms of machinery hours or age which compromises the efficiency and effectiveness. The machinery and equipment are sourced as per the manufacturer's specifications, some of which are not in suitable with Kenyan conditions.

In addition, some locally manufactured agricultural implements are made of poor-quality raw materials leading to substandard products. Besides the machinery and equipment, there are no clear skills requirement for operators, fabricators and artisans for agricultural machinery.
Whereas certification for structural stability for agro-structures and processing facilities is carried out by the respective Government Ministries responsible for Public Works, there are no adequate institutional structures in place to ensure that the facilities operate and function effectively. In addition, consultants and contractors involved in the construction and installation of these facilities often do not possess the requisite qualifications that may lead to performance failure. Further, there is no regulatory framework to ensure compliance to standards.

2.3 Investment in Agricultural Mechanization

Investment in agricultural mechanization is undertaken by both public and private sectors. Public investment is mainly through infrastructure development, training and direct service provision to farmers and fisher folk. However, up to the year 2020 agriculture sector allocation from the national budget has been less than 5 percent, against that of at least 10 percent as recommended in the 2014 Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods. Further, agricultural mechanization sub-sector receives only a small and inadequate proportion of the allocation for investment. This has led to inadequate resources to acquire, maintain and operate the machinery hire services offered by the government.

Private sector investment in agricultural mechanization is low. This is due to low returns to investment associated with heavy capital required and high maintenance cost. Financial institutions such as commercial banks offer credit facilities for acquisition of machinery and equipment though at interest rates beyond the reach of targeted farmers, fisher folks and service providers.

2.4 Research and technology development

Before 2014 agricultural mechanization research was being undertaken by various institutions; Kenya Agricultural Research Institute (KARI), Kenya Sugar Research Foundation (KESREF), Coffee Research Institute (CRI) and Tea Research Foundation (TRF) and universities and other research institutions.

Through KALRO Act of 2013 the KARI was restructured and established combining four former research institutes (KARI, KESREF, CRI and TRF). The Kenya Agricultural and Livestock Research Organization (KALRO) is mandated to carry out all agricultural research in crops and Livestock subsectors including agricultural mechanization. In 2015, the Agricultural Mechanization Research Institute (AMRI) was established with the mandate of carrying out research in agricultural mechanization technologies and innovations geared at enhancing productivity and value addition for crops and livestock in Kenya. However, its performance has been hampered by limited funding and low capacities in human resource and infrastructure. Other institutions involved in research in agricultural mechanization include Universities, Kenya Industrial Research Development Institute (KIRDI), Private companies and non-governmental organizations (NGOs). However, agricultural mechanization research has been uncoordinated and not prioritized. In addition, information sharing among the institutions and other stakeholders has been poor. There is limited research on fisheries mechanization.

There are several institutions involved in fabrication of agricultural mechanization technologies including private companies, Agricultural Technology Development Centres (ATDCs), non-governmental organizations NGOs and the informal sector. There are many agricultural technologies that have been developed and modifications/improvements made in the area of farm mechanization, irrigation, post-harvest handling and agro-processing. These organizations are also involved in promotion and dissemination of mechanization technologies

2.5 Training, Extension and Technology adoption

Agricultural mechanization adoption requires extension services. Skilled human resource is critical in agricultural mechanization extension. The skills are required by artisans, operators, producers and other end-users, service providers (mechanics, engineers), suppliers and extension agents. Training is offered by universities, middle level colleges and machinery dealers. Extension services are offered by public sector, private companies and non-governmental organizations. However, the trainings offered by these institutions are not regulated hence lack standards. In addition, there is no certifying authority for agricultural

machine operators. The existing extension packages are deficient of mechanization skills and hence low rate of adoption.

2.6 Modernization of Agricultural Mechanization

The situation in the country requires introduction and promotion of machinery and equipment at all stages of the value chains. The range should cater for both large- and small-scale users. Modernization of agricultural mechanization is an important aspect in enhancement of food quality, preservation of operator safety and comfort. It entails use of ICT and renewable energy. The use of ICT in machinery has the ability to achieve high precision and reduce cost of operation. Several large scale farms have modernized their operations by utilizing ICT and this has resulted to increased efficiency and profits. In small holder production systems, the use of ICT and renewable energy options have not been exploited to the benefit of agricultural mechanization. Consequently, the youth have not found agriculture attractive. Training institutions in agricultural mechanization should infuse modern technologies in their curriculum including use of modern machinery.

2.7 Sustainable Land management and Climate Change

In Kenya, the major causes of land degradation are deforestation, overgrazing, land overuse, use of traditional farming methods and effects of human activities. The mechanized operations in soil and water conservation, land preparation and other farming activities are low due to inadequate technical skills, inaccessibility and high cost of agricultural mechanization. In addition, improper use of agricultural machinery has continued to exacerbate land degradation.

The major climate change hazards associated with agriculture are rampant floods and droughts. Global warming causes change in temperature regimes and precipitation patterns, which affects the time window for agricultural operations.

Conservation agriculture machinery are inaccessible and of high cost. Consequently, the technology is inhibited by inadequate technical skills. Few large-scale farmers have been able to use the technology while medium and small-scale farmers have limited access to the technology. Environment conservation is key to agricultural development as it assures sustainability of natural resource base for use by future generations.

2.8 Institutional and Legal Framework

There are various institutions that are involved either directly or indirectly in the agricultural mechanization sub-sector. These institutions are classified as public, private and development agencies and are interlinked by different mandates and responsibilities along the mechanization value chain. They include farmer/pastoralist/fisher folk organizations, agro-processors, research institutions, private sector and Non-Governmental Organizations. At the National level, the subsector is served by Agricultural Engineering Services Directorate (AES) in the Ministry of Agriculture, Livestock, Fisheries and Cooperatives, which has ATDCs as field

stations. The counties have agricultural engineering units in charge of agricultural engineering services and include the Agricultural Mechanization Services (AMSs) stations. In addition, public institutions offering agricultural mechanization training include the universities, colleges, Kenya Institute of Highway and Building Technology (KIHBT) and TVETs. The institutions involved in agricultural mechanization research include universities, KALRO-AMRI and Kenya Industrial Research Development Institute (KIRDI). The Kenya Bureau of Standards (KEBS) constitutes committees to develop standards and ensures adherence.

The agricultural machinery dealers, service providers and manufactures have no umbrella association. However, the private institutions that offer agricultural mechanization services include private sugar companies, cooperative societies among others.

2.9 Cross Cutting Issues in Agricultural Mechanization

Cross cutting issues identified in agricultural mechanization are in reference to persons with special needs and gender considerations. For persons with special needs, inadequate employment opportunities, lack of capital and low skills necessary to enhance agricultural productivity affects adoption of agricultural mechanization. Gender roles and responsibilities are dynamic and they respond to changing economic circumstances. Different genders have specific roles in agricultural mechanization. Generally, the males are involved in manufacturing, sales and operation while females and youth have limited roles other than learning basic skills and technology. In agricultural development, men, women and youth are recognized as important players, but women and young farmers generally face more socio-cultural and economic constraints than men do. However, according to Kenya Youth Agribusiness Strategy 2017 - 2021, majority of the farmers engaged in agriculture are aged between 50 and 65 years. This domination of agriculture by the aging community may negatively affect sustainable agricultural production.

The contribution of labour to agriculture is such that women have more responsibilities due to their triple roles (reproductive, productive and social) in the society. In addition, they experience drudgery due to the kinds of technologies used and their labour contribution is not commensurate with the returns they get. Further, there is a decreasing number of young people involved in agriculture as an occupation. This is an undesirable signal of distress in the agricultural sector that is already negatively affecting the national economy. As farm power mechanization directly relate to agricultural labour, gender dimensions need to be addressed as an integral part of mechanization interventions. There is need to encourage and promote application of agricultural mechanization in all farming systems for effectiveness and efficiency and to remove drudgery associated with manual labour.

CHAPTER THREE: POLICY OBJECTIVES AND INTERVETIONS

3.1 Agricultural Mechanization Policy Focus

The Agricultural Mechanization Policy aim to improving agricultural mechanization to ensure the subsector measurably contributes to driving agriculture sector growth and development in Kenya.

3.1.1 Overall Objective

The overall objective is to raise and sustain the level of agricultural mechanization for increased productivity, incomes and food security

3.1.2 Specific objectives

The specific objectives of the policy are to:

(i) Create a conducive environment for access and distribution of agricultural machinery

(ii) Promote investment in agricultural mechanization

(iii) Strengthen regulation of agricultural mechanization quality assurance

(iv) Enhance training and extension framework for adoption of agricultural mechanization

(v) Enhance agricultural mechanization research, technology development and innovations along value chains

(vi) Enhance adoption of sustainable agricultural land management practices and climate smart agricultural mechanization technologies

(vii) Develop agricultural mechanization technologies that address the interest of people with special needs

3.2 Challenges and Policy Interventions

3.2.1 Access and Distribution of Agricultural Machinery

Challenges

(i) High cost of agricultural machinery and equipment.

(ii) Inadequate distribution mechanism of agricultural machinery and equipment

(iii) Inadequate local manufacturing of agricultural machinery and equipment

(iv) Inadequate after sale services

(v) Inadequate information on availability of relevant agricultural machinery and services

(vi) Poor management of public owned agricultural machinery

Policy Interventions

National government will;

(i) Support establishment of agricultural mechanization knowledge and technology exchange platform

National and County governments will:

(i) Institute measures that create an enabling environment to reduce cost of agricultural machinery and equipment;

(ii) Stimulate participation of investors and SMEs in manufacture and distribution of agricultural machinery and equipment;

(iii) Ensure in collaboration with the private sector for provision of adequate after sales services for agricultural machinery and equipment;

(iv) Institute innovative management systems for public and other organizations that offer agricultural mechanization services

3.2.2 Agricultural Mechanization Quality Assurance

Challenges

(i) Insufficient performance data and information on different agricultural machinery and technology

(ii) Inadequate national agricultural mechanization standards, testing procedures and certification mechanisms

(iii) Existence of substandard agricultural machinery and equipment

(iv) Inappropriate machinery, farm structures and practices for post-harvest management

(v) Poor quality raw materials for manufacture of agricultural machinery

(vi) Low capacity (trained personnel, infrastructure, equipment) for testing and evaluation of agricultural machinery and equipment for quality assurance

(vii) Use of inappropriate designs and layouts of agro-processing facilities

Policy Interventions

National Government will:

(i) Establish a National Agricultural Mechanization Testing Centre

(ii) Aggregate data from the county governments to establish national data bank for agricultural mechanization.

(iii) Develop national standards, testing procedures and certification mechanisms for agricultural machinery and equipment.

(iv) Promote use of standards, designs and layouts for production, processing facilities and farm structures

(v) Strengthen the capacity for testing and evaluation of agricultural machinery and equipment

(vi) Enforce standards for agricultural machinery and equipment at points of entry

(vii) Regulate service providers for agro-structures and agro-processing facilities

National and County governments will:

(i) Enforce standards for agricultural machinery and equipment

(ii) Promote availability of after sales services for agricultural machinery and equipment

(iii) Enforce standards for raw materials

Governments will:

(i) Establish and regularly update data bank for agricultural mechanization.

3.2.3 Investment in Agricultural Mechanization

Challenges

(i) Low public funding for agricultural mechanization

(ii) Low private sector investment in agricultural mechanization

(iii)Inadequate knowledge on investment opportunities in agricultural mechanization

Policy Interventions

National and County governments will:

(i) Promote incentives for financing agricultural mechanization investment

(ii) Increase allocation of public expenditure to the agricultural mechanization sub-sector

(iii) Establish an Agricultural Mechanization Fund for development of agricultural mechanization in Kenya

(iv) Provide a rebate to farmers from Road Maintenance Levy Fund

The County governments will:

(i) Provide for a sustainable financial mechanism to support effective agricultural mechanization services

3.2.4 Training, Extension and Technology adoption

Challenges

(i) Unregulated training curriculum for agricultural mechanization

(ii) Lack of a certification authority for licensing agricultural machine operators.

(iii) Low accessibility and adoption of agricultural mechanization technologies

(iv) Inadequate agricultural mechanization extension framework

Policy Interventions

National Government will:

(i) Support agricultural mechanization training in Technical and Vocational Education and Training (TVET) institutes, universities and research institutes

(ii) Develop an appropriate framework for agricultural mechanization extension

County government will:

(i) Support investors to provide contracted agricultural mechanization services for improved technology accessibility and adoption

(ii) Strengthen Agricultural Mechanization Service (AMSs)

(iii) Enhance capacity for agricultural mechanization extension services

3.2.5 Research and technology development

Challenges

(i) uncoordinated agricultural mechanization research efforts

(ii) Low level of funding towards research and technology development in agricultural mechanization

(iii) Ineffective research-extension-producer linkages in agricultural mechanization development

(iv) Limited research on fisheries mechanization

(v) Inadequate infrastructure for agricultural mechanization research

Policy Interventions

National government will:

(i) Strengthen existing public research institutes involved in agricultural, fisheries and forest mechanization

(ii) Enhance technology development in agricultural mechanization

(iii) In collaboration with stakeholders, enhance funding towards research in agricultural mechanization

(iv) Enhance coordination of agricultural mechanization research among stakeholders

(v) Strengthen collaboration among public institutes involved in agricultural mechanization research

National and County government will:

(i) Create systems for effective stakeholders linkages in agricultural mechanization in research and development

County government will:

(i) Support adaptive research in agricultural mechanization

3.2.6 Modernization of Agricultural Mechanization

Challenges

(i) Low access to modern Technology

(ii) Inadequate financing

(iii)Limited Research priorities

Policy Interventions

National Government will:

(i) Strengthen the capacity of research institutions in modernized agricultural machinery

(ii) Support the development and dissemination of modern technologies in agricultural mechanization

National and County governments will:

(i) Promote the use of renewable energy sources in agricultural mechanization

(ii) Mobilize resources for research and promotion on ICT and other emerging technologies

3.2.7 Institutional and Legal framework

Challenges

(i) Limited coordination of agricultural mechanization initiatives

(ii) Inadequate institutions to support agricultural mechanization

(iii) Poor coordination , partnership and collaboration among private sector players in agricultural mechanization

(iv) Currently there is no specific Act of Parliament that governs the Agricultural Mechanization Sector in terms of coordination, promotion and regulation.

Policy Interventions

National Government will:

(i) The Government will initiate development of legislation to be enactment by Parliament to provide for establishment of key institutions that include the Agricultural Mechanization Board; the Kenya Agricultural Mechanization Testing Centre and the Agriculture Technology Development Centers. The law will create an enabling legal framework for regulation Agricultural Mechanization industry in terms of enhancing quality of services rendered.

(ii) Promote establishment and strengthening of agricultural mechanization institutions

(iii) Promote establishment of agricultural mechanization associations

3.2.8 Sustainable Agricultural Land management and Climate Change

Challenges

(i) Inadequate investment and development in mechanized soil and water conservation

(ii) Poor land use and management practices

(iii) Underdeveloped alternative energy for mechanization

(iv) Inadequate agricultural machinery inspection regulations to enforce emission controls

(v) Insufficient knowledge and research on appropriate mechanization technology that respond to climate change

(vi) Declining agricultural land productivity due to climate change and improper land use

(vii) Weak institutional framework for management of soil and water conservation

Policy Interventions

National governments will:

(i) Develop land-use Master plan for sustainable land management in consultation with County governments

(ii) Enhance Mechanized Soil and Water Conservation

(iii) Strengthen mechanized floodwater harvesting and utilization

(iv) Support mechanized drought adaptation and mitigation systems

(v) Enhance production of affordable and accessible land development agricultural machinery

(vi) Enhance research and data sharing on climate-smart agriculture mechanization technologies

National and County governments will:

(i) Enhance mechanized soil and water conservation initiatives

County government will:

(i) Support mechanized climate smart agriculture

(ii) Promote Mechanized Soil and Water Conservation

(iii) Promote environmentally friendly mechanized agricultural production and processing techniques

(iv) Support production of affordable land development agricultural machinery

3.2.9 Cross Cutting Issues in Agricultural Mechanization

3.2.9.1 Agricultural Mechanization for Persons with Special Needs

Challenges

(i) Stigmatization and withdrawal

(ii) Inadequate agricultural mechanization technologies tailored for the persons with special needs

Policy Interventions

National and County governments will:

(i) Promote and support development of appropriate mechanization technologies which are suitable to the persons with special needs

(ii) Support youth women and persons with special needs to access agricultural mechanization technologies

3.2.9.2 Gender and Agricultural Mechanization

Challenges

(i) Poor access to capital among women and youth hinder adoption of agricultural mechanization technologies.

(ii) Limited opportunities for the women and youth to participate in agricultural mechanization value chain

(iii) Low utilization of ICT in agricultural mechanization

(iv) Inadequate gender sensitive agricultural mechanization technologies

(v) Retrogressive cultural practices that discourage operation of agricultural machinery by women and youth.

Policy Interventions

National and County governments will:

(i) Promote appropriate gender friendly mechanization technologies

(ii) Develop capacity of women and youth in agricultural mechanization

(iii) Promote utilization of ICT in agricultural mechanization.

(iv) Promote customized, affordable and innovative financing products and packages in agricultural mechanization for women and youth

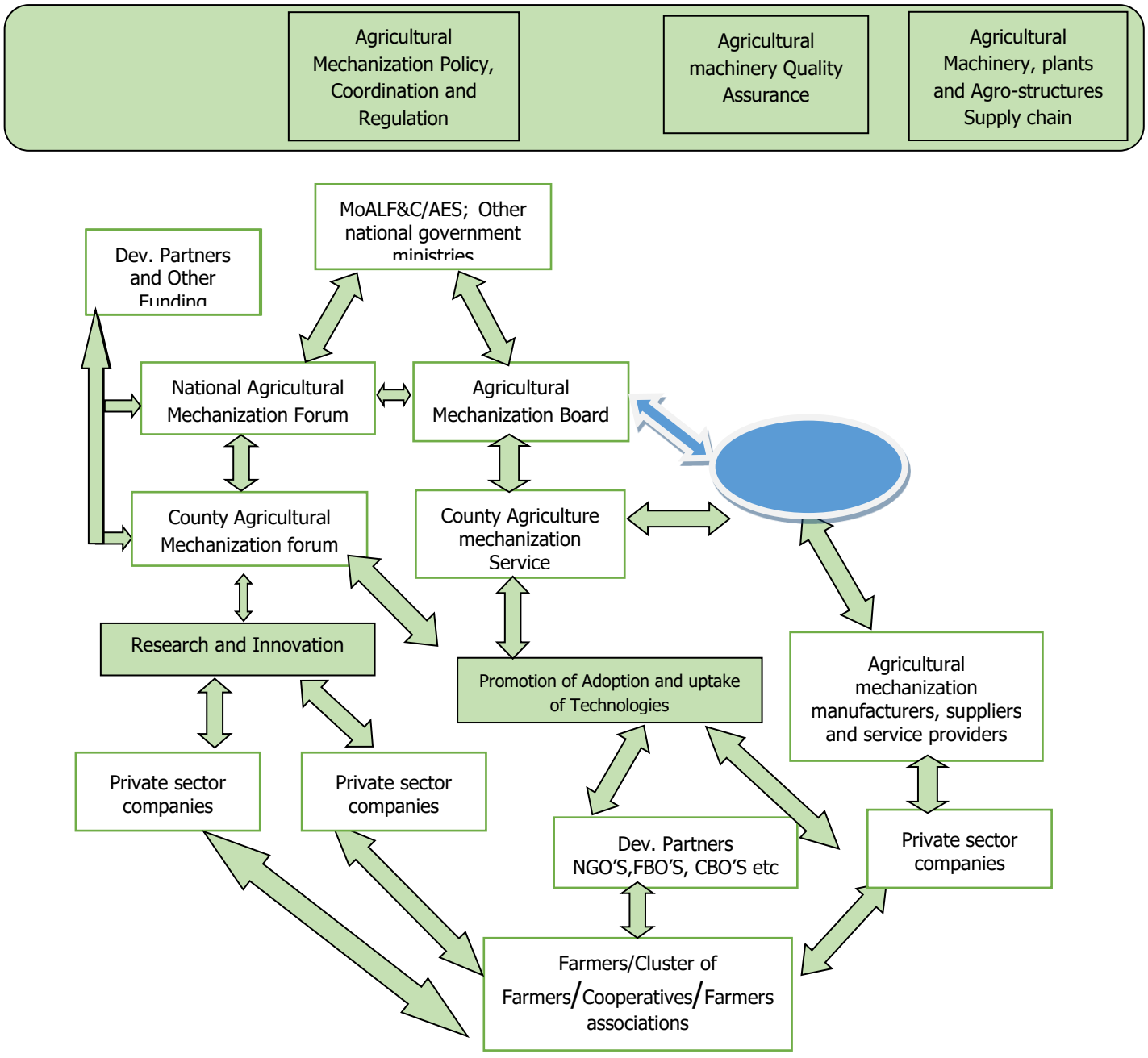
CHAPTER FOUR: POLICY IMPLEMENTATION

4.1 Policy Implementation and Coordination

An implementation framework developed guide effective implementation of the Agriculture Mechanization Policy. The implementation framework for the policy will incorporate an integrated approach, joint planning and regular joint reviews of progress. A five-year strategy will be developed to implement the policy spearheaded by the NARS forum. Annex 1 provides a detailed implementation framework matrix for NARS.

4.1.1 National Agriculture Mechanization Coordination Mechanisms

Roles of Institutions in Agriculture Mechanization



a) Role of the National and County Governments

The National Government will provide overall leadership in the policy development while the County Governments will be responsible for implementation. The roles of the two levels of government will be as follows:

National government

(i) Formulate sub-sector legislations, standards and guidelines in collaboration with the county governments and other relevant stakeholders;

(ii) Formulate and review Agriculture Sector Mechanization Policy and strategy in collaboration with the county governments and other relevant stakeholders

(iii) In consultation with county governments, develop a national agricultural mechanization development, investment and strategic plan;

(iv) Coordinate technology and research development

National and county government

(i) Oversee and coordinate agricultural mechanization sub-sector entities and agencies;

(ii) Collaborate and liaise with other agencies involved in agricultural mechanization development at local, regional and international levels;

(iii) Jointly formulate projects and programmes in collaboration with other stakeholders coordinate technology and research development

(iv) Establish a National Agricultural Mechanization Data Management Information System (AMDMIS);

(v) Conduct monitoring and evaluation of Agriculture Sector Mechanization Policy implementation;

(vi) Undertake regulatory function for the sub-sector including conflict resolution mechanisms to deal with agricultural mechanization disputes.

(vii) Support capacity building for agricultural mechanization contracting service providers.

(viii) Mobilize resources and finances for the sub-sector

(ix) Organize farmers to ensure systems in the provision of credit

(x) Implement programs for ensuring the provisions of incentives and facilities to promote agricultural mechanization

b) Agricultural Mechanization Board

The Agricultural Mechanization Board (AMB) shall be established with key responsibility of regulation of agriculture mechanization. The Board shall be composed of representatives of key actors in Government and the agriculture mechanization supply chain.

The functions of the Board will include:

(i) Advise the Cabinet Secretary on matters concerning agricultural mechanization

(ii) Licensing and registering actors of identified agricultural mechanization technologies

(iii) Inspection of and quality assurance of agricultural machinery, plant and agro-structures

(iv) Surveillance on quality, performance and safety of agricultural machinery and equipment

(v) Advising government and manufacturers against dumping of obsolete equipment.

(vi) Review and development of standards and guidelines of agricultural machinery

(vii) Provide guidance on imports and exports of agricultural machinery

(viii) Provide a platform for liaison and dialogue with industry stakeholders

(ix) Administer agricultural mechanization fund.

c) Kenya Agricultural Mechanization Testing Centre

The c) Kenya Agricultural Mechanization Testing Centre will be responsible for ensuring quality control and assurance of imported and locally manufactured or assembled agricultural mechanization technologies meant for agricultural use.

The functions will include:

(i) Testing and evaluating agricultural machinery, implements and equipment.

(ii) Creating strong linkages with other players for adoption of locally, durable, safe and efficient agricultural machinery for sustainable agricultural productivity.

(iii) Carry out survey on agricultural mechanization and advising policy makers on the types of machinery required for the Kenyan Agriculture, and development of export oriented Agricultural machinery industries.

(iv) Contribute towards up scaling of agricultural mechanization regulations and standards.

(v) Develop and maintain a Kenyan Agriculture machinery database for reference in design & development.

(vi) Support Development of agricultural mechanization standards

(vii) Support the protection of intellectual property rights on technologies and innovations

d) Agricultural Technology Development Centres (ATDCs)

The ATDC will be responsible for the following;

(i) Piloting technology and adaptive research

(ii) Technology innovation and incubation

(iii) Capacity building of agricultural mechanization stakeholders

(iv) Development of knowledge platforms

e) Agricultural Mechanization Training Institute (AMTI)

In order to ensure effective and efficient use of machinery and equipment and the safety of the general public, owners and operators of plant and machinery, the Agricultural Mechanization Training Institute (AMTI) will be stablished under the TIVET law. The institute responsible to the Ministry; have regional mandate and will provide user level training programmes targeting plant and machine operators and other stakeholders in agricultural mechanization. AMTI will issue certificates of competency for service providers in agricultural mechanization. Public Private Partnership with key stakeholders particularly importers and manufacturers of agricultural machinery will be vital in the success of this initiative.

The specific mandate of AMTI will be to:

(i) Identify key training priority areas for the sub-sector in collaboration with the County Government and key stakeholders;

(ii) Develop training curricula in collaboration with the County Government and other key stakeholders;

(iii) Undertake scheduled training in collaboration with relevant stakeholders;

(iv) Assess the impact of training through monitoring and evaluation;

(v) Revise the training modules in collaboration with relevant stakeholders;

(vi) Develop linkages with relevant professional bodies, universities and other training institutions for improved human resource development;

(vii) Create a data bank in collaboration with other stakeholders to facilitate planning of appropriate institutional programs;

(viii) Establish mechanisms for information sharing amongst stakeholders;

(ix) Maintain updated technology database and ensure continuous human resource development through regular review of training needs.

f) Agricultural Mechanization Research and Innovation

The overall purpose of research and innovation in agricultural mechanization is to generate and disseminate knowledge, technologies and innovations for increased productivity, commercialization and competitiveness in crops, livestock and fisheries value chains in Kenya. In this respect, the Agricultural Mechanization Research Institute (AMRI), Kenya Marine and Fisheries Research Institute (KEMFRI) and Kenya Forest Research Institute (KEFRI) will be strengthened to undertake research on agricultural mechanization in collaboration with Universities, other relevant research institutions, the County governments and other stakeholders.

Further, the Agricultural Mechanization Board will through a constituted Agricultural Mechanization Research Advisory Committee carry out the following research functions:

(i) Promote coordinated and regulated research and technology development for agricultural mechanization sub-sector

(ii) Identify agricultural mechanization research priority areas in collaboration with AMRI, KEMFRI, KEFRI, Universities, the County governments and other stakeholders

(iii) Undertake resource mobilization for Agricultural Mechanization research

(iv) Make recommendations on strategic and policy issues on agricultural mechanization research.

(v) Review, inform and advise on the status of agricultural mechanization research.

In order to enhance the adoption of agricultural mechanization technologies and innovations in the country the ATDCs will be strengthened to undertake adaptive research in collaboration with AMRI, KEMFRI, KEFRI, Universities, the County governments and other stakeholders in their respective mandate areas.

4.2 Resource Mobilization

4.2.1 Resources for Policy Implementation Coordination

The resources for the coordination of the policy shall draw from the following sources;

a) The National Agricultural Mechanization Fund;

(i) The County funds that may be allocated for supporting mechanization activities in the county

(ii) Resources allocated to the ministry for agricultural mechanization

(iii) Development partner support for promoting implementation of the policy or mechanization programmes

Coordination will include the following;

(i) Activities of the national and County Agricultural Mechanization Forums

(ii) Coordination and collaborative meetings of stakeholders sanctioned by the National and county Forums

(iii) Planning, Monitoring and review meetings on the progress of implementation of agricultural mechanization policy interventions

4.2.2 Investment in Agricultural Mechanization

The National and County Governments will, through partnerships with the private sector and development partners' initiate and implement programmes to attract investments for modernization and development of agricultural mechanization in Kenya. These initiatives will include bilateral arrangements between Kenya and countries that have employed best practices in agricultural mechanization.

4.2.3 Funding for specific initiatives along the agricultural machinery supply chain

The funding for specific initiatives along the agricultural machinery, structures and agro-processing plant supply chain. Actors along the agricultural machinery, structures and agro-processing plant supply chain will be encouraged to invest in the supply chain through fiscal and initiatives and other support such as training and incubation of innovations. The County Governments will strengthen and streamline the operations of the County Agricultural Mechanization units (CAMs) through additional allocations and investment in new machinery.

4.2.4 The Agricultural Mechanization Fund

At the national level an Agricultural mechanization Development Fund (AMDF) shall be established to facilitate the development of agricultural mechanization sub-sector. The funds for the AMDF will be drawn from the National Government, development partners and other stakeholders for the following purposes:

(i) Support development, repairs, maintenance, improvement and rehabilitation of agricultural mechanization infrastructure at the National and County Government levels.

(ii) Support agricultural mechanization research, training, technology development and innovation

(iii) Support programmes that target acquisition of agricultural machinery by farmers

(iv) To support credit guarantee schemes to acquire agricultural machinery, agro-structures, agricultural processing plants and equipment targeting farmers, pastoralists, fisher-folk, local agricultural machinery service providers, local dealers and, local manufacturers.

Counties, based on their prioritized agricultural mechanization requirements will also, where appropriate establish programmes and allocate funds to support development of mechanization at the County level.

4.4 Monitoring, Evaluation and Review of Policy

Monitoring of policy implementation will be central in in ensuring that planned policy interventions are implemented efficiently and effectively. The Ministry, the Counties, key national institutions proposed for establishment in this policy such as the Agricultural mechanization Board, private sector organizations, service providers and farmers institutions will be involved in tracking and reviewing implementation of policy through the established structures.

The following will be undertaken;

(i) Development of a coordination framework and guidelines for collaboration and cooperation among, public departments and agencies, county governments and other stakeholders for tracking of policy implementation and Review

(ii) Development and implementation of mechanization Strategies and workplans for implementing priority policy intervention ant the national and county levels

(iii) Establishment of a repository data and information relating to all activities, including policy implementation progress, on agricultural mechanization in Kenya.

(iv) Operationalize a platform for consultation comprising of stakeholders composed of farmers, relevant public sector institutions, the academia, agricultural machinery and equipment suppliers, suppliers of agro-structures and agro-processing facilities, agricultural mechanization service providers, agricultural machinery operators and their respective associations, exporters and service providers

The coordinating unit will compile and submit an annual report on the implementation status of the policy to the Ministry for the time being responsible for agriculture. The reports will inform periodic annual reviews, five-year evaluation and reviews of the National Agriculture Sector Mechanization Policy and its contribution to the national economy.

Annex 2: Implementation Framework

Policy Intervention	Expected Output	Responsible Institution				Indicative Time Frame (ST- Upto3yrs MT- Upto5yrs LT-Upto10yrs Continuous-)
		National Government	County Government	Private sector,	Farmer organizations/ Others	
1. Access and Distribution of Agricultural Machinery						
(i) Establishment of agricultural mechanization knowledge and technology exchange platform	Agricultural mechanization knowledge and technology exchange platform	❖				LT
(ii) Institute measures that create an enabling environment to reduce cost of agricultural machinery and equipment	Enabling environment to reduce cost of agricultural machinery and equipment	❖	❖			LT
(iii) Stimulate participation of investors and SMEs in manufacture and distribution of agricultural machinery and equipment	Participation of investors and SMEs in manufacture and distribution of agricultural machinery and equipment	❖	❖	❖	❖	LT

(iv) Ensure in collaboration with the private sector for provision of adequate after sales services for agricultural machinery and equipment	Provision of adequate after sales services for agricultural machinery and equipment	❖	❖	❖		ST
(v) Institute innovative management systems for public and other organizations that offer agricultural mechanization services	Innovative management systems for public and other organizations that offer agricultural mechanization services	❖	❖	❖	❖	LT
2. Agricultural Mechanization Quality Assurance						
(i) Establish a National Agricultural Mechanization Testing Centre	National Agricultural Mechanization Testing Centre	❖				LT
(ii) Aggregate data from the county governments to establish national data bank for agricultural mechanization.	National data bank for agricultural mechanization.	❖				LT
(iii) Develop national standards, testing procedures and certification mechanisms for	National standards, testing procedures and certification mechanisms for agricultural machinery and equipment.	❖				LT

agricultural machinery and equipment.						
(iv) Promote use of standards, designs and layouts for production , processing facilities and farm structures	Use of standards, designs and layouts for production , processing facilities and farm structures	❖				LT
(v) Strengthen the capacity for testing and evaluation of agricultural machinery and equipment	Capacity for testing and evaluation of agricultural machinery and equipment	❖				LT
(vi) Enforce standards for agricultural machinery and equipment at points of entry	standards for agricultural machinery and equipment at points of entry	❖				LT
(vii) Regulate service providers for agro-structures and agro-processing facilities	Regulated service providers for agro-structures and agro-processing facilities	❖				LT
(viii) Enforce standards for agricultural machinery and equipment	Enforced standards for agricultural machinery and equipment	❖	❖			LT
(ix) Promote availability of after sales services for agricultural machinery and equipment	availability of after sales services for agricultural machinery and equipment	❖	❖			LT

(x) Enforce standards for raw materials	Adherence to standards for raw materials	❖	❖			LT
(xi) Establish and regularly update data bank for agricultural mechanization.	Data bank for agricultural mechanization		❖			LT
3. Investment in Agricultural Mechanization						
(i) Promote incentives for financing agricultural mechanization investment	Availability of incentives for financing agricultural mechanization investment	❖	❖			LT
(ii) Increase allocation of public expenditure to the agricultural mechanization sub-sector	Increased allocation of public expenditure to the agricultural mechanization sub-sector	❖	❖			LT
(iii) Establish an Agricultural Mechanization Fund for development of agricultural mechanization in Kenya	Agricultural Mechanization Fund established	❖	❖			LT
(iv) Provide a rebate to farmers from Road Maintenance Levy Fund	A rebate to farmers from Road Maintenance Levy Fund	❖	❖			LT
(v) Provide for a sustainable financial	Availability of a sustainable financial mechanism to		❖			LT

mechanism to support effective agricultural mechanization services	support effective agricultural mechanization services					
4. Training, Extension and Technology adoption						
(i) Support agricultural mechanization training in Technical and Vocational Education and Training (TVET) institutes, universities and research institutes	Agricultural mechanization training in Technical and Vocational Education and Training (TVET) institutes, universities and research institutes	❖				LT
(ii) Develop an appropriate framework for agricultural mechanization extension	Framework for agricultural mechanization extension	❖				LT
(iii) Support investors to provide contracted agricultural mechanization services for improved technology accessibility and adoption	Provision of contracted agricultural mechanization services		❖			LT
(iv) Strengthen Agricultural Mechanization Service (AMSs)	Strengthened Agricultural Mechanization Service (AMSs)		❖			LT
(v) Enhance capacity for agricultural	Enhanced capacity for agricultural mechanization extension services		❖			LT

mechanization extension services						
5. Research and technology development						
(i) Strengthen existing public research institutes involved in agricultural, fisheries and forest mechanization	Existing public research institutes involved in agricultural, fisheries and forest mechanization strengthened	❖				LT
(ii) Enhance technology development in agricultural mechanization	Technology development in agricultural mechanization enhanced	❖				LT
(iii) Enhance funding towards research in agricultural mechanization	Funding towards research in agricultural mechanization enhanced	❖	❖	❖	❖	LT
(iv) Enhance coordination of agricultural mechanization research among stakeholders	Enhanced coordination of agricultural mechanization research among stakeholders	❖				LT
(v) Strengthen collaboration among public institutes involved in agricultural mechanization research	Strengthened collaboration among public institutes involved in agricultural mechanization research	❖				LT

(vi) Create systems for effective stakeholders linkages in agricultural mechanization in research and development	Availability of systems for effective stakeholders linkages in agricultural mechanization in research and development	❖	❖			LT
(vii) Support adaptive research in agricultural mechanization	Adaptive research in agricultural mechanization	❖				LT
6. Modernization of Agricultural Mechanization						
(i) Strengthen the capacity of research institutions in modernized agricultural machinery	Strengthened capacity of research institutions in modernized agricultural machinery	❖				LT
(ii) Support the development and dissemination of modern technologies in agricultural mechanization	Development and dissemination of modern technologies in agricultural mechanization	❖				LT
(iii) Promote the use of renewable energy sources in agricultural mechanization	Use of renewable energy sources in agricultural mechanization	❖	❖			LT
(iv) Mobilize resources for research and promotion on ICT and	Availability of resources for research and promotion on	❖	❖			LT

other emerging technologies	ICT and other emerging technologies					
7. Institutional and Legal framework						
(i) Establish a National Agricultural Mechanization Board to coordinate agricultural mechanization initiatives	National Agricultural Mechanization Board established	❖				LT
(ii) Promote establishment and strengthening of agricultural mechanization institutions	Established and strengthened of agricultural mechanization institutions	❖				LT
(iii) Promote establishment of agricultural mechanization associations	Established agricultural mechanization associations	❖				LT
8. Sustainable Agricultural Land management and Climate Change						
(i) Develop land-use Master plan for sustainable land management	Availability of a land-use Master plan for sustainable land management	❖	❖			MT
(ii) Enhance Mechanized Soil and Water Conservation	Enhanced Mechanized Soil and Water Conservation	❖				LT

(iii) Strengthen mechanized floodwater harvesting and utilization	Strengthened mechanized floodwater harvesting and utilization	❖				LT
(iv) Support mechanized drought adaptation and mitigation systems	Mechanized drought adaptation and mitigation systems	❖				LT
(v) Enhance production of affordable and accessible land development agricultural machinery	Production of affordable and accessible land development agricultural machinery enhanced	❖				LT
(vi) Enhance research and data sharing on climate-smart agriculture mechanization technologies	Enhanced research and data sharing on climate-smart agriculture mechanization technologies	❖				LT
(vii) Enhance mechanized soil and water conservation initiatives	Availability of mechanized soil and water conservation initiatives	❖	❖			LT
(viii) Support mechanized climate smart agriculture	Supported mechanized climate smart agriculture		❖			LT
(ix) Promote Mechanized Soil and Water Conservation	Promoted mechanized Soil and Water Conservation		❖			LT

(x) Promote environmentally friendly mechanized agricultural production and processing techniques	Availability of promoted environmentally friendly mechanized agricultural production and processing techniques		❖			LT
(xi) Support production of affordable land development agricultural machinery	Production of affordable land development agricultural machinery		❖			LT
9. Cross Cutting Issues in Agricultural Mechanization						
a). Agricultural Mechanization for Persons with Special Needs						
(i) Promote and support development of appropriate mechanization technologies which are suitable to the persons with special needs	Promoted and supported development of appropriate mechanization technologies which are suitable to the persons with special needs	❖	❖			LT
(ii) Support youth women and persons with special needs to access agricultural	Supported youth women and persons with special needs to access agricultural mechanization technologies	❖	❖			LT

mechanization technologies						
b). **Gender and Agricultural Mechanization**						
(i) Promote appropriate gender friendly mechanization technologies	Appropriate gender friendly mechanization technologies promoted	❖	❖			LT
(ii) Develop capacity of women and youth in agricultural mechanization	Developed capacity of women and youth in agricultural mechanization	❖	❖			LT
(iii) Promote utilization of ICT in agricultural mechanization	Utilization of ICT in agricultural mechanization promoted	❖	❖			LT
(iv) Promote customized, affordable and innovative financing products and packages in agricultural mechanization for women and youth	Promoted customized, affordable and innovative financing products and packages in agricultural mechanization for women and youth	❖	❖			LT

Annex 2: Stakeholder Analysis

STAKEHOLDER	KEY INSTITUTIONS	ROLE
Agriculture sector Ministries	Agriculture, Livestock & Fisheries, Water, Coop., Lands, Water & Irrigation, Environment & Natural Resources	Collaboration in Programme development and implementation, coordination and policy guidelines,
Trade Sector Ministries	Trade, Foreign Affairs, Industrialization, East African Community, Finance, Devolution and Planning	Provide international market information, trade negotiation, maintain quality standard, provide information on tariffs, taxes, levies
Infrastructure sector ministries	Public works, Roads, Transport, Energy	Provision and development of power, roads, telecommunication,
Research and Training institutions in agricultural mechanization	KALRO, KIRDI, Universities and ATDCs,	Provision of expertise, capacity building, provision of science technology and innovation, collaboration and coordination of partnership in research programmes in mechanization,
Machinery and equipment manufacturers	Ndume Limited, Kariobangi Light Industries and others	Up scaling of Machinery and equipment
Machinery and equipment supplies/dealers	CMC Agricultural Machinery Division, Holman Brothers Ltd, Same Tract, Farm Equipments & Implements Ltd (FEIL), Farm Machinery Distributors Kenya Ltd, FiatAgri Ltd, Toyota (K), Car & General, Brazafric etc.	Provision of Machinery and equipment supplies
Regulatory bodies	KeBS, AFA	Provision of quality, advisory services setting of standards, and regulatory services
Farmers and Farmer organizations	CGA, EAGC, KENAFF County Representatives	Empowerment, awareness creation, capacity building, resource mobilization, networking, advocacy and Technology/ information dissemination, support for production and marketing, technology adoption and uptake

Private Sector organizations	KEPSA, CMA, KAM, Chamber of Commerce & Industry	Provide partnership in research, extension, resource mobilization, entrepreneurship development
Financial Institutions	AFC, Private Banks, Micro Finance Institutions	Provision of financial facilities , saving and credit, investment in capacity building and purchasing of Machinery and equipment
Development Partners	Bilateral and Multilaterals	Provision of Technical support , financial assistance , capacity development
Regional and international organizations	JICA, KoTRA, FAO	Cooperation in areas of mechanization. Resource mobilization, technical support
NGOs,	African Tillage Network, Kick start, KENDAT	Community empowerment, capacity building, resource mobilization, networking, advocacy and Technology/ information dissemination, technology adoption and uptake
Agro-Processors,	Agro-processing dealers and millers	Provision of agro-processing machinery and equipment, capacity building, dissemination of this technologies