KALRO
Kenya Agricultural & Livestock Research Organization

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STRATEGIC PLAN
2017 – 2021

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ACRONYMS AND ABBREVIATION

AFA	Agriculture and Food Authority
AGOA	African Growth and Opportunity Act
AGRA	Alliance for Green Revolution in Africa
AMRI	Agricultural Mechanization Research Institute
APVC	Agricultural Product Value Chain
ARF	Agricultural Research Fund
ARI	Apiculture Research Institute
ARLRI	Arid and Range Lands Research Institute
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
ASDS	Agricultural Sector Development Strategy
AU	African Union
BioRI	Biotechnology Research Institute
BRI	Beef Research Institute
CAADP	Comprehensive African Agricultural Development Programme
CBO	Community Based Organization
CBPP	Contagious Bovine Pleuro Pneumonia
CCPP	Contagious Caprine Pleuro Pneumonia
CGIAR	Consultative Group on International Agricultural Research
CIDPs	County and Integrated Development Plan
COMESA	Common Market for East and Southern Africa
COMSHIP	Comesa Seed Harmonisation Implementation Plan
CRF	Coffee Research Foundation
CRI	Coffee Research Institute
CSFs	Critical Success Factors
DDRT	Demand Driven Research and Training
DRI	Dairy Research Institute
EAAFRO	East African Agriculture and Forestry Research Organization
EAC	East African Community
EAAFJ	East African Agriculture and Forestry Journal
EAVRO	East African Veterinary Research Organization
ECF	East Coast Fever
EMBRAPA	Empresa Brasileira de Pesquisa Agropecuária (Brazilian Agricultural Research Corporation)
EMCA	Environmental Management and Coordination Act
FAO	Food and Agriculture Organization
FARA	Forum for Agricultural Research in Africa
FBOs	Faith Based Organizations
FCRI	Food Crops Research Institute
GDP	Gross Domestic Product
GERRI	Genetic Resources Research Institute
GMOs	Genetically Modified Organisms
HRI	Horticulture Research Institute

HRIS	Human Resource Information Management System
IARC	International Agricultural Research Centres
IBC	Institutional Biosafety Committee
ICAR	Indian Council of Agricultural Research
ICIPE	International Centre of Insect Physiology and Ecology
ICRAF	World Agro-forestry Centre
ICRI	Industrial Crops Research Institute
IF	Implementation Framework
IGAD	Intergovernmental Authority on Development
ILRI	International Livestock Research Institute
InP	Innovation Platforms
IPR	Intellectual Property Rights
ITK	Indigenous Technical Knowledge
KAGRC	Kenya Animal Genetic Resources Centre
KALRO	Kenya Agricultural and Livestock Research Organization
KARI	Kenya Agricultural Research Institute
KDN	Kenya Data Network
KEBS	Kenya Bureau of Standards
KEFRI	Kenya Forestry Research Institute
KEMRI	Kenya Medical Research Institute
KEPHIS	Kenya Plant Health Inspectorate Services
KESREF	Kenya Sugar Research Foundation
KEVEVAPI	Kenya Veterinary Vaccines Production Institute
KEWI	Kenya Water Institute
KIPI	Kenya Industrial Property Institute
KIRDI	Kenya Industrial Research and Development Institute
KITs	Knowledge, Information and Technologies
KMFRI	Kenya Marine and Fisheries Research Institute
KNBS	Kenya National Bureau of Statistics
KPI	Key Performance Indicators
KRA	Key Result Area
KSU	KALRO Seed Unit
LogFrame	Logical Framework
M&E	Monitoring and Evaluation
MDGs	Millennium Development Goals
MoA	Ministry of Agriculture
MoALF	Ministry of Agriculture, Livestock and Fisheries
MSMIs	Micro, Small and Medium Industries
MTP	Second Medium Term Plan
NACOSTI	National Commission of Science, Technology and Innovation
NARS	National Agricultural Research System
NASEP	National Agricultural Sector Extension Policy
NBA	National Biosafety Authority
NEMA	National Environmental Management Authority
NGOs	Non-Governmental Organizations

NIB	National Irrigation Board
NRF	National Research Fund
NRRI	Non-Ruminant Research Institute
PCPB	Pest Control Products Board
PESTEIL	Political, Economic, Social, Technological, Environmental, Institutional and Legal
PPP	Public-Private-Partnerships
PPR	Peste des petits ruminants
SADC	Southern Africa Development Community
SAGA's	Semi-Autonomous Government Agencies
SARM	Semi Annual Review Meeting
SDEC	Standards Development and Enforcement Committee
SDGs	Sustainable Development Goals
SGCRI	Sheep, Goats and Camels Research Institute
SI	International System of Units
SO	Strategic Objective
SP	Strategic Plan
SRI	Sugar Research Institute
STI	Science, Technology and Innovations
STISA	Science, Technology and Innovations Strategy for Africa
SWOT	Strengths, Weaknesses, Opportunities and Threats
TEAL	Tools to Enhance Assessment Literacy
TRFK	Tea Research Foundation of Kenya
TRI	Tea Research Institute
UN	United Nations
VSRI	Veterinary Science Research Institute
WTO	World Trade Organization

FOREWORD

The agricultural sector is a major driver of Kenya's economy and livelihoods for the majority of Kenyans contributing 26% directly to the Gross Domestic Product (GDP) and a further 25% indirectly through linkages with agro-based and associated industries. This success of the sector is attributable to research and development initiatives over the years. The Kenya Agricultural and Livestock Research Organization (KALRO) was established through the KALR Act No.17 of 2013 to streamline the operations of the national agricultural research system to effectively contribute to the growth of the sector.

This Strategic Plan (2016–2020) describes the vision, mission, goal, strategic objectives and strategies that will guide KALRO in delivering its mandate to contribute to the growth of the agricultural sector by generating appropriate technologies and innovations for increased productivity and quality in diverse products, processes and services. Underpinning the success of the implementation of the Strategic Plan are the six core values identified in the Plan, the Kenya Constitution 2010 and the aspirations of agricultural based international, regional and national bodies. The Plan has been developed to guide KALRO's research in crops, livestock, genetic resources, plant and animal health, national resource management, agricultural mechanization as well as application of cutting edge research techniques such as biotechnology tools to contribute to the growth of the agricultural sector Medium Term Plans and Kenya Vision 2030 through the application of Science, Technology and Innovation (STI).

The KALRO Board values the role of all stakeholders and management of risks to ensure that appropriate agricultural and livestock technologies and innovations are generated and adopted. The National and County Governments, Universities, associate institutes, the private sector, development partners and other bodies will work closely to set transformative research priorities that will increase value to the national economy. Given the contribution of the agricultural sector to the national economy, there is a strong case to provide enhanced support to KALRO to enable the organization to play its strategic role in agricultural research and business development opportunities towards transformed livelihoods as espoused in the NARS Policy.

The KALRO Board is committed to achieving the objectives articulated in the Strategic Plan by aligning key performance metrics to the Plan and tracking progress towards realizing KALRO's vision. This will be achieved by overseeing its successful implementation that will significantly contribute to addressing the challenges facing the agricultural sector while taking advantage of the existing opportunities to support the achievement of the sector developmental goals and meet the needs of Kenyans as per our Vision '**Excellence in agricultural and livestock research towards transformed livelihoods'**.

Finally, I would like to thank all the stakeholders who took time to provide invaluable input in the development of this Strategic Plan.

Prof. Moses K. Limo
Chairman,
KALRO Board of Management

PREFACE

Agricultural research in Kenya has evolved over the years since the early 1900s from testing sites, evaluating suitability of crop and animal breeds, propagating materials mainly for the settler farms to the current national research system. The National Agricultural Research System (NARS) was guided by the Agriculture Act (Cap 318), Science and Technology Act (Cap 250) and sectoral based legislations. Research has progressed from being mostly an advisory service coordinated by the Ministry of Agriculture, to a robust system which included several independent research organizations and the private sector. Each organization conducted research independently, with minimal consultation, leading to inefficient use of resources. It therefore became necessary to transform the NARS into a dynamic, innovative, responsive, and well-coordinated system driven by a common vision and goal.

The NARS policy which was developed in 2012 aimed at streamlining the management and regulation of the national agricultural research system to make it a more effective, efficient and accountable. The Policy led to the enactment of the KALR Act, No. 17 of 2013, which established KALRO through the merger of the Kenya Agricultural Research Institute (KARI), Coffee Research Foundation (CRF), Tea Research Foundation of Kenya (TRF) and Kenya Sugar Research Foundation (KESREF). The reorganization of the agricultural research system is expected to lead to higher efficiency in the delivery of the services necessary for propelling the advancement of the agricultural sector and national economy in general.

Although each of the former research organizations had individual Strategic Plans (SP), the SPs lapsed after the organizations were merged to form KALRO. It was therefore necessary to develop the first KALRO Strategic Plan (2016 – 2020) to guide the operations of the Organization. The SP was developed through a consultative and participatory process. Data were collected through stakeholder workshops, expert consultations, key informant interviews, focus group discussions and desktop literature reviews. The draft SP was circulated to different stakeholders to solicit comments and their inputs were incorporated into the final version of the SP.

The Strategic Plan is aligned to the Kenyan Constitution, Vision 2030, NARS Policy, the Agricultural Sector Development Strategy (ASDS), other relevant Government policies and strategies, regional and international strategies, the Sustainable Development Goals (SDGs), and the framework of the Government's Performance Contracts. Five Key Result Areas (KRA) have been identified for focus during the SP implementation period, namely: Development of technologies and innovations; sharing, storing and collation of research knowledge, information and products; generation and advocacy of socioeconomic information, market and policy options; strengthening organizational capacities and resource management and lastly developing and operationalizing systems

for coordination and regulation of research. The SP incorporates necessary measures to ensure that monitoring and evaluation is conducted efficiently to achieve the intended results. The budget projections in the Strategic Plan are indicative and will be reviewed annually.

I acknowledge with appreciation the dedication and hard work undertaken by various teams and individuals involved in the development of this SP. It took several months of intensive data gathering, continuous engagements and consultations by the Headquarters Committee led by different Heads of Divisions, the Institute Committees led by the respective Institute Directors and the Steering Committee and Task Force members to build consensus around various issues included in this Plan. The net result is a comprehensive document that will help the Organization attain new heights while delivering on its mandate. In particular, I appreciate the efforts of the Steering Committee Members comprising of the two Deputy Director Generals, Dr Joseph Mureithi (Livestock) and Dr Felister Makini (Crops); the Chief Manager Corporate Services, Mr David Kikwai, and Directors, Dr Lusike Wasilwa (Crops Systems) and Dr Foustine Wandera (Livestock Systems).

I equally highly appreciate the excellent coordination of the whole process by the SP Task Force led by Dr Wellington M. Mulinge and its members: Dr Beatrice Salasya, Dr Festus Murithi, Dr Jack Ouda, Dr Jacob Ong'ala, Dr Joseph Kimemia, Dr Lawrence Mose, Mr Martin Kivui, Dr Rahab Muinga and Mrs Violet Kirigua. I am also grateful to Dr Florence Kithinji, a consultant from the Kenya School of Government, who supported the process during the initial strategic planning stages. I am also grateful to Mr Nathan Maweu, Ms Grace Mbugua and Ms Annah Sang who provided secretarial support, Mr Koinange T. Mukundi for facilitating editorial work and Ms Emma Nyaola and Ms Nogrecia Mnene for designing the document. I am also thankful to Professor David Minja, Kenyatta University, for reviewing the Strategic Plan. Finally, it is my hope and desire that in implementing this Strategic Plan, the expectations of all stakeholders will be met.

Eliud K. Kireger, PhD
Director General, KALRO

EXECUTIVE SUMMARY

1 Introduction

Agriculture contributes about 26% directly to the Gross Domestic Product (GDP) and a further 25% indirectly through linkages with agro-based and associated industries. Thus the agricultural sector is a major driver of Kenya's economy and livelihood for the majority of the population. The sector accounts for 65% of the national total exports and provides more than 70% of informal employment in the rural areas. It is estimated that the sector on average contributed 1.17% GDP growth in the overall economy between 2010 and 2016.

The country's Vision 2030 has set a target to increase growth in agricultural output by a sustained 7% and above per year in order to propel the national economic growth to 10% per annum. Improvements in total factor productivity are expected to contribute to about 3% of agricultural productivity, with the remainder coming from increased investments. The increase in productivity will not only ensure that the government achieves targets set by the Vision 2030 but also the East African Community (EAC) Vision 2050, Africa Union's Agenda 2063 and the Sustainable Development Goals (SDGs). The objective of the Strategic Plan is to ensure that through collaborative efforts, agricultural and livestock research contributes to accelerated growth in total factor productivity through generation of technologies, innovation and knowledge.

1.1 Evolution of Agricultural Research and Formation of KALRO

Agricultural research in Kenya started with the establishment of the first government farms in the early 1900s in Mazeras, Nairobi, Naivasha and Kibos for testing suitability of crop varieties and animal breeds, and to propagate planting materials mainly for the settler farms. Later, it was incorporated in the EAC and implemented by the East African Agriculture and Forestry Research Organization (EAAFRO). With the break-up of the EAC in 1977, agricultural research in Kenya was conducted by the Scientific Research Division in the Ministry of Agriculture.

In 1979, the Kenya Agricultural Research Institute (KARI) was established to focus on food, horticultural and industrial crops and livestock. Coffee, Tea and Sugar Research Foundations were established in various years to conduct research on respective mandate crops. The National Agricultural Research System (NARS) policy developed in 2012 indicated that agricultural research was uncoordinated and undertaken by many institutions leading to duplication and inefficient use of resources, hence the recommendation to amalgamate KARI and the three Research Foundations.

The Policy led to the enactment of the KALR Act, No. 17 of 2013 'to provide for the establishment and functions of the Kenya Agricultural and Livestock Research Organization, to provide for the organs of the Organization, to provide for co-ordination of agricultural research activities in Kenya, and for connected purposes'. The Kenya

Agricultural and Livestock Research Organization (KALRO) was formed by merging the Kenya Agricultural Research Institute (KARI), Coffee Research Foundation (CRF), Tea Research Foundation of Kenya (TRFK) and Kenya Sugar Research Foundation (KESREF). The Organization consists of the Board, the Secretariat based at the Headquarters, and 17 Research Institutes located in different parts of the country. The Secretariat consists of the Director-General who is the Head of the Secretariat; two Deputy Director Generals and other persons determined by the Board for the proper performance of the functions of the Organization. To support the Directorate eight Operational Units and Corporate Services Division were established. The Organization has 17 semi-autonomous Research Institutes, 47 Centres, several sub-Centres and field stations/testing sites spread throughout the country. The mandate of KALRO is to undertake, streamline, coordinate and regulate all aspects of research in agriculture and livestock development, and promote the application of the research findings, technologies and innovations. To achieve its mandate, it was necessary to develop the first KALRO Strategic Plan (SP) to guide the implementation of the Organization's functions and research programmes.

1.2 Planning, Data Collection, Analysis and Validation Process

The approach for developing the Strategic Plan was consultative, participatory and based on the information required. Data were collected internally by a Task Force appointed by the Director General. Institute teams were also formed and conducted stakeholder consultations in the counties, to incorporate as many views as possible and create ownership not only within KALRO but also among external partners. The internal and external environments of KALRO were analysed to determine the strengths, weaknesses, opportunities and threats (SWOT) and political, economic, socio-cultural, technological, environmental, institutional and legal (PESTEIL) situations surrounding the Organization. This led to the identification of issues likely to impact on the operations and delivery of services of the Organization.

2 Situational Analysis

Agriculture and Livestock Research in Kenya is affected by several external and internal environmental factors. A clear understanding of these factors will enable KALRO to exploit the opportunities while minimizing the threats from emerging competitive forces. A conscious effort has been made as part of the process of preparation of the Strategic Plan to analyse the external environment comprising of the political and economic environments as well as socio-cultural, technological, ecological and legal factors; and the internal environment.

Analysis of the internal environment involved conducting a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis of the Organisation. A more detailed analysis was also done on the KALRO's Stakeholders and key issues.

Within the political environment, National, Regional and International policies and strategies were found to be of paramount importance to the Organization. Key among

them were the Kenyan Constitution, for instance, which recognizes access to food as a human rights issue and importance of natural resources and their use for posterity. Additionally, it classifies research as a National Government function under the 4th schedule item No. 16, of the Constitution. The economic, socio-cultural, technological, ecological and legal factors were other avenues the situational analysis acknowledged as possible paths of providing additional means of engagement. These include fruitful interactions leading to access to regional markets, opportunities for partnerships, linkages leading to provision of market outlets for KALRO products and services.

The establishment of the County Governments and devolution of agricultural extension services brought new opportunities and posed challenges in research-extension linkages as well as modes of operation to reach the grass roots. All County governments prepare five-year County Integrated Development Plans (CIDPs) with each County Department (e.g. Agriculture and Livestock) developing sectoral plans as components of the CIDPs. In addition, County Governments are allowed to enter into agreements with the National Government or its agencies to provide or receive any service that the County requires. It is therefore necessary for KALRO to develop mechanisms for working closely with the County Governments to ensure results from research create appropriate impacts at the grass roots level.

3 Strategic Orientation and Positioning

3.1 KALRO's Strategic Focus

Being the premier agricultural and livestock research organization in Kenya, KALRO is obligated to provide demand-driven solutions to agricultural challenges locally, regionally and internationally through cutting-edge research. Thus KALRO should not only focus on addressing the national challenges but also lead globally through partnerships, collaboration and networking to generate technology and innovations. KALRO will be guided by its **Vision *"Excellence in agricultural and livestock research towards transformed livelihoods"*;** and **Mission** "***To conduct agricultural research through application of science, technology and innovation to catalyse sustainable growth and development in agriculture and livestock product value chains***".

These will be achieved through observation of the following Organization's core values:

a) Customer focus
b) Professionalism
c) Integrity
d) Innovativeness
e) Collaboration
f) Environmental consciousness.

3.2 Strategic Approach

To respond and deliver successfully on its mandate, KALRO strategically adopted the Agricultural Product Value Chains (APVC) approach. The approach focuses on product value chains in all stages starting from production to consumption and waste disposal as opposed to focusing on commodities *per se.*

4 Organizational Key Results Areas and Strategic Objectives

Given its strategic orientation, positioning and focus, the following five Key Result Areas (KRA) were identified to ensure that the organization delivers on its mandate and catalyse agricultural sector growth to at least 7% per year as envisaged in Vision 2030:

KRA 1: Technologies and innovations for agricultural products value chains generated;

KRA 2: Knowledge, information and technologies on agricultural products value chains collated, stored and shared;

KRA 3: Socio-economics information, market and policy options supporting agricultural product value chains generated and advocated;

KRA 4: Organization capacities and resource management strengthened;

KRA 5: Systems for coordination, prioritization and regulation of agricultural product value chains developed and operationalized.

5 Implementation, Monitoring, Evaluation and Performance Management

This Strategic Plan will cover five years during which annual work-plans based on performance contract targets will be prepared and implemented. Through guidance from the Planning, Monitoring and Performance Management Unit, there will be structured planning, monitoring and learning coupled with provision of advice, including those identified critical success factors, to inform subsequent activities and necessary adjustments. Various M&E mechanisms have been identified to ensure the SP is implemented effectively and efficiently.

The logical framework has been adopted as a monitoring and evaluation tool and matrices of performance indicators will be developed and used. An implementation matrix has been developed to show the linkage between the key results areas, strategic objectives and strategies on one side; and the key performance indicators, targets and budgets on the other.

CHAPTER 1: INTRODUCTION

1.1 Role of Agriculture in Kenya's Economy

The country's agricultural sector is the mainstay of the national economy. Agriculture contributes approximately 26% directly to the Gross Domestic Product (GDP) and a further 25% indirectly through linkages with agro-based and associated industries. Overall, the agricultural sector is the leading source of employment in the rural areas, where 80% of Kenya's population live, employs over 80% of the total labour force, generates over 60% of foreign exchange earnings and provides about 75% of industrial raw materials. The sector is dominated by smallholders who account for approximately 75% of the total agricultural output.

The ASALs in Kenya occupy 80% of the country land mass and are home to about 10 million people. They support pastoralism which provides livelihood to over three million people. About 70% of the national livestock population and about 90% of wildlife that supports the tourism industry are in these ASALs hence improving their productivity will enhance the performance of the agricultural sector in the country.

Growth in the agricultural sector is closely linked to the overall economic growth in Kenya. It is estimated that the sector on average contributed 1.17% GDP growth in the overall economy between 2010 and 2016[1]. It is a provider of investment opportunities for the private sector, and a prime driver of agriculture-related industries and the rural non-farm economy. The GDP growth originating from agriculture benefits mostly the poorest half of the population by reducing poverty levels[2]. Agriculture, therefore, remains the engine of the national economy and its performance impacts heavily on most of the other sectors. By contributing raw materials to the manufacturing/industrial sector, the agricultural sector has a definite role in Kenya's progress towards becoming a newly industrialized country by 2030. The country's Vision 2030 has set a target to increase growth in agricultural output by a sustained 7% per year in order to propel the national economic growth to 10% per annum. Improvements in total factor productivity are expected to contribute about 3% of agricultural productivity, with the remainder coming from increased investments.

The broad national objectives of the agricultural sector are to contribute towards (i) attainment and maintenance of domestic supply of the main food items; (ii) production of raw materials for industries; (iii) creation of gainful employment and increase in incomes of those involved in production; and (iv) management and conservation of natural resources. Additionally, the sector produces agricultural commodities for export and import substitution.

[1]The contribution of agriculture to growth is defined as the agricultural growth rate times the sector average share over the period divided by the GDP growth rate (World Bank, 2008).
[2]The green revolution in South Asia cereal yields increased by more than 50 percent and poverty had declined by 30 percent (World Bank, 2008).

For the agricultural sector to continue contributing significantly to the overall goal of economic growth, wealth creation, food and nutrition security and poverty alleviation, smallholder agriculture must be transformed from subsistence to a commercial and profitable business enterprise.

1.2 The Role of Research in Agricultural Development

Agricultural research in Kenya has made significant contributions to rural development. The impact indicators of the long-term investments in agricultural research may be grouped into three categories: (i) the Productivity Impact Indicator, which focuses on the efficient use of resources; (ii) the Livelihood Impact Indicator, which determines whether gains of increased productivity benefits the community; and (iii) the Environmental Impact Indicator, which determines whether the gains achieved by the first two indicators can be sustained. The annual rate of returns to investments in research has been established to range between 20 to 40 percent[3] and that investments in agricultural R&D returns between 30 and 75 percent[4]. However, it is noted that developing and transferring technology alone will not close the yield gaps, reduce post-harvest losses and wastage[5] because transformative agriculture requires more considerations beyond technology. Thus, for impacts to be realized, agricultural transformation has to focus on innovation which is a major source of improved competitiveness, productivity and economic growth[6]. Investment in agricultural research is therefore key to economic growth since it generates technologies, knowledge and innovations.

1.3 Evolution of Agricultural Research

Agricultural research in Kenya started through the establishment of the first government farms in the early 1900s in Mazeras, Nairobi, Naivasha and Kibos for testing suitability of crop varieties and animal breeds and propagation of materials mainly for the settler farms. Research in government farms was supplemented by on-farm experiments in large scale settler farms. Later, research in East Africa (Kenya, Tanganyika, Uganda and Zanzibar) was coordinated by the East African Agricultural and Forestry Research Organization (EAAFRO) and the East African Veterinary Research Organisation (EAVRO) established in 1948 and based in Muguga, Kenya. With the break-up of EAC in 1977, individual research bodies were formed by each of the three countries in the region. In Kenya, the agricultural research was hosted within the Scientific Research Division in the Ministry of Agriculture.

In 1979, KARI was established to focus on food, horticultural and industrial crops and livestock research. Coffee, Tea and Sugar Research Foundations were established in 1964, 1980 and 1990, respectively to focus on their respective mandate crops.

[3] FAO, 1988
[4] FAO 2009
[5] FAO 2012
[6] World Bank 2012

Agricultural Research has evolved over the years from being mostly an advisory service coordinated by the Ministry of Agriculture, to a robust system which includes the private sector, institutions of higher learning and several independent national and international research institutions.

Kenya's agricultural research has been guided by the Agriculture Act (Cap 318), the Science and Technology Act (Cap 250), sectoral based legislations, as well as university statutes. Non-governmental organizations (NGOs) and many other non-state actors also perform some aspects of agricultural research. Currently, the NARS is regarded as one of the strongest in Sub-Saharan Africa. It has capacity to implement priority research programmes targeting mainly the small-scale resource poor farmers. However, it was noted that research in the country was being undertaken without a shared vision, mission and goals among both the public and private sectors. Each institution conducted independent research with minimal consultation with others thereby leading to inefficient use of resources. It therefore became necessary to transform the agricultural research system into a dynamic, innovative, responsive, and well-coordinated system driven by a common vision and goal. Against this background, the Government of Kenya developed the National Agricultural Research System Policy (NARS policy) in 2012 to inform the process of establishing an effective and efficient national agricultural research system. The process benefited from key stakeholders and lessons learnt from other National Agricultural Research Systems such as Empresa Brasileira de Pesquisa Agropecuária Brazilian Agricultural Research Corporation (EMBRAPA), Indian Council of Agricultural Research (ICAR) and Malaysian Research Systems. The reforms focused on rationalization and consolidation of existing public funded agricultural research institutions.

The overall objective of the NARS Policy was to create an enabling environment for a vibrant agricultural research system that contributes effectively to national development. The Policy aimed at streamlining and enhancing coordination of agricultural research so that the sector can effectively contribute to the goal of attaining 10% annual economic growth envisaged under the economic pillar of Vision 2030. The policy was also meant to improve the synergies and complementarities among various players operating along the research-development continuum for enhanced efficiency and output.

1.4 Overview of KALRO

The NARS policy led to the enactment of the Kenya Agricultural and Livestock Research (KALR) Act, no 17 of 2013 'to provide for the establishment and functions of the, Kenya Agricultural and Livestock Research Organization, to provide for the organs of the Organization, to provide for co-ordination of agricultural research activities in Kenya, and for connected purposes'. The Kenya Agricultural and Livestock Research Organization (KALRO) was formed by merging of KARI, KESREF, TRFK and CRF. The Organization consists of the Board of Directors in which the management of the organization vests and a Secretariat to implement Board decisions. The Act further established 16 Research Institutes to focus on different thematic research areas.

The overarching objective of the first KALRO Strategic Plan is to ensure, through collaborative efforts, that agricultural and livestock research contributes to accelerated growth in total factor productivity through generation of technologies, innovation and knowledge. The resulting increase in productivity will not only ensure that the Government achieves targets set by the Vision 2030 but also the EAC Vision 2050, Africa Union's Agenda 2063 and the SDGs.

1.4.1 Mandate of KALRO

The mandate of KALRO as stated in the Act is to:

a) Promote, streamline, coordinate and regulate in Kenya research in crops, livestock, genetic resources and biotechnology;
b) Promote, streamline, coordinate and regulate research in crops and animal diseases;
c) Expedite equitable access to research information, resources and technology and promote the application of the research findings and technology in the field of agriculture.

1.4.2 Core Functions of KALRO

To carry out its functions KALRO shall:

a) Formulate policy and make policy recommendations to the Cabinet Secretary on agricultural research;
b) Prioritize areas for, and co-ordinate, agricultural research in Kenya in line with the national policy on agriculture;
c) Determine and advise the Government on the resource requirements for agricultural research in Kenya both at the National and County level;
d) Regulate, monitor and ensure that all agricultural research undertaken by research institutes and other institutions or persons undertaking agricultural research is consistent with the national priorities specified in the relevant policy documents;
e) Establish and exercise control over the research institutes, committees and research Centres established pursuant to this Act;
f) Formulate or approve medium and long term research plans, strategies and budgets of research institutes, committees and organizations established pursuant to this Act;
g) Provide grants to research institutes and persons desirous of carrying out research and training programmes which are consistent with the national research priorities and plans of the Organization;
h) Support and promote the training and capacity building in relation to agricultural research;
i) Promote the dissemination and application of research findings in the field of agriculture and the establishment of a Science Park;
j) Liaise with and ensure the co-ordination of institutions, agencies and persons involved in agricultural research;
k) Establish platforms for the purposes of sharing research information, advancing research and transfer of technology and dissemination of information relating to advancements made in agricultural research;

l) Ensure continuance of performance improvement in the field of agricultural research; and
m) Perform such other functions as may be conferred on it by this Act or any other written law.

1.4.3 Organization Structure

The organograms of KALRO, Research Institutes and Centers are presented in Annexes 1a, 1b and 1c.

1.4.4 Organizational Intra-relationships

The Board of Management which is appointed by the National Government is responsible for the overall governance of KALRO. The Organization is comprised of the Directorate, Secretariat, Institutes and Centres. The Headquarters is located in Loresho, along Kaptagat Road, off Waiyaki Way, Nairobi.

1.4.4.1 The Directorate

The Directorate is comprised of the Director General and, Deputy Director Generals (Crops and Livestock) and Chief Manager - Corporate Services. Their role is to oversee and coordinate the implementation of policies, plans and Board decisions in the Organization. The Directorate reports to the Board of Management on regular basis on the progress, challenges and other relevant experiences encountered during implementation of planned activities.

1.4.4.2 Secretariat

The Secretariat is the implementing arm of the Board and comprises of the Directorate, the Operational Units and Corporate Services. There are eight operational units in the secretariat namely; (i) Crop Systems; (ii) Livestock Systems; (iii) Socio-economics, Applied Statistics, Outreach and Partnerships; (iv) Commercial Enterprise and Business Development; (v) Planning, Monitoring & Evaluation and Quality Assurance; (vi) Knowledge Management and Policy Research and Development, (vii) Range and Environmental Management; and (viii) Land and Water Management. The Operational Units are responsible for formulating organization-wide policies, strategies, projects and coordinating their implementation.

The Corporate Services comprise of: (i) Finance and Accounts (ii) Human Resource and Administration (iii) Supply Chain Management (iv) Internal Audit

1.4.4.3 Research Institutes

The Organization has 17 Research Institutes located across the country and largely organized along commodities and disciplines. The Institutes are responsible for the implementation of the Organizations's research agenda through a network of Research Centres and Sub-Centres, covering all the agro-ecological zones in Kenya. The research agenda is implemented through annual work-plans that are approved by the Board. The research programmes are designed to incorporate cross-cutting themes to allow for inter-institute collaboration. Thematic leaders who are based at appropriate Centres across the country lead the research activities. Table 1 shows a list of the Research Institutes and their Headquarters.

Table 1: KALRO Research Institutes and Heaquarters

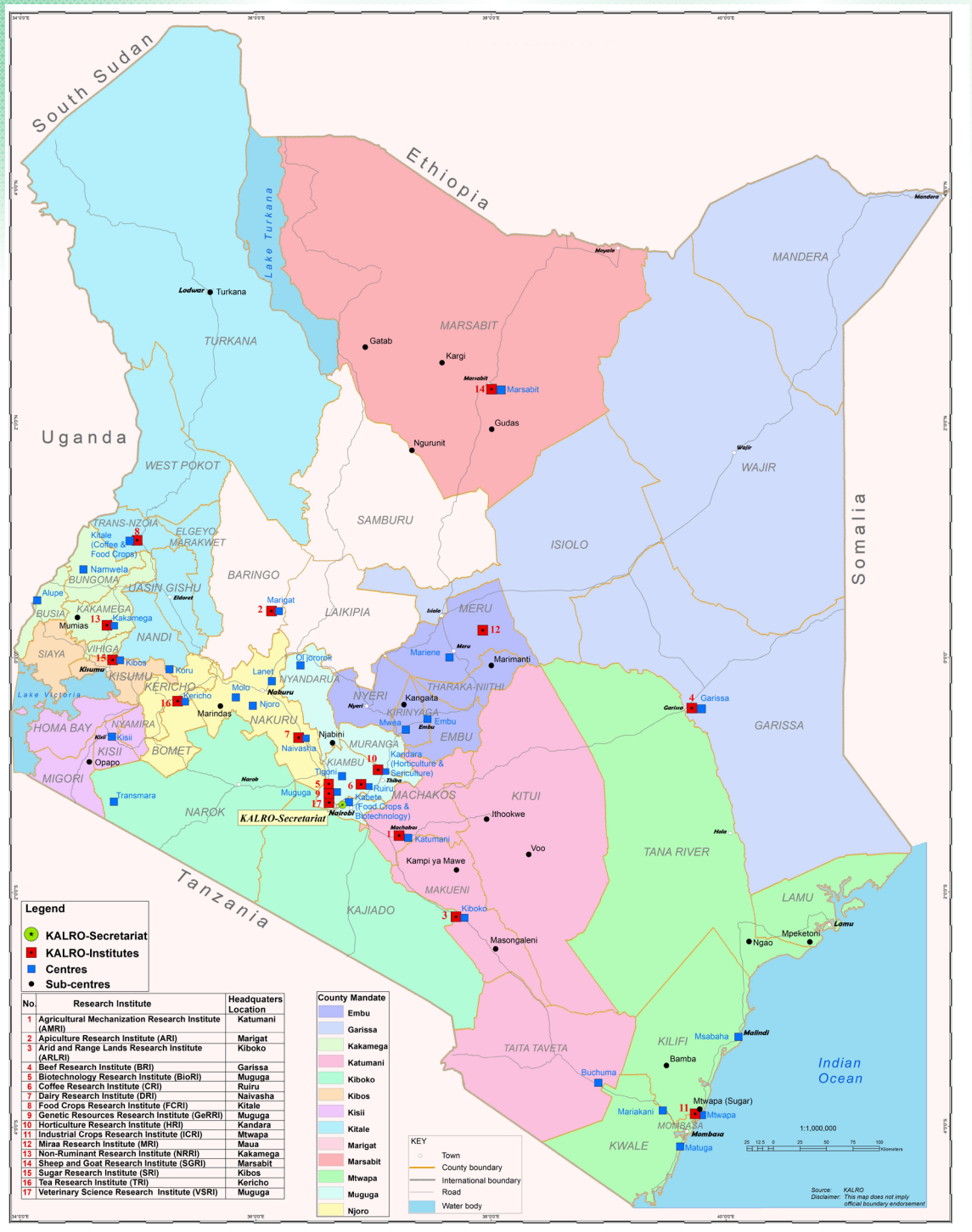
No.	Research Institute	Headquarters location
1.	Agricultural Mechanization Research Institute (AMRI)	Katumani
2.	Apiculture Research Institute (ARI)	Marigat
3.	Arid and Range Lands Research Institute (ARLRI)	Kiboko
4.	Beef Research Institute (BRI)	Garissa
5.	Biotechnology Research Institute (BioRI)	Muguga
6.	Coffee Research Institute (CRI)	Ruiru
7.	Dairy Research Institute (DRI)	Naivasha
8.	Food Crops Research Institute (FCRI)	Kitale
9.	Genetic Resources Research Institute (GeRRI)	Muguga
10.	Horticulture Research Institute (HRI)	Thika
11.	Industrial Crops Research Institute (ICRI)	Mtwapa
12.	Miraa Research Institute (MRI)	Meru
13.	Non-Ruminant Research Institute (NRRI)	Kakamega
14.	Sheep, Goats and Camels Research Institute (SGCRI)	Marsabit
15.	Sugar Research Institute (SRI)	Kisumu
16.	Tea Research Institute (TRI)	Kericho
17.	Veterinary Science Research Institute (VSRI)	Muguga

1.4.4.4 Research Centres and Sub-Centres

KALRO has an established network of research Centres and Sub-Centres providing experimental sites covering all agro-ecological zones in Kenya. Through this network, KALRO has a physical presence in 37 out of the 47 Counties. However, it is important to note that some Centres have mandate areas that cover more than one County. This is to ensure that appropriate technologies relevant to every County are developed and adaptive research undertaken will effectively cover all the 47 Counties. The agricultural sector in

the Counties particularly the extension staff will be deliberately engaged through fora such as innovation platforms and on-farm field activities.

Research Institutes are responsible for programmes undertaken at various research Centres. Due to their specific agro-ecological coverage, Centres host several projects from across Institutes. Centre Directors oversee management of research Centres by providing administrative leadership for all the activities being undertaken at the Centres. They report administratively to the respective Institute Directors and technically to each Institute Director whose activities are in the Centre. Similarly, the scientists from other Institutes working in Centres managed by a different Institute report administratively to the Centre Director and technically report to their respective Institute Directors. It is important to note that Research Institutes have a national mandate hence the day to day running of Centres is the responsibility of Centre Directors. Figure 1 shows the distribution of KALRO Institutes, Centres and the Counties they are responsible for (County Mandates).



No.	Research Institute	Headquaters Location
1	Agricultural Mechanization Research Institute (AMRI)	Katumani
2	Apiculture Research Institute (ARI)	Marigat
3	Arid and Range Lands Research Institute (ARLRI)	Kiboko
4	Beef Research Institute (BRI)	Garissa
5	Biotechnology Research Institute (BioRI)	Muguga
6	Coffee Research Institute (CRI)	Ruiru
7	Dairy Research Institute (DRI)	Naivasha
8	Food Crops Research Institute (FCRI)	Kitale
9	Genetic Resources Research Institute (GeRRI)	Muguga
10	Horticulture Research Institute (HRI)	Kandara
11	Industrial Crops Research Institute (ICRI)	Mtwapa
12	Miraa Research Institute (MRI)	Maua
13	Non-Ruminant Research Institute (NRRI)	Kakamega
14	Sheep and Goat Research Institute (SGRI)	Marsabit
15	Sugar Research Institute (SRI)	Kibos
16	Tea Research Institute (TRI)	Kericho
17	Veterinary Science Research Institute (VSRI)	Muguga

Figure 1: KALRO Institutes, Centres and County Mandates

1.5 Achievements of the Former Research Institute and Foundations

The four institutions forming KALRO had hitherto developed and implemented well thought out strategic plans, with detailed priorities, programmes and specific strategies. The implementation of these strategies achieved tremendous outputs 10 years prior to the merger. Some of these include:

1.5.1 Technologies, Innovations and Knowledge

a) The following livestock improved breeds were availed to farmers:
   i) Twenty thousand improved Sahiwal bulls and a million straws of semen;
   ii) Seven hundred superior Boran bulls;
   iii) One thousand heifers of Boran-Friesian crosses.
b) Developed vaccines for the control of various livestock diseases including; Newcastle, fowl pox, East Coast Fever (ECF), Contagious Bovine Pleuro Pneumonia (CBPP), Peste des petits ruminants (PPR) and Contagious Caprine Pleuro Pneumonia (CCPP).
c) Developed animal health diagnostic kits which included complement fixation test for CBPP and latex agglutination test for CCPP;
d) Developed medicated urea-molasses blocks and a technology for Total Mixed Rations (TRM) that uses crop residues for livestock;
e) Over 15 improved fodder varieties of forage legumes and grass cultivars were developed;
f) Four improved range grasses varieties were identified and recommended for the rangelands;
g) Developed improved indigenous chicken breeds from which over a million chicks were supplied to farmers;
h) Designed appropriate mobile and fixed poultry houses, and formulated appropriate feed rations for various types of poultry;
i) Developed and released:
   i) Five coffee varieties;
   ii) One hundred and fifty cereal crops varieties;
   iii) Eighty root and tuber crops varieties;
   iv) Thirty-five varieties of pulses;
   v) Twenty sugarcane varieties of sugarcane;
   vi) Fifty tea varieties.
j) Introduced and improved:
   i) Thirty-six varieties of fruits;
   ii) Twenty varieties of floriculture;
   iii) Thirty-five varieties of medicinal and aromatic plants;
   iv) Ten oil and nut crops varieties.
k) Installed twelve thousand drip irrigation kits in different parts of the country;
l) Developed, tested and promoted:
   i) Integrated soil fertility management strategies for improving soil fertility and crop production on smallholder farms, and;

ii) Water harvesting, irrigation technologies and integrated nutrient management options for sustainable crop production in arid and semi-arid lands.

m) Developed targeted recommendations for fertilizers to avoid blanket application and launched a book showing fertilizers recommendations for different areas.

n) About ninety-one thousand soil samples were tested across the country.

0) Promoted application and utilization of Geographical Information Systems (GIS) as a tool for development of crop suitability maps and extrapolate site specific fertilizer recommendations for different agro-ecological zones.

p) Conducted household and agribusiness baseline surveys in the 47 Counties.

1.5.2 Contribution to Development of Agricultural Policies and Strategies

KALRO and the former research organizations contributed to the development of several national overarching policies and strategies, and those specific to different commodities. This was done through participation in different technical working groups during policy formulation, providing policy briefs and reports containing relevant information, and contributions made during various policy dialogue forums of stakeholders. Some of the national policies and strategies that the Organization contributed to their development in the recent past include:

a) Agricultural Sector Development Strategy (ASDS)
b) National Agricultural Research System (NARS) Policy
c) National Agricultural Sector Extension Policy (NASEP)
d) Science, Technology and Innovations (STI) Strategy
e) National Food and Nutrition Security Policy (FNSP)
f) National Seed Policy
g) National Climate Change Action Plan
h) National Agricultural Mechanization Policy
i) National Agricultural Soil Management Policy
j) National Lands Policy
a) All the three Vision 2030 Medium Term Plans (MTP)

1.5.3 Registered Varieties

Forty-four crop varieties were registered by KEPHIS to secure breeders rights. The varieties included:

i. Six for sugarcane
ii. One for cotton
iii. Twenty-Three for pyrethrum
iv. Ten for tea
v. Four for coffee

1.5.4 Products Granted Patent Certificates by Kenya Industrial Property Institute (KIPI)

The following four research products and processes were also granted patent certificates by KIPI:

i. Vector and Rodent Holding Device;
ii. Process for Optimum Production of High Catechin Content Black Tea;
iii. Pyrethrum Solar Dryer;
iv. Improved Process and Associated Technology for Pre-Drying Green Leaf Tea.

1.6 Rationale for the Strategic Plan

Globally, agricultural research has shifted to more integrated systems focussing on demand-driven high impact outputs for development and environmental sustainability. At the national level, there are overarching policies guiding the process of developing the KALRO Strategic Plan. Key among them is Vision 2030 which is the country's development blueprint that envisions Kenya to be *"a globally competitive and prosperous country with a high quality of life by 2030"*. The realization of this vision is anchored on Science, Technology and Innovation (STI) to steer all the sectors of the national economy and growth. It aims at transforming Kenya into "*a newly industrializing, middle income country providing a high quality of life to all citizens in a clean and secure environment*."

Consequently, the ASDS 2010-2020 was developed to guide the growth of the sector in the realization of the vision. Through this strategy the agriculture sector is envisioned to achieve a growth rate of 7% per year, which will in turn lead to the realization of the 10% annual economic growth as anticipated in Vision 2030. In this regard, KALRO is mandated to streamline, rationalize and put in place an integrated and harmonized research system that will effectively contribute to the delivery of the Vision.

The Second Medium Term Plan (MTP) of the Vision 2030 gives priority to increased acreage under irrigation in order to reduce the country's dependence on rain fed agriculture. The MTP gives priority measures that will be taken to mechanize agricultural production, revive cooperatives and farmers' unions, and subsidize farm inputs to raise productivity. The Government further focuses on establishing disease free zones in the livestock producing areas, working in cooperation with the relevant County Governments, to support higher productivity and processing of animal products for domestic consumption and exports. To meet the goals of job creation and value-addition in agriculture and livestock, the Government seeks to establish special economic zones in partnership with private investors to support increased manufacturing and exports with high value added. Kenya adopts climate-smart agriculture intervention strategies such as harnessing farm waste as a source of organic fertilizer, and use of bio-fertilizer that does not contribute to harmful emissions, better weather forecasting/early warning systems, growing resilient food and fodder crops, managing post-harvest losses and crop and livestock insurance. KALRO is therefore expected to develop technologies

and innovations to address some of these issues and contribute to the attainment of the objectives of various MTPs.

Endeavours in the agricultural sector development in Kenya focuses on both internal and external environments. Thus, KALRO's Strategic Plan must not only conform to the national aspirations but also be in tandem with evolving policies while taking advantage of current and emerging opportunities in the regional and international arena. Some of the potential key partners at regional and continental levels include Africa Union (AU), The New Partnership for Africa's Development (NEPAD) (through the Comprehensive Africa Agriculture Development Programme (CAADP) process, Maputo and Malabo Declarations) that inform investment in agriculture. Other partners include Forum for Agricultural Research in Africa (FARA), Alliance for Green Revolution in Africa (AGRA), Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA). There are also several International Agricultural Research Centres, whose partnerships bring synergy in diverse ways. All these organizations have goals of impacting on people at the grassroots, and many achieve this through engaging the NARS.

The newly launched 17 SDGs provide a framework for shifting the world economic development onto a path of inclusivity, sustainability and resilience. The SDGs, and the broader sustainability agenda, go much further than the MDGs, in addressing the root causes of poverty and the universal need for development that works for all people. Through an integrated approach, the goals tackle the social, economic and environmental challenges to achieve sustainable development to meet the needs of the present without compromising the ability of future generations to meet their own needs. Kenya in its capacity as a member of the United Nations (UN) aligns its policies and development agenda to the SDGs and the Malabo Declaration of June 2014 which contains key commitments to transform agriculture across the African continent by enhancing public and private investment in agriculture; ending hunger; increasing intra-African trade in agricultural commodities and services and enhancing resilience to climate variability and related risks.

It is envisaged that KALRO through its research and dissemination programmes will directly contribute to the attainment of the following 11 SDGs:

SDG 1. End poverty in all its forms everywhere
SDG 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture
SDG 3. Ensure healthy lives and promote well-being for all at all ages
SDG 5. Achieve gender equality and empower all women and girls
SDG 6. Ensure availability and sustainable management of water and sanitation for all
SDG 7. Ensure access to affordable, reliable, sustainable and modern energy for all
SDG 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

SDG 12. Ensure sustainable consumption and production patterns
SDG 13. Take urgent action to combat climate change and its impacts
SDG 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
SDG 17. Strengthen the means of implementation and revitalize the global partnership for sustainable development

It is expected that through this Strategic Plan, agricultural research will play a key role in increasing agricultural productivity and raising incomes with the net benefit of significant poverty reduction.

1.7 Planning, Data Collection, Analysis and Validation Process

The process of strategic planning was initiated by the establishment of Strategic Planning committees including; the Steering Committee, Institute Committees and a Taskforce. The primary focus was to collect both primary and secondary data that would form the database. The process was consultative and participatory. In this regard, all KALRO's key stakeholders were involved.

1.7.1 Data Collection and Analyses

The primary data were collected from KALRO Institutes using questionnaires and through stakeholders' consultations, including the County Governments. Secondary data included review of the international, national and regional policy documents; and past and present strategic plans for key organizations. The rationale for stakeholder consultations was to incorporate as many views as possible. In addition, these consultations were expected to create a sense of ownership not only within KALRO but also among the external partners. The stakeholders included: State Departments of Ministry of Agriculture, Livestock and Fisheries, Council of Governors, County Governments, Donors, Farmer organizations, NGOs, private and various value chain actors. Stakeholder consultations involved holding engagement workshops, focus group discussions and key informant interviews with various representatives.

The data collected at the Institutes were used to perform SWOT (strengths, weaknesses, opportunities, and threats), PESTEIL (political, economic, socio-cultural, technological, institutional, ecological and legal) and stakeholders' analyses. The resulting reports were uploaded in a central database and used to analyse the external and internal environment in which KALRO operates. The approach was based on the thematic area identification, ranking and frequency analysis of the themes. Stakeholders' analysis was also performed to identify primary and secondary stakeholders along various value chains processes e.g. production, post-harvest, handling, marketing and financing. Summary of issues from the Counties and the environment in which KALRO operates were highlighted and strategies developed based on the SWOT and PESTEIL models.

1.7.2 Validation of the Draft Strategic Plan

The draft strategic plan was validated through both internal and external stakeholder consultative process. The aim of the validation was to counter-check inclusiveness of the issues that needed to be addressed by KALRO as per its stated mandate. The internal validation included consultative meetings, workshops and retreats with Operational Unit Heads and Senior scientists, Institute Directors and finally the KALRO Board of Management.

After the Board was agreeable with the draft, it was thereafter shared with the external stakeholders who included: National Government Departments, Sector Ministries, Semi-Autonomous Government Agencies (SAGA's); County Government, Council of Governors Technical Committee on Agriculture, Selected County Agriculture Executives; Farmer Organizations; Private Organizations, Companies, Associations and Councils; Research Institutions, Universities and other related organizations, International organizations and NGOs, Missions, Agro chemical companies, Seed Companies, Banks, Media and Consultative Group on International Agricultural Research (CGIAR). The comments from the stakeholders were considered and incorporated in the final SP. The first KALRO Strategic Plan was officially launched in 2017.

CHAPTER 2: SITUATIONAL ANALYSIS

Chapter 2 presents results of the situational analysis of the external and internal environments in which KALRO operates, and assesses the implications of the interactions with those environments on the organization. The PESTIEL, SWOT and stakeholders' analyses were used to describe those environments.

2.1 Analysis of KALRO's External Environment

Agriculture and Livestock Research in Kenya is affected by several external environmental factors. Understanding these will enable KALRO to take advantage of the opportunities and minimize the threats especially from emerging competitive forces. Through this, the Organization will be able to cope with the realities of the surrounding environment. The results of the analysis of the external environment are presented in the following sections.

2.1.1 Political Environment

a) National Policies and Strategies

National political considerations influence the enabling environment and allocation of resources to various competing needs. They also lead to the development of various legislations and regulations which facilitate or limit the operations of an organization such as KALRO. In general, the political developments in the country are currently supportive of agricultural research. The Kenyan Constitution for instance recognizes the importance of natural resources and their use for posterity. In section 43 (c) under the Bill of Rights, the Constitution indicates that *"every person has the right to be free from hunger and to have adequate food of acceptable quality"*. Article 60 (1) (c) emphasises sustainable and productive management of land resources. Research is identified as a National Government function under the 4th schedule item No. 16, of the Constitution.

The Kenya Vision 2030 identifies STI as a key foundation supporting the Vision's pillars in attaining wealth creation, social welfare and international competitiveness. Further, it identifies agriculture as one of the key sectors to deliver the 10% annual economic growth rate envisaged under the economic pillar. To achieve this, transformation of smallholder agriculture from subsistence to an innovative, commercially-oriented and competitive agricultural sector is considered to be critical.

The National Agricultural Research Systems (NARS) Policy, 2012, aimed at bringing together agricultural research institutions and aligning agricultural research priorities to respond to national development goals, market demands and client needs. The Policy led to the enactment of the KALR Act 2013, which created KALRO with a clear and elaborate legal framework that guides its mandate, functions and operations. This Policy provides

KALRO with the opportunity to develop demand driven agricultural technologies, and lobby for increased resources from both National and County Governments and development partners as well as establishment of a system for delivery and uptake of agricultural research outputs.

The ASDS 2010 - 2020 states that the sector is the backbone of Kenya's economy and livelihoods for most of the rural population. Research has a central role in contributing to the development of the sector and the Strategy provides mechanisms to support it. On the other hand, the objectives of the National Food and Nutrition Security Policy, 2012 are to achieve adequate nutrition for all Kenyans; increase the quantity and quality of food available; enhance accessibility and affordability of food products; and protect vulnerable populations.

The National Livestock Policy, 2014 seeks to improve the livestock management systems, improve and conserve the available animal genetic resources, control animal diseases and pests and support research in the livestock sub-sector. The policy is explicit that there is need to support livestock research to develop interventions for the growth of the sector. The National Agribusiness Strategy, 2012, emphasises the need for research development and innovation to better catalyse growth of a vibrant agribusiness sector. Research will be key in addressing various challenges along the APVC through development of diversified demand-driven technologies including expanding use of irrigation systems in agricultural production.

In the Kenya Constitution 2010, agricultural extension is mandated to devolved function of the County Governments. KALRO will therefore collaborate with the County Governments in the prioritization of the research agenda and dissemination of technologies and knowledge. In this regard, establishment and strengthening of linkages with County Governments will be a key success factor for adoption of KALRO's technologies and innovations.

It is unequivocal that the policies stress the need for food and nutrition security, poverty reduction and sustainable improvement of livelihoods through STI. Addressing their aspirations provide opportunities for enhancing KALRO's scope of research.

b) Regional and International Policies

Kenya is affiliated to international and regional organizations involved in agriculture such as FAO, International Commodity Organizations such as for coffee, tea, sugarcane, World Trade Organization (WTO), AGRA, FARA, African Growth and Opportunity Act (AGOA), ASARECA and CGIAR affiliated institutions. KALRO thus operates in a professional political environment which is articulated in various international, regional and national policies and will benefit greatly from working with these organizations.

2.1.2 Economic Environment

This section highlights the economic forces relevant to the development of the agricultural sector. Although there have been some gains due to the availability of regional markets, demand of agricultural technologies and increased consumption of agricultural products, the following economic factors significantly influence the successful operation of KALRO:

a) High Inflation and Fluctuating Exchange Rates

Depreciating exchange rates often leads to rising import prices in the producer sector, since exchange rates and import prices of inputs co-vary. High inflation rates lead to increased cost of conducting research arising from increasing cost of inputs and services. The high inflation rate may also affect exchange rates.

Exchange losses arising from currency appreciation can also reduce the amount of donor funds allocated for research. On the other hand, exchange gains arising from currency depreciation increase the amount of donor funds set aside for research. However, these gains may be dissipated depending on the level of increased cost of imported inputs and services within the research programme.

b) Regional Markets and Integration

There are various existing and emerging regional markets such as the EAC common market, Southern Africa Development Community (SADC) and Common Market for Eastern and Southern Africa (COMESA). These create increased opportunities for partnerships and linkages, provide market outlets for KALRO products and increase research opportunities within the economic blocks. They also create opportunities to compete for and tap into available research funds from regional bodies such as Intergovernmental Authority on Development (IGAD) that advocate for promotion of Research and Development. Consequently, there is need for high quality research and products to enable KALRO exploit and benefit from these opportunities.

c) Ability to Adopt Technologies and Innovations

The KALRO's mandate is to develop technologies and innovations that are appropriate and cost effective. However, their adoption can be at varied levels largely due to lack of awareness and resources especially finance.

2.1.3 Socio-Cultural Factors

These are forces that emerge as a result of interacting with the society and communities with regard to their values, norms and customs. Socio-cultural factors that may influence research in KALRO are highlighted below:

a) Stakeholders Perception

Stakeholders can form negative perceptions if their expectations are out of line with what the organization could actually deliver or mandate. The misalignment can be as a result of misinformation and or misrepresentation. The demand for products and services can be affected by stakeholders' and communities' perceptions arising from their level of appreciation or their comparison with those of other providers. Understanding how cultural factors may influence the Organization's success is important. Incorporating the perceptions in planning process is essential for ensuring the successful formulation and implementation of KALRO's research programmes.

b) Increasing Population

Population growth and changing diets are among the factors that affect the demand for food. Kenya's population is growing by 2.9 percent and it is expected to reach 66.96 million in 2030 and 95.47 million in 2050[7]. Demand for food is projected to double by 2030 and 20 percent of that increase is attributable to population growth. For example, the gap between maize production and consumption is expected to widen in the future and this would present a great challenge to ensuring future food security. By 2030, the production of maize based on the current productivity levels is expected to be 3.00 million metric tonnes against a demand of 6.33 million metric tonnes. The gap will widen in 2050 with maize production at 3.67 million metric tonnes against demand of 8.72 million metric tonnes[8]. This implies KALRO has to focus its research to ensure that it takes into account development of crop and livestock technologies and strategies for the management of small agricultural plots.

c) Low Academic Levels Among Farming Communities

Given that agriculture is knowledge intensive, low education levels among many farmers contribute to low adoption of technologies and innovations. This demands that KALRO develops and supports farmer friendly advisory, extension and promotion strategies of its technologies. The organization will carry out capacity building for both extension staff and farmers.

d) Indigenous Technical Knowledge

Availability of various indigenous technical knowledge (ITK) by the different farming communities and clients create opportunities to use, develop and improve technologies that are appropriate to the various communities. Documenting, validating and protecting the intellectual property in ITK provide opportunities to utilize the knowledge in KALRO's research process.

[7] United Nations, 2017
[8] Gichuhi, W and G. Odwe, (2015)

e) Youth in Agriculture

The engagement of the youth in agriculture remains low, there is a growing number of young and well educated '*farmpreneurs*' taking up agriculture as a business. There is need to find ways to encourage more youth to be involved in agriculture. It is also necessary to take cognisance of the needs of the youth already engaged and how to address them.

f) Women in Agriculture

Women are mostly involved in farm activities but do not have equal access to resources and opportunities required to improve farm activities. KALRO in developing its programmes, will take into consideration issues that will make the participation of women more inclusive.

2 .1.4 Technological Factors

The agricultural industry has been characterized by low-level technology adoption and inadequate innovation in production, processing and value addition systems that has led to persistent high costs of production and processing. The vital aspects of technological factors are information and communication infrastructure, adoption of the state of the art research procedures plus equipment and application of biotechnology. The organization will therefore adopt modern methodologies in conducting research.

2.1.5 Ecological Factors

It is recognized that the degradation of natural resources can adversely affect productivity and increase levels of poverty. The Environmental Management and Coordination Act (EMCA) of 1999 (Revised in 2012) indicate that all Kenyans are entitled to a healthy environment and this should be safeguarded and enhanced. Some of the ecological factors that need to be considered are: impact and implications of climate change, depletion of natural resources and degradation of the environment.

2.1.6 Legal Factors

There are several Acts of Parliament and regulations that impact on the operations of KALRO. These include the STI Act, 2013, which established the National Commission of Science, Technology and Innovation (NACOSTI), the National Biosafety Act, 2009, the Intellectual Property Rights (IPR), various County Government Acts and relevant global standards. In addition, there are various policy and legal factors that affect the operations of KALRO. For example, non-payment of levies of some crops, freeze on employment leading to inability to recruit required staff, the minimum wage policy and its implication on the cost of operation and increased bureaucracy of working with various stakeholders. The legal and regulatory frameworks also impact positively on KALRO, by providing the legal mandate to carry out and regulate research on all aspects of agriculture and livestock. KALRO is obliged to comply and conform to the various regulations and statutes, but also demand for compliance of regulation and statutes by stakeholders in its favour.

2.2 Analysis of Strengths, Weaknesses, Opportunities and Threats

An analysis of the internal environment of the organization was undertaken to identify the strengths as well as the weak areas of the organization. It also identified the opportunities and threats. KALRO will endeavour to minimise the effect of its weaknesses and threats while safeguarding the strengths and exploiting the opportunities. The strengths, weaknesses, opportunities and threats are shown in Table 2.

Table 2: KALRO's Strengths, Weaknesses, Opportunities and Threats

	Positive	Negative
Internal	**Strengths**	**Weaknesses**
	1. Skilled personnel who are experienced in carrying out research in different areas of the organization's mandate; 2. Availability of infrastructural facilities for research; 3. Availability of equipment for research; 4. Diversified sources of revenue generation; 5. Adequate agro-ecological coverage of the country; 6. Has specialized institutes; 7. Custodian of the national germplasm.	1. Low/insufficient funds, especially low Government funding; 2. Outdated/obsolete equipment and inadequate facilities in key areas and in some institutes; 3. Inadequate capacity to catalyse agricultural technology dissemination; 4. Inadequate key investments for growth; 5. Delayed implementation of human resources management policies, plans/ terms of services; 6. Manual internal business systems; 7. Inadequate linkages with County Governments.

	Opportunities	Threats
External	1. High regard of KALRO by the research and development community; 2. Existence of research/technology gaps; 3. Supportive policies; 4. Access to assets/infrastructure for agricultural research; 5. Availability of diverse partnerships and linkages; 6. Devolved agricultural functions; 7. Support and good-will from various stakeholders through funding and partnership; 8. High demand for research products and services.	1. Little influence over budgetary allocation; 2. High turnover of skilled staff; 3. Climate change and unfavourable climate; 4. Low involvement of youth in agriculture; 5. Inadequate support systems for farmers to adopt technologies; 6. Changing market requirements (standards) and consumer preferences; 7. Competition with other organizations; 8. Erosion of the germplasm resources base.

2.3 Analysis of Stakeholders

In the process of carrying out its functional obligations, KALRO interacts with a number of internal and external stakeholders. These stakeholders provide either opportunities for the Organization to enhance its efficiency and effectiveness or present threats that are likely to have a significant impact on the implementation of the Strategic Plan. Hence the necessity of identifying and assessing how these stakeholders are likely to affect the organization's performance.

Stakeholder analysis was conducted to identify the interests, roles/responsibilities, comparative advantages and contribution of the various stakeholders in the development and implementation of the Strategic Plan. The analysis involved an inventory of the main stakeholders having a complementary role or synergy to KALRO's effort, taking into considerations the various ways they may influence the implementation. The results of stakeholder analysis are presented in Table 3.

Table 3: Stakeholders Analysis

Stakeholder	Core areas of operational excellence in supporting agricultural research	Potential strategies for obtaining stakeholder support
County and National Governments		
County Governments	• Have financial resources that can support agricultural research • Provide enabling environment for agricultural research in the counties • Provide extension services to farmers • Promotion of crops and livestock development in counties • Organize farmers into producer and marketing groups	• Involvement in priority setting of the research agenda • Continuous engagement in implementation, monitoring and evaluation of research projects • Facilitate joint forums for sharing research results • Collaborate and participate in County agricultural forums • Collaborate in financing county specific research projects • Involvement in mobilization of farmers and other value chains actors in agricultural research activities
Joint Agricultural Secretariat (Comprised of national and county agricultural ministries)	• Conduct priority setting for the agriculture sector	• Collaborate in research priority setting • Assist in lobbying for research funds

Stakeholder	Core areas of operational excellence in supporting agricultural research	Potential strategies for obtaining stakeholder support
Kenya Plant Health Inspectorate Services (KEPHIS)	• Plant variety evaluation, release, registration and protection; • Seed Certification; • Custodian on implementation of the Phytosanitary regulations	• Adherence to laid down guidelines for development and release of crop varieties • Adherence to phytosanitary regulations during import and export of plant materials
Pest Control Products Board (PCPB)	• Assessment of safety, efficacy, quality and economic value of pest control products for registration	• Collaborate in the evaluation of pest control products
National Environmental Management Agency (NEMA)	• Oversees implementation of regulations on environmental management • Conducts environment audit in research fields and laboratories • Conducts environmental impact assessment for projects	• Collaboration in carrying out environmental audits • Collaboration in environmental impact assessment
Agriculture and Food Authority (AFA)	• Provision of regulatory services • Registration and licensing • Promotion of best practices in agricultural production • Provision of extension services for specific crops	• Involvement in setting the research agenda • Collaboration in dissemination of technologies
Kenya National Bureau of Statistics (KNBS)	• Conduct population census, including collection agricultural data • Collection of county level agricultural statistics	• Collaboration in agricultural data collection • Capacity building in statistical data collection • Provision of agriculture enumeration clusters
Kenya Veterinary Vaccines Production Institute (KEVEVAPI)	• Evaluation and production of vaccines • Commercialization of developed vaccines • Market and distribute veterinary vaccines locally and abroad.	• Collaboration during development, distribution and commercialization of vaccines • Joint planning of activities, continuous engagement • Vaccine royalties

Stakeholder	Core areas of operational excellence in supporting agricultural research	Potential strategies for obtaining stakeholder support
Ministry of Agriculture, Livestock and Fisheries (MoAL&F) and other sector ministries	• Partnership in technology development • Development of agricultural sector policies and regulations • Provision of finances • Linkage with development partners	• Involvement in setting the research agenda • Provision of resources for research • Collaboration in agricultural research and analysis • Involvement in policy formulation • Engagement in implementation, monitoring and evaluation of research projects
Plant Breeders Association of Kenya (PBAK)	• Develop and deliver varieties and improved germplasm to society	• Collaboration in breeding of superior crop varieties • Collaboration in the registration and protection of the varieties
Kenya Animal Genetic Resources Centre (KAGRC)	• Involved in animal genetic resources conservation and multiplication of germplasm	• Collaborate in animal breeding research • Engagement in establishment of animal genetic technology and innovation platform
Agricultural Development Corporation (ADC)	• Commercialization of technologies through multiplication and sale of improved crop varieties and livestock breeds • Have adequate land distributed nationally that can be used for research	• Establish collaboration in commercialization of technologies • Engagement to provide of land for multi-locational research trials
Kenya Bureau of Standards (KEBS)	• Development of standards and quality control • Testing and calibration of facilities • Certification of products, services and systems	• Engagement in calibration of research facilities and equipment • Engagement in certification of research products, services and management system

Stakeholder	Core areas of operational excellence in supporting agricultural research	Potential strategies for obtaining stakeholder support
National Commission of Science, Technology and Innovation (NACOSTI)	• Provides research policy guidelines • Accreditation of research institutes and approval of Scientific research • Advising the National and County governments on the science, technology and innovation (STI) policy • Assure relevance and quality of STI programmes in research institutes • Awareness creation on knowledge and information of research system	• Continuous engagement, monitoring and evaluation • Collaborate on Accreditation of research institutes • Collaborate in advising National and county governments on agricultural STI matters • Creation of joint forums for sharing research findings
National Research Fund (NRF)	• Provides research funds • Liaise with the National Innovation Agency to funding and implement prioritized research programmes • Development of human resources capacity through grants to persons or research institutions pursuing postgraduate programmes • Supports development of research capacities in the national priority areas of STI • Financial support for the development of research facilities for research institutions	• Writing and evaluation of competitive agricultural research proposals • Lobbying to provide block funding to KALRO by the Fund for agricultural research • Continuous engagement to prioritize research staff capacity needs • Collaboration in sharing research information and knowledge
National Biosafety Authority (NBA)	• Support development and implementation of guidelines in facilities undertaking research, testing or commercialization of GMOs • Collaborate in monitoring any genetically modified organisms for compliance with the requirements of regulations	• Training for KALRO Institutional Biosafety Committee (IBC) • Collaborate and support in awareness creation on genetically modified organisms in agriculture

Stakeholder	Core areas of operational excellence in supporting agricultural research	Potential strategies for obtaining stakeholder support
National Irrigation Board (NIB)	• Development of irrigation and drainage systems • Conducts water and waste analysis and use in agriculture	• Collaborate in irrigation and drainage research • Collaborate in Promotion of irrigation initiatives
Kenya Water Institute (KEWI)	• Conduct research on water and waste water management • Training water quality analysis	• Collaborate in capacity building for water quality analysis
Kenya Industrial Property Institute (KIPI)	• Provide patents to protect research outputs • Timely provision of IP services • Development and implementation of IP Policies	• Assist in development and implementation of IP policies • Collaborate in building capacity for drafting IP applications • Collaborate in the registration and protection of research products and outputs • Collaborate in IP training opportunities
National Treasury	• Resource allocation for research • Custodian of Government property • Linkage for bilateral grants • Provide tax waiver for externally funded projects	• Ensure compliance with all financial regulations • Engagement in budget preparations and negotiations • Ensure prudent use of public funds • Engagement in seeking tax waivers when necessary
Parliament (Senate and National Assembly)	• Approves agricultural policies • Enacts laws for agricultural sector • Approves budgets for research	• Continuous engagement on provision of adequate resources for agricultural research • Ensure compliance with all relevant statutory regulations • Ensure prudent utilization of public resources
Private Sector		
Kenya National Farmers' Federation (KENAFF)	• Promote progressive uptake of agricultural innovations by farmers • Facilitate capacity building for farmers • Promotion of smallholder gender balance in agriculture	• Collaboration in formulation of agricultural policies • Collaborate in priority setting for the agricultural research • Involvement in mobilization of farmers to participate in agricultural research and dissemination activities • Collaboration in development and implementation of joint research projects

Stakeholder	Core areas of operational excellence in supporting agricultural research	Potential strategies for obtaining stakeholder support
Kenya Private Sector Alliance (KEPSA)	• Conducts high-level advocacy on cross-cutting agricultural laws and policy-related issues • Develops capacity on business for membership organizations	• Collaboration in formulation agricultural policies • Collaborate in priority setting for the research • Provide financing of specific research programmes/ activities
Kenya Association of Manufacturers (KAM)	• Promote trade and investments • Value addition of agricultural products • Promote formulation, enactment and administration of sound agricultural policies • Provide market access for agricultural products	• Collaboration in development of agricultural policies • Collaborate in priority setting for the research programmes in line with the industry needs • Collaboration in development and testing of value addition technologies • Collaboration in conducting market research and provision of market information • Financing of specific research programmes
Seed Trade Association of Kenya (STAK)	• Preparation for and support of phased domestication of Seed Trade Harmonization Regulations • Develop market for quality seeds	• Collaborations in production, processing, marketing and distribution of high quality crop seeds
Kenya Veterinary Association (KVA)	• Delivers quality veterinary services • Supports growth in the animal resource industry	• Collaboration in development of veterinary related policies • Collaborate in priority setting for the research programmes in line with industry needs • Collaboration in development and testing of veterinary research products
Farmers and Farmer/ Livestock Producer Associations	• Recipient of the developed technologies • Provide feedback on technologies • Involved in technology testing and adoption • Identification of researchable issues • Custodian of indigenous technology and knowledge • Provide market for KALRO services and products • Marketing of farmer produce	• Involvement in priority setting of research agenda • Involvement in research processes • Timely response to their requests • Provide improved technologies • Continuous engagement in technology dissemination activities • Involvement in monitoring and evaluation

Stakeholder	Core areas of operational excellence in supporting agricultural research	Potential strategies for obtaining stakeholder support
Community Based Organizations (CBOs); Non-Governmental Organizations (NGOs); Faith Based Organizations (FBOs)	• Have good linkage with the farmers • Market outlet for KALRO products and services • Collaborate in the dissemination of information and technologies • Facilitate in technology adoption and utilization	• Engagement of their clients in the research processes • Involvement in mobilization of farmers and other value actors • Engagements in value chains/ innovations platforms • Continuous assessment of their needs and involvement in setting the research agenda • Develop and implement joint research projects • Engagement in capacity building/training
Local Financial Institutions	• Provision of credit facilities to farmers • Provision of insurance • Provide economic evaluation and advisory services on investments	• Continuous engagement • Prudent financial management • Involvement in value chain/ innovation platforms • Engagement funding for research and dissemination activities
Communication Providers e.g. Safaricom, Airtel, Kenya Data network (KDN)	• Collaborate in information dissemination • Enable communication and data transfer within and outside KALRO • Data backups	• Collaborate in financing of research activities • Involvement in disseminating research recommendations
Media (print and electronic)	• Dissemination of information • Communication networks • Awareness creation • Advertisement • Reporting news on KALRO activities	• Strategic engagement to promote KALRO • Dissemination of research results • Dissemination of information alerts
Agri-businesses (input dealers and merchants)	• Provision of quality agricultural inputs • Dissemination/awareness creation of current technologies • Provision of extension services	• Collaborate in providing advice on various technologies • Collaborate in capacity building and training for farmers • Collaborate in providing forums for product promotion • Collaborate as outlets for marketing KALRO products

Stakeholder	Core areas of operational excellence in supporting agricultural research	Potential strategies for obtaining stakeholder support
African Seed Trade Association (AFSTA)	• Preparation and support of phased domestication of Seed Trade Harmonization Regulations • Awareness creation of the COMESA Seed Trade Harmonization Regulations • Capacity building in the production of quality seeds and support of small-holder farmers	• Collaborate in developing Seed Trade Harmonization Regulations • Collaborate in capacity building in the seed sector
Alliance for Commodity Trade in Eastern and Southern Africa (ACTESA)	• Promotes common policies aimed at structural change and regional development • Coordinates macroeconomic policy coordination	• Collaborate in conducting reviews of regional policies influencing agriculture
National Agricultural Research System		
Kenya Industrial Research and Development Institute (KIRDI)	• Collaboration in research and training • Dissemination of research outputs • Development of agricultural MSMI's using local innovations and inventions • Conduct of research and development of industrial and allied technologies	• Collaboration in commercialization of agricultural research outputs
Kenya Marine and Fisheries Research Institute (KMFRI)	• Conducts research to integrate aquaculture, crop and livestock farmers	• Development and implementation of collaborative research on crop, aquaculture and livestock integration
Kenya Medical Research Institute (KEMRI)	• Undertakes in vaccine development, diagnostics, Genetic Engineering and Bioinformatics • Conducts research on food safety nutrition and health • Undertakes research on zoonotic diseases	• Collaborate in joint capacity building on vaccine Development, Diagnostics, Genetic Engineering and Bioinformatics • Develop and implement joint research in food safety, nutrition and health • Collaborate in joint research on zoonotic diseases

Stakeholder	Core areas of operational excellence in supporting agricultural research	Potential strategies for obtaining stakeholder support
Kenya Forestry Research Institute (KEFRI)	• Conducts research in forestry, farm forestry and allied natural resources	• Conduct joint research in agroforestry and other natural resources • Share research facilities • Undertake joint capacity building initiatives
Universities	• Large pool of experts with diverse capacities and skills • Provision of training expertise • State of art laboratories and research equipment • Training in many agricultural related disciplines	• Development and implementation of joint research projects • Training of research personnel in the Universities • Joint supervision of post graduate students by KALRO and Universities staff • Organizing joint forums for sharing research results • Sharing of research facilities and equipment • Participation of university staff in research priority setting • Preparing joint scientific publications
International Organizations		
International Agriculture Research Centres (IARCs), including the Consultative Group for International Agriculture Research Centres (CGIAR)	• Large pool of international experts with diverse capacities and skills • Conduct research in many areas of interest to KALRO • Implements research projects with NARS institutions • Have large pool of crops and livestock germplasm • Funds collaborative research • Supports capacity building for scientists	• Sharing of research staff and facilities • Development and implementation of joint research projects • Capacity building of staff • Participation in research priority setting forums • Organizing joint events for sharing research results • Preparing joint scientific publications • Providing finances for research project and training opportunities

Stakeholder	Core areas of operational excellence in supporting agricultural research	Potential strategies for obtaining stakeholder support
International Non-Government Organizations	• Have large pool of international experts with diverse capacities and skills • Mobilize funds to support research projects in many areas • Established global networks for agricultural development	• Development and implementation of collaborative projects • Involvement in lobbying and mobilizing resources to support agricultural research from international partners • Financing specific research projects in areas of interest • Involvement in priority of the setting of the research agenda
Development Partners	• Have an international focus of development issues • Provide finances for agricultural research • Develop research priorities that they support • Support capacity building and infrastructure development for research	• Ensure prudent financial management of donor funds • Development of research projects for support by development partners • Ensure good visibility • Incorporate and use credible M&E frameworks in donor funded projects • Development of joint capacity building and infrastructural projects for donor support
International Organizations, Regional Economic Communities/ Blocks and Research Networks	• Develop common regional policies and strategies to promote agricultural development among partner states • Provide trading opportunities across regions • Finances agricultural research	• Financing research projects • Participation in international and regional agricultural policy and strategies development forums • Participation in development of joint regional trading protocols

2.4 Summary of Key Issues

Table 4 summarises the key issues, as distilled from the PESTEIL, SWOT and Stakeholder analyses. These issues inform KALRO's Strategic direction and thematic areas in the preceding chapters.

Table 4: Summary of Key Issues from the PESTEIL, SWOT and Stakeholder Analyses

Key Issues	Challenges	Strategic Intervention
Technology generation	• Unmet demand for technologies and innovations • Impact of climate change and global warming • Low use and application of Biotechnology • Decreasing of land available for agriculture	• Adoption of cutting edge technology • Collaborations
Natural resource management	• Depletion of natural resources • Forest/bush clearing for agriculture • Cultivation of steep slopes and river beds • Soil degradation • Heavy use of fertilizers and pesticides • Insufficient water for domestic, farming, processing and for irrigation • Pollution of water sources • Increase in water borne diseases • Climate change	• Development of sustainable technologies • Development of a healthy ecosystem for greater productivity • Adherence to laid down regulations • Development and implementation of a climate change risk management strategies
Technology transfer	• Limited partnerships and linkages with County stakeholders • Inadequate extension staff • Uncoordinated dissemination due to too many players in provision of extension services (Ministries, NGOs, CBOs, farmer organizations, private sector) • Inappropriate language on technical publications	• Involvement of Counties in providing extension services • Establishment of research extension linkages • Engagement of value chain actors • Establishment of a clear policy on extension • Vetted source of information • Use of simple and or local languages, pictorials/ diagrams for farmer technical publications
Policy and legal environment	• Policies and laws which are often duplicating and conflicting • Inadequate capacity for policy analysis and development • Low use of evidence based policy making process • Low implementation of existing policies • Uncoordinated mechanism for monitoring and evaluation of policy implementation	• Review and harmonization of existing policies and laws • Enhanced capacity for policy research, analysis and development • Support for policy dialogue forums to bring together policy analysts and policy makers • Development of coordinated M&E framework for policy implementation

Key Issues	Challenges	Strategic Intervention
Research undertaking	• Uncoordinated research • Limited understanding of procedures for identifying and prioritizing research needs • Duplication of research • Inefficient use of the scarce resources • Poor reporting and documentation	• Conducting focused and non-duplicated research • Adopting efficient and effective approaches • Establishing system for coordination and regulation
Adequate resources mobilisation	• Inadequate resources for research • Inadequate diversification of resources • Competition for resources with other enterprises/ development agencies • Idle assets and capacity	• Diversify funding opportunities • Advocate for higher budgetary allocation • Mapping of resources
Monitoring and evaluation	• Limited documentation of the impact of research on livelihoods • Uncoordinated Monitoring and Evaluation (M&E) • Uninformed decision making • Low accountability	• Document impacts of investments in research • Ensure accountability • Evidence based decision making
Capacity Building	• Dynamic research needs • Inadequate qualified staff	• Attract, train and retain skilled staff
Partnerships and collaborations	• Weak partnership and linkages among the stakeholders • Unhealthy competition between stakeholders • Insufficient skills in managing partnerships • Disputes on ownership of Intellectual Property Rights (IPR) • Conflict between development partners vs. national research agenda	• Capacity build HR and equipment • Encourage collaborative research • Facilitate access to cutting edge technology • Development of clear memoranda of understanding
Visibility of KALRO	• Low visibility in the public domain	• Position the organization as a regional centre of excellence in agricultural research • Develop and implement Corporate Communication Policy • Participate in Corporate Social Responsibility • Continuous interaction with the Media • Branding of the organization

CHAPTER 3: STRATEGIC DIRECTION

The chapter presents the strategic direction the Organization which it will take during the Strategic Plan period following the situational analysis conducted in Chapter 2 and review of various national, regional and international policies and strategies. The Organization's strategic focus, vision, goal mission, core values and key results areas of the organization are presented.

3.1 National Strategic Focus for the Agriculture Sector Development

The key strategic focus of Kenya's agricultural sector policies includes:

a) Increasing productivity and incomes;
b) Emphasis on irrigation to reduce over-reliance on rain-fed agriculture in the face of limited high potential agricultural land;
c) Encourage diversification into non-traditional agricultural commodities;
d) Value addition and agribusiness development to reduce vulnerability;
e) Enhance the food and nutrition security and reduction in the number of people suffering from hunger and nutrition related challenges;
f) Encourage private-sector-led development in the sector; and
g) Ensure environmental sustainability.

Various policies and strategies have been developed and operationalized to address the sector's performance. Vision 2030, the Kenya's long-term development blueprint, identifies agriculture as vital to the attainment of economic development. The Vision is implemented through five-year Medium Term Plans (MTPs). The challenges identified and addressed during the first MTP that continue to face the sector are:

a) Weak, uncoordinated and fragmented agricultural innovation systems are attributed to lack of exploitation where synergies and networking among Government, research and training institutions, industry, financial sector and professional groups;
b) Lack of harmonized National Agriculture Research Policy, agenda and priorities;
c) Inadequate funding for agricultural research;
d) Absence of skills inventory and inadequate alignment of the planning of human resource to development needs;
e) Poor state of infrastructure and equipment for agricultural research in higher education and training.

In an effort to implement the overarching national policies, the agriculture sector has developed and operationalized various policies and strategies whose thrust is provided in the following sections.

3.1.1 Sector Policies

The Key Sector policies include:

a) *National Food and Nutrition Security Policy (2011):* This policy aims to achieve good nutrition for optimum health of all Kenyans as required under the Constitution 2010. It focuses on increasing the availability, accessibility and affordability of the nutritious food to all Kenyans at all times, and protecting vulnerable populations using innovative and cost effective safety nets linked to long term development.

b) *National Land Policy (2007:* The policy's aim is to guide the country towards efficient, sustainable and equitable use of land for prosperity and posterity. Important issues addressed are constitutional, land tenure, land use management, land administration, and land issues requiring special intervention.

c) *The Regional Development Policy (2010):* The broad objectives include establishing mechanisms for integrated planning at regional and local levels; and providing policy guidelines for economic utilization of resources in the region in consultation with the relevant agencies. The policy aims to build and strengthen the capacities of regional development institutions at all levels, and strengthen the infrastructure as well as service linkages between existing and new market centres.

d) *National Seed Policy (2010):* The National Seed Policy aims to harmonized all seeds activities. It outlines the interventions to be implemented by the seed sub sector to provide guidance to the industry for sustainable availability of adequate high quality seed and planting material. KALRO is to remain a major player in this industry.

e) *The Cooperative Development Policy (2011)*: This policy highlights the potential and comparative advantages that exist within Kenya's cooperative movement to contribute effectively to Kenya's transformation from a predominantly agricultural economy to an industrialized economy. The cooperative movement which currently generates 30% of national savings plays an important part in this endeavour.

f) *ASALs Policy (2012):* The purpose of this draft policy is to accelerate sustainable development in Northern Kenya and other arid lands to address developmental challenges. The main economic development objectives are to: provide a framework for ASAL development coordination, resource mobilization, research, monitoring and evaluation; address inequality including gender, youth and vulnerable groups; provide a policy framework for enhancing synergy on Ending Drought Emergencies; promote sustainable utilization of existing land and land based resources to facilitate national economic development; and to provide an enabling environment for sustainable agriculture, livestock, trade and tourism development in the ASALs.

g) *Other Sector Policies:* In addition to the above national policies, there are commodity focused policies to promote the development of various agricultural sub-sectors. These include National Livestock Policy, National Dairy Development Policy, National Poultry Policy, National Horticulture Policy and National Beekeeping

Policy among others. The policies also take cognizance of the need for engagement and partnership between the Government and the private sector in the management of the sub-sectors; to move the sub-sectors on a path of sustainable growth and development. Research is recognized as crucial in realizing the policies objectives.

3.1.2 Strategies to Implement the Stated Policies in Agriculture Sector

Several strategies have been developed to implement the key Agriculture Sector policy concerns. The most important and relevant strategies with regard to KALRO mandate are summarized below:

a) *The Agricultural Sector Development Strategy (ASDS) 2010-2020:* It is the overall national strategy for the Agricultural sector ministries and other stakeholders. The main objectives include increasing agricultural productivity, commercialization and competitiveness of agricultural commodities and enterprises, and managing key factors of production. The strategic interventions which include research interventions among others aim at increasing agricultural productivity and competitiveness.

b) *The National Agribusiness Strategy (2012):* This strategy was developed and operationalized to establish a highly productive and efficient agribusiness sector, competitive both locally and internationally. The policy emphasises the need for linkages between public and private organizations in research for development of diversified agricultural and food products/services which are essential for improving the competitiveness of the sector.

c) *The National Climate Change Response Strategy (2010):* It was developed to strengthen and focus on nationwide actions towards climate change adaptation and mitigation of greenhouse gases (GHG) emission.

d) *The Sustainability Strategy for Regional Development Authorities (2010):* The goals of the strategy include promoting integrated economic development through sectoral value chains and spatial concentration of infrastructure facilities and stronger linkages between zones. It aims to enhance productivity and skills as well as competitiveness and expansion of export markets plus diversification of export products.

e) *The National Water Resources Management Strategy (2007-2015):* Its main goal is to achieve efficient and sustainable water resource management in order to ensure water availability for environmental balance, basic human needs and economic production, especially agriculture.

3.1.3 The National Policies on Agricultural Research and Extension

In order to support the national and sectoral agriculture policy aspirations, the NARS Policy (2012) and the National Agricultural Sector Extension Policy-NASEP (2012) were formulated to guide agricultural research and extension services. The strategic paths for these policies are summarized as follows:

a) The main objective of the NARS Policy is to reform the Kenyan agricultural research system into a dynamic, innovative, responsive and well-coordinated system driven by a common vision and goal for efficient use of existing capacity. The policy aims to promote prompt application of agricultural research results and services to enhance productivity and economic growth, and promote private sector and non-state institutions engagement in research and technology transfer.

b) The NASEP's main objective is to empower a pluralistic extension clientele through sharing information, imparting knowledge and skills and changing attitudes to enhance technology and innovation adoption. In this regard, linkages and partnerships with extension agents are crucial for deployment of comprehensive outreach strategies.

3.1.4 County Policies

All County Governments are required to develop five year County Integrated Development Plans (CIDPs). The CIDPs are guided by the Constitution of Kenya 2010, County Government Act 2012, Kenya Vision 2030 and its Second Medium Term Plan (2013-2017). The CIDP are meant to assist the County Governments in prioritization of local socioeconomic development in the county. The process of preparing the CIDPs is a consultative engagement. Thus all projects and programmes proposed in the CIDP are identified through various consultative forums at the county level.

The County Agriculture, Livestock & Fisheries Strategic Plan is aligned to the County Integrated Development Plan (CIDP) of the County Government. The strategic plan sets agricultural development goals and objectives based on the priorities identified in the CIDP and draws strategies to achieve them. The Strategic Plan also identifies technologies and innovation targeted for promotion to increase productivity and growth in the agricultural sector and make it vibrant. Annex 5 shows the envisaged working relationship between the County Governments and KALRO.

3.2 KALRO's Strategic Focus

In order to address and consolidate demands for research and extension in the aforementioned National and Agricultural Sectoral Policies, KALRO plans to strategically position itself as the key driver for increasing productivity, commercialization and competiveness of the agricultural sector while paying attention to effects of climate change and sustainable agro-ecological ecosystems. The Organization will focus on catalysing agricultural sector growth rate of at least 7% per year as stated in Vision 2030.

3.2.1 Strategic Approach

In order to respond to the strategic focus, KALRO has adopted the Value Chain Approach (Annex 2) to develop and implement its research programmes. A value chain describes the full range of activities to bring a product or service from conception through the full

range of production, delivery to final consumers and disposal after use. The research on product value chains focuses on the whole chain up to the consumers, rather than focusing on commodities *per se*. This requires a radical shift from the traditional research that focuses on production-side and its consequent linear technology dissemination, to modern research approaches, innovation and knowledge management systems that support robust and integrated agricultural product value chains from resource to consumption and waste disposal. Thus, there will be demand for more integration and coordination of all actors along priority APVC-based research projects while paying more attention to post-harvest and value-addition processing as well as the development and marketing of agricultural products, by-products and services.

3.2.2 Organizational Strategic Direction

As the premier agricultural and livestock research organization in Kenya, KALRO is mandated to provide leadership and demand-driven solutions to agricultural challenges both locally and internationally. It will focus on addressing the national challenges through cutting-edge research and modern research methodologies and tools. This should be reflected in the Organization's vision, mission, goal and core values.

i. Vision

Excellence in agricultural and livestock research towards transformed livelihoods.

ii. Mission Statement

To conduct agricultural research through application of science, technology and innovation to catalyse sustainable growth and development in agriculture and livestock Product Value Chains.

iii. Organization Goal

To contribute to the growth of the agricultural sector through research coordination and regulation; technology and innovation development; and catalyse transfer and utilization of agricultural research outputs.

iv. Guiding Core Values

KALRO will be guided by the following core values in its operations:

1. **Customer orientation:** the central focus of KALRO is to provide timely and responsive demand-driven research interventions aimed at addressing the needs of the customers within the agricultural sector. KALRO will achieve this by maintaining a culture that promotes responsiveness to customer needs.
2. **Professionalism:** KALRO will uphold high standards of excellence in the provision of services to their customers. One of the hallmarks of excellence is

integrity and ethics in all areas of operation. In this regard, KALRO's research outputs and recommendations will adhere to the highest standards of scientific rigour, ethics and sound evidence base.

3. **Innovativeness:** KALRO recognizes the need for innovation in order to be responsive to the agricultural sector challenges. In this regard KALRO commits to develop flexible and integrated solutions in tandem with the needs of customers and stakeholders.

4. **Collaboration:** Given the multi-stakeholder interest that the agricultural sector attracts, KALRO is expected to collaborate and forge partnerships for the development of the sector in Kenya and beyond. KALRO will therefore endeavor to create beneficial opportunities for agricultural research and development.

5. **Environmental consciousness:** KALRO will ensure that the environment is conserved while discharging its mandate.

6. **Integrity**: KALRO is committed to ethical delivery of its mandate to all stakeholders.

3.3.1 Organization's Key Result Areas (KRAs)

Given the key areas of focus discussed above and KALRO's role of conducting and regulating agricultural research in Kenya, the following key result areas will guide the Organization in delivering on its mandate:

KRA 1: Technologies and innovations for agricultural products value chains generated;

KRA 2: Knowledge, information and technologies on agricultural products value chains collated, stored and shared;

KRA 3: Socio-economics information, market and policy options supporting agricultural product value chains generated and advocated;

KRA 4: Organization capacities and resource management strengthened;

KRA 5: Systems for coordination, prioritization and regulation of research developed and operationalized.

CHAPTER 4: KEY RESULT AREAS, STRATEGIC OBJECTIVES AND STRATEGIES

The description of the five Key Result Areas (KRA) that have been identified to address the mandate of KALRO and deliver on its mission is presented in this chapter. The strategic objectives for each KRA have been identified and the specific strategies to address each strategic objective are articulated.

4.1 Technologies and Innovations for APVCs Generated - KRA 1

The crops and livestock sub-sectors in Kenya are expected to significantly contribute to the attainment of the SDGs and meeting the development aspirations of the Government of Kenya as encapsulated in various policy documents. However, despite the increases in crop and livestock production[9], the agricultural sector has not been able to meet the country's food demands for local consumption and supplies for agro-based industries. This has led to continued importation of large quantities of both fresh and processed agricultural products.

Agricultural technologies and innovations are central to addressing the challenges that continue to impede growth of the sector. Some of these challenges include low production and productivity, fluctuations in supply of agricultural inputs, poor pre-and-post-harvest handling, limited product value addition, poor access to markets and unorganized markets. Biotic and abiotic stresses are additional constraints that are also exacerbated by climate change ramifications where new pests and diseases are frequently emerging. The depletion and unsustainable management and utilization of the natural resources has also continued to be a major challenge.

Increasingly, nutrition is gaining importance in terms of ensuring that food available to consumers, particularly the vulnerable, is nutritious and safe. Yet currently, policies and programmes aimed at improving agricultural performance remain largely disconnected from nutrition and health. Consequently, nutrition outcomes continue to lag behind expectations, despite overwhelming evidence of the grave consequences of poor nutrition on survival, growth and development of the most vulnerable groups thus impacting negatively on the overall national socio-economic development. The need for capacity for research on innovative agriculture-income-nutrition pathways in this regard cannot be overemphasized.

Biotechnology is fast evolving world over and is recognised as a rapidly developing and far reaching technology with promising opportunities for enhancing food, nutrition, health and environmental sustainability to meet market/consumer/end user needs. Biotechnology tools such gene editing, genomic and marker assisted selection, imaging

[9] GoK, 2015

and tissue culture will expedite the development of novel products including crop varieties with desirable traits, disease free planting materials, livestock vaccines, drugs and disease diagnostic kits.

Most farm operations, especially among smallholders, are largely done through manual labour using rudimentary tools such as hand hoes (*jembes*) and machetes (*pangas*). This causes a lot of drudgery in farming especially for the majority women farmers, and makes agriculture highly unattractive to the youth. Consequently, the average age of the Kenyan farmers is over 50 years since the youth who are the majority find farming laborious and unappealing. Use of motorized machinery and equipment as well as animal-drawn implements such as ox-ploughs has remained low in smallholder systems, probably because of their technological inappropriateness, unavailability and costs. In addition, most of the farm equipment and machinery as well as their spare parts are imported and are often oriented towards large and medium scale operations, hence do not sufficiently support smallholder operations.

To enhance productivity and reduce drudgery in agriculture, mechanization and automation of farm operations will be essential. For a sustainable farm machinery value chain, there will be need for other business support enterprises (hire services, spare parts, machinery service, repair and maintenance) to make it fully functional. Of importance will be the linkages between research and the manufacturing industry. Promotion of mechanization has the potential of creating employment in the rural areas through hiring out of the equipment to undertake farm operations, stocking and selling machinery and equipment, and initiating business for their spare parts and maintenance. Moreover, mechanization will make agriculture attractive, especially for the youth.

A central mandate of KALRO is to generate technologies, knowledge, information and innovations in crops, livestock and natural resources that are required to enhance productivity and competitiveness of the agricultural sector to meet the local demand for quality food and agro-products for industries, and take advantage of opportunities in the regional and international markets. It is also necessary to exploit the crops-livestock integration opportunities. Crop residues and agro-industrial by-products are valuable feed resources for animals. In addition, manure from livestock provide an opportunity for soil improvement.

This KRA will therefore be expected to contribute to the mission of KALRO by generating technologies and innovations for crops, livestock, natural resources, agricultural mechanization using various advanced research techniques such as biotechnology and also promote the conservation of the agricultural genetic resources. In order to deliver on the expected results, the KRA will have five strategic objectives as outlined below:

4.1.1 Strategic Objective 1 (SO1.1): To improve crop production, productivity and utilization

In order to realize SO1 of KRA 1 (SO1.1), the following strategies will be adopted:

a) Develop and promote improved crop varieties;
b) Develop good agronomic technologies and practices;
c) Improve and maintain crop health and food safety;
d) Develop pre- and post-harvest handling and storage technologies and practices;
e) Develop and promote emerging crops;
f) Support the development of processing and value addition of crop products;
g) Develop and promote organic farming;
h) Document, adapt and promote approved Indigenous Technical Knowledge (ITK) on crops;
i) Develop and promote biopolymers' research and products;
j) Support plant genetic resources conservation.

4.1.2 Strategic Objective 2 (SO2.1): To improve livestock production, productivity and products utilization

In order to realize SO2 of KRA 1 (SO2.1), the following strategies will be adopted:

a) Develop and promote improved livestock breeds;
b) Develop, improve and promote livestock husbandry practices;
c) Develop and promote forages and improved feeds and feeding systems;
d) Develop robust and sustainable forage seed systems;
e) Improve and maintain livestock health and food safety;
f) Develop and promote emerging livestock including beneficial insects;
g) Develop and upscale best practices in handling of livestock and livestock products;
h) Support the development of processing and value addition of livestock products;
i) Document, adapt and promote approved Indigenous Technical Knowledge (ITK) on livestock;
j) Support animal genetic resources conservation.

4.1.3 Strategic Objective 3 (SO3.1): To develop environmental friendly technologies and natural resource systems for sustainability

In order to realize SO3 of KRA 1 (SO3.1), the following strategies will be adopted:

a) Develop and promote natural resources management technologies for sustainable crops and livestock production and better range management;
b) Develop and promote climate change adaptation and mitigation technologies;
c) Develop and promote water management technologies for agricultural production;
d) Develop and promote agriculture and livestock waste management;
e) Develop technologies for environmental sustainability and green production;
f) Develop and promote integrated biodiversity conservation technologies.

4.1.4 Strategic Objective 4 (SO4.1): To develop appropriate agricultural machinery and equipment/implements

In order to realize SO4 of KRA 1 (SO4.1), the following strategies will be adopted:

a) Acquire, test and adapt agricultural machinery, equipment/implements for efficient agricultural operations;
b) Develop/fabricate and promote appropriate agricultural machinery;
c) Support development and up-scaling of agro-processing machinery, equipment/implements;
d) Support establishment of linkages with private sector for fabrication and supply of appropriate agricultural machinery and equipment and attendant support services;
e) Develop infrastructural facilities and equipment for agricultural mechanization research.

4.1.5 Strategic Objective 5 (SO5.1): To support and promote use of biotechnology applications in agricultural development

In order to realize SO5 of KRA 1 (SO5.1), the following strategies will be adopted:

a) Develop, apply and commercialize plant biotechnology knowledge, information and technologies;
b) Develop, apply and commercialize livestock biotechnology knowledge, information and technologies;
c) Develop, apply and commercialize microbial biotechnology knowledge, information and technologies;
d) Develop, apply and commercialize arthropod biotechnology knowledge, information and technologies;
e) Establish a National Biotechnology Centre of excellence.

4.2 Knowledge, Information and Technologies on Agricultural Products Value Chains Research Collated, Stored and Shared - KRA 2

Low adoption of knowledge, information and technologies (KIT) by various value chain actors is attributable to many factors including weak relationships and linkages coupled with ineffective approaches and methods used to manage and share the KITs. The KITs have mostly remained with the individual developers hence limiting impact. This is exacerbated by the devolution of public extension services to County Governments with lack of clear mechanisms for engagements. Although KALRO has adopted the APVC approach, mechanisms for engagement with value chain actors and the market to inform research and expedite uptake of KITs are still unclear. The Organization therefore, needs to develop innovative mechanisms for the management and sharing the requisite KITs available in different KALRO Institutes in order to enhance adoption and create desirable impacts. In addition, establishment of overarching innovation platforms as well as specific value chain platforms will enhance linkages and provide a basis for feedback to input into the research process thus actualising the APVC approach and

demand driven research and training. Furthermore, the experience and knowledge from KALRO will be shared with other NARS institutions, the Counties and relevant African countries with the aim of harnessing synergy and mutual benefits through consultancy and training. To deliver sufficiently on this KRA, there will be need to work closely within research programmes to ensure that technologies, innovations, knowledge and information generated are appropriately collated, packaged, stored and disseminated to different stakeholders and beneficiaries using appropriate channels.

4.2.1 Strategic Objective 1 (SO1.2): Promote knowledge and information management and outreach

In order to realize SO1 of KRA 2 (SO1.2), the following strategies will be adopted:

a) Collect and collate KALRO knowledge and information for storage, ease of retrieval and dissemination;
b) Acquire, adapt and promote knowledge and information from partners and collaborators;
c) Strengthen and provide innovative library products and information services;
d) Develop and promote digital online platforms for outreach;
e) Sustain and improve publication of the organization's peer reviewed journals to international repute.

4.2.2 Strategic Objective 2 (SO2.2): Establish Practical Training Centres in all the Institutes

In order to realize SO2 of KRA 2, the following strategies will be adopted:

a) Develop appropriate curricula, training approaches and tools;
b) Provide capacity building services within the Counties and in the African region.
c) Develop specialized short courses and certificate level training.

4.2.3 Strategic Objective 3 (SO3.2): Establish overarching innovation platforms

In order to realize SO3 of KRA 2 (SO2.2), the following strategies will be adopted:

a) Build capacity for establishment and nurture potential overarching and specific value chain innovation platforms in the counties;
b) Develop and facilitate novel outreach methodologies and approaches;
c) Establish linkages with private sector for supply of technologies (including fabrication and supply of appropriate agricultural machinery and equipment) and after sales support services;
d) Create a mechanism for information flow/feedback to research.

4.2.4 Strategic Objective 4 (SO4.2): To enhance collaboration and partnerships

In order to realize SO4 of KRA 2 (SO4.2), the following strategies will be adopted:

a) Develop mechanisms for collaboration and partnering;
b) Build and maintain collaborations within NARS and IARs;

c) Forge public private partnerships;
d) Establish and maintain linkages with National and County Governments;
e) Develop the capacity of the platforms to mobilize resources for research and extension services, identify/prioritize research needs and participate in impact assessment;
f) Lobby the private sector and counties to fund research in their areas of interest and or through joint activities.

4.3 Socio-economics Information, Market and Policy Options Supporting Agricultural Product Value Chains Generated and Advocated - KRA 3

The generation, dissemination and adoption of agricultural technologies and knowledge for improved livelihoods are highly influenced by the prevailing social, economic, cultural, gender, policy and political environment prevailing in the country. Availability of inputs and outputs markets, and conducive policies play a key role in influencing farmers and other value chains actors to adopt particular KITs.

The KALR Act, 2013 mandates KALRO to undertake markets and policy research/ analysis to provide evidence based advice to the National and County Governments to inform formulation of new policies or review of existing ones. KALRO will therefore conduct socio-economics, markets and policy research and development to contribute to the understanding of the human dimension issues that influence the development and application of appropriate agricultural KITs.

The Government, donors, researchers and users of KITs are interested in the impacts that the technologies have on improving the livelihoods of households and communities. This necessitates that KALRO will develop appropriate participatory mechanisms/ methodologies to create and assess impacts.

Sound KITs that emanate from research are based on credible experimental designs, data collection, analysis and interpretation. There is therefore need to provide appropriate statistical inputs, analytical skills and data in all stages of technology development and dissemination to ensure scientific credibility of the research products. Applied statistics division will support scientists in this regard.

The users of the research information include National and County government departments and institutions, parliament, farmer organizations and associations, donor community and international organizations with agricultural orientations. The information is accessed through policy forums, research papers, policy briefs, technical reports and annual reports.

The socioeconomics, market and policy analysis and applied statistics research therefore provide a platform for the interface of the agricultural researchers and users of the KITs. This Key Result Area will be expected to contribute to the attainment of the

overall organizational mission and result areas through the attainment of its purpose of generating and promoting socioeconomics, applied statistics and policy knowledge and information. In order to deliver on the expected results, the thematic area will have three strategic objectives as outlined below.

4.3.1 Strategic Objective1 (SO1.3): To generate and promote use of socio-economics information

In order to realize SO1 of KRA 3 (SO1.3), the following strategies will be adopted:

a) Generate and promote use of agricultural economics information;
b) Generate and promote use of social and cultural information;
c) Develop approaches for mainstreaming equity within gender, youth and people living with disabilities in agriculture;
d) Develop and promote use of participatory research methods in the organization;
e) Develop, adopt and apply standardized tools for research, monitoring and evaluation.

4.3.2 Strategic Objective 2 (SO 2.3): To undertake marketing research, policy analysis and development

In order to realize SO2 of KRA 3 (SO 2.3), the following strategies will be adopted:

a) Analyse and provide agricultural market information;
b) Contribute to development of appropriate input and output markets;
c) Analyse and provide agricultural policy options;
d) Develop, adopt and apply standardized models and tools for market and policy research;
e) Review and analyse the effects of global, continental, regional, National and County policy, legal and institutional frameworks on agriculture as evidence towards policy formulation.

4.3.3 Strategic Objective 3 (SO3.3): To provide statistical support in technology development and deployment

In order to realize SO3 of KRA 3 (SO3.3), the following strategies will be adopted:

a) Develop and promote applied statistical research methods and services;
b) Build capacity of scientists on applied statistical research methods;
c) Support the development and maintenance of crop and livestock research database.

4.4 Organization Capacities and Resource Management Strengthened - KRA 4

Successful delivery of KALRO mandate depends on a robust organizational capacity and resource mobilization. Capacity at the organizational level focuses on the overall performance and functional capabilities, as well as, access to human, finances, information, technology, infrastructure and other resources, including its organizational structure and its ability to adapt to change. Capacity development at this level will aim

at developing the organization as a total system, including its constituent individuals and groups as well as its relationship to the outside. This Key Result Area will focus on individual capacity for the development of specific individual attributes that will enable them to perform functions, make decisions and ensure implementation in an effective, efficient and sustainable manner. Successful implementation of this will require holistic approaches which include enhancing the capacity of stakeholders and institutions involved, including establishment of new institutional arrangements for successful programme implementation.

4.4.1 Strategic Objective 1 (SO1.4): To improve human resource capacity development and management

In order to realize SO1 of KRA 4 (SO1.4), the following strategies will be adopted:

a) Harmonize staff employment status;
b) Improve employee planning and staff development for optimal workforce requirements and succession;
c) Develop and implement a staff appraisal system;
d) Develop and implement a reward and recognition system;
e) Develop and implement human resource policies and documentations;
f) Establish and implement an integrated Human Resource Information Management System (HRIS).

4.4.2 Strategic Objective 2 (SO2.4): To mobilize and manage financial resources

In order to realize SO2 of KRA 4 (SO2.4), the following strategies will be adopted:

a) Increase internally generated revenue through commercialization of research information, products and services;
b) Strengthen the KALRO Seed Unit (KSU);
c) Establish and operationalize the Agricultural Research Fund (ARF);
d) Lobby and advocate for increased budgetary allocation by National and County Governments;
e) Strengthen Public Private Partnerships (PPP) and collaborations by building capacity for Demand Driven Research and Training (DDRT);
f) Mobilize funding through competitive grants;
g) Develop and operationalize an integrated financial management system.

4.4.3 Strategic Objective 3 (SO3.4): To develop infrastructure and manage assets

In order to realize SO3 of KRA 4 (SO3.4), the following strategies will be adopted:

a) Secure KALRO land;
b) Develop and implement a framework for management of organization assets;
c) Develop and adopt a shared access regime to research infrastructure;
d) Develop a master plan on organization's infrastructure;
e) Develop infrastructure for Biotechnology Centre of Excellence.

4.4.4 Strategic Objective 4 (SO4.4): To provide organization legal services and manage intellectual property

In order to realize SO4 of KRA 4 (SO4.4), the following strategies will be adopted:

a) Develop and implement a strategy on acquisition of titles for land parcels which are yet to be titled;
b) Streamline and harmonize the legal instruments impacting on the Organizations' mandate;
c) Develop and operationalize effective and efficient institutional corporate and legal system;
d) Formulate and operationalize effective and efficient Intellectual Property Rights policy and procedures;
e) Establish and implement mechanisms for dealing with litigation matters and management of the Organization's contracts.

4.4.5 Strategic Objective 5 (SO5.4): To strengthen the procurement and supplies system

In order to realize SO5 of KRA 4 (SO5.4), the following strategies will be adopted:

a) Develop and institutionalize an efficient procurement and supplies system in compliance with the relevant laws and regulations;
b) Automate supply chain management operations;
c) Develop a framework for asset management;
d) Support the Establishment Biotechnology Centre of Excellence.

4.4.6 Strategic Objective 6 (SO6.4): To strengthen and manage information and communications technology (ICT) infrastructure and services

In order to realize SO6 of KRA 4 (SO6.4), the following strategies will be adopted:

a) Develop and implement cohesive knowledge, information and communication technologies platform/database;
b) Establish, operationalize and maintain ICT infrastructure;
c) Develop and implement data integration and analytics tools;
d) Establish support for knowledge and information management and transfer.

4.4.7 Strategic Objective 7 (SO7.4): To support and maintain a strong Internal Audit Unit

In order to realize SO7 of KRA 4 (SO7.4), the following strategies will be adopted:

a) Develop and operationalize a framework for organizational audit risk assessment;
b) Develop and operationalize efficient and effective internal audit;
c) Strengthen internal control systems.

4.4.8 Strategic Objective 8 (SO8.4): To strengthen corporate affairs and communications

In order to realize SO8 of KRA 4 (SO8.4), the following strategies will be adopted:
a) Develop and implement corporate brand;
b) Strengthen internal communications;
c) Strengthen public and media relations;
d) Develop and implement a framework for donor/investor relations.

4.4.9 Strategic Objective 9 (SO9.4): To enhance security services

In order to realize SO9 of KRA 4 (SO6.4), the following strategies will be adopted:
a) Develop and implement security policy and manual;
b) Develop and implement framework for security risk assessment;
c) Establish a surveillance system to safeguard organization's assets;
d) Support the establishment of fencing of the organization estate.

4.5 Systems for Coordination, Prioritization and Regulation of Research Developed and Operationalized - KRA 5

The National Agricultural Research System Policy (2012) sought to streamline, rationalize and put in agricultural research system that is consultative, efficient and effective, taking into account economies of scale. The policy focused on creating an enabling environment for a vibrant agricultural research system that would contribute to the overarching national policies of economic growth, wealth creation, poverty reduction and gender equity.

Agricultural research was hitherto carried out by public and private sector institutions without a common vision, legal and strategic framework. Many key players such as producers, the private sector, universities, consumers and the civil society were largely ignored. This situation led to lack of cohesion, inefficient use of resources and limited impact. The shift in global agricultural research towards integrated agricultural research for development and emphasis on demand-driven research also required major adjustments in the way research was organized and managed n Kenya. This called for the establishment of a national institutional framework to capture the synergies of the diverse actors involved in agricultural research and development to address the emerging issues.

The key objectives of the policy are to: improve agricultural research policy framework; harmonize and provide direction to national research for sustainable development; strengthen the legal, institutional and regulatory framework; coordinate planning, development and sharing of human resources and physical assets, and coordinate planning, development and management of knowledge, information and communication technology; increase focus on outreach and technology dissemination and targeted partnership development framework.

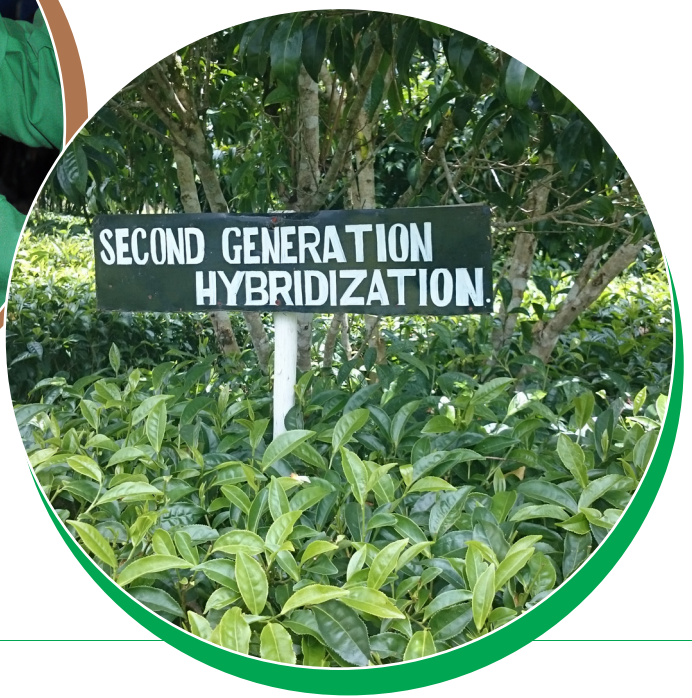
The KALR Act which was enacted following the development of the NARS policy mandates KALRO to promote, streamline, co-ordinate and regulate agricultural research in Kenya. In doing this, KARO is expected to liaise with and ensure the co-ordination of institutions, agencies and persons involved in agricultural research. The Organization will also coordinate the development of a framework for setting priorities for agricultural research in Kenya in line with the national policy on agriculture.

This KRA will focus on developing a framework and mechanisms for addressing this key mandate given to KALRO by the Act on coordination and regulation of agriculture and livestock research in Kenya. One strategic objective and several strategies have been identified to deliver on this KRA.

4.5.1 Strategic Objective 1 (SO1.5): To coordinate and regulate agricultural and livestock research in Kenya

In order to realize SO1 of KRA 5 (SO1.5), the following strategies will be adopted:

a) Conduct an inventory of the NARS to identify who is involved and on-going research;
b) Develop and maintain database of all research undertaken in Kenya;
c) Establish a Standards Development and Enforcement Committee (SDEC);
d) Develop framework and mechanisms for coordination and regulation of agricultural research;
e) Establish and implement criteria, procedures and standards for agricultural research;
f) Establish forum for national priority setting in agricultural research agenda;



CHAPTER 5: IMPLEMENTATION, MONITORING AND EVALUATION OF THE STRATEGIC PLAN

The implementation, monitoring and evaluation (M&E) system for the Strategic Plan are presented in this chapter. The successful implementation of strategic plans largely depends on commitment of the management, discipline and consistency of leadership. It also requires involvement of all staff so that they remain committed to the implementation of the plan. The Strategic Plan will be mainstreamed to all levels of the Organization for ownership and ease of implementation. The scope and complexity of the KALRO Strategic Plan will require a rigorous, comprehensive and carefully implemented monitoring and evaluation framework.

KALRO will use the Logical Framework (logframe) to monitor and evaluate the implementation of the Strategic Plan. The logframe will help in tracking the implementation and achievements of the Organization's objectives of both research programmes and corporate services. It will assist in the identification of the expected causal links in the following results chain: inputs, processes, outputs (including coverage or "reach" across beneficiary groups), outcomes, and impact. It will lead to the identification of performance indicators at each stage in the chain, as well as risks which might impede the attainment of the objectives.

All KALRO programmes and projects will be required to develop a logframe that will be aligned to at least one Key Result Area and respective performance indicators. During implementation, the logframe will be a useful tool to review progress and take corrective action.

5.1 Monitoring and Evaluation Mechanisms

The following M&E mechanisms will be used during the implementation of the Strategic Plan:

a) Annual Work Plans and Performance Contracts: The Institutes, Operational and Corporate Units will develop annual work plans based on the Strategic Plan. Implementation plans will have clearly defined activities with specific timelines for implementation (Annex 2). The Institutes' plans will be cascaded to affiliate Centres and staff, who will prepare annual targets that will be monitored and reported in conformity with the performance contract arrangements.

b) Supervision: KALRO will carry out supervision of the overall Strategic Plan's implementation and prepare quarterly and annual reports. Findings from the supervision missions will be followed up with appropriate actions.

c) Service Delivery Surveys and Field Visits: Surveys and field visits to assess the effectiveness and quality of service delivery will be undertaken. The information from the surveys will be disseminated to all the stakeholders including the Organization's Management to ensure appropriate actions are taken.

d) Semi-Annual Review Meetings (SARM): These meetings will be held with stakeholders' representatives to keep the Strategic Plan's activities and outputs on track during implementation. They will also enable the organization and stakeholders to identify and take necessary actions to address emerging challenges.

e) Mid Term Review: A mid-term review will be organized to assess the level of implementation of the Strategic Plan. Review meetings will be held with stakeholders' representatives and the findings will inform the need for any changes in the implementation of the SP for the remaining period.

f**) External Programme and Management Review:** This review will be undertaken by external subject matter specialists contracted by KALRO Management. The assessment will cover research activities of the organization within the APVC framework, prevailing administrative, financial, scientific and management structures as well as processes. Special emphasis will consider the role of linkages between the various research and outreach, planning, budgeting, monitoring and reporting organs of the organization and partners. The review will be undertaken towards end of the Strategic Plan period so that the results can inform the development of the subsequent Strategic Planning period. The external experts will be expected to provide an un-biased review to enable management re-focus the research programmes and corporate services to be in line with the international best practices and ensure KALRO remains a refutable research organization internationally.

g) **Quality Management Systems (ISO Certification):** The former institutions that were merged to form KALRO were ISO 9001:2008 certified but the respective certification became redundant after the merger. In addition, ISO 9000:2008, has been replaced by ISO 9001:2015. KALRO will therefore be certified during the SP period with the relevant ISO standards to maintain high and quality management standards to remain competitive as a research organization.

5.2 Reporting and Learning

Reporting the progress of implementation will be critical in adjusting strategic directions and measuring performance. There will be quarterly monitoring and evaluation reports. The reports will outline in summary form the projected targets, achievements/ milestones attained, facilitating factors and challenges. The lessons learnt will enable the management institute appropriate remedies to overcome any challenges.

5.3 Implementation and Coordination

5.3.1 Implementation Framework (IF)

To operationalize the Strategic Plan, a detailed Implementation Framework (IF) covering the Strategy Plan period will be developed. The key activities for the implementation and coordination will include:

a) Sensitizing staff on their roles in the Plan implementation;
b) Communicating the Plan to various stakeholders;
c) Assigning and communicating roles and responsibilities to different players;
d) Allocating resources as per priority activities identified in the Plan;
e) Setting up a Strategic Plan implementation committee;
f) Preparing annual work plans;
g) Monitoring and evaluating the implementation process; and
h) Conducting a post-implementation review to bring out lessons learnt and share the results with relevant stakeholders.

5.3.2 Automation of Strategic Plan Implementation

The Strategic Plan progress will be measured by outcomes for each of the five Key Result Areas. Outcome categories will be labelled as indicators, and the measures for each indicator will be reported in the dashboards which will be embedded in the KALRO web-site. These measures will be aligned to the mission and vision of KALRO as well as the needs and expectations of internal and external stakeholders.

An easy-to-use automation software for the strategy implementation, employee performance management and reporting will be used to bring the Strategic Plan to real time tracking. It will provide real-time visual updates on the status of the Strategic Plan implementation, automate all tracking and reporting, and keep KALRO's entire team engaged and working towards a common goal.

5.3.3 Implementation Committee for KALRO Strategic Plan 2016-2020

The Director General will establish a Strategic Plan implementation committee comprising members from the Secretariat and representatives of the Institutes. The committee will be responsible for prioritizing the strategic directions identified in the process of the Strategic Plan implementation; identifying major trajectories that correspond to KALRO's research vision; plan, coordination and development of efficient and effective implementation strategies of research programmes.

5.4 Risk Management

The implementation of a Strategic Plan can be affected by various risks of which are unforeseen at the time of planning. It is therefore important to identify possible risks that can have adverse impacts on the organization during the implementation of the Strategic Plan and plan for some mitigation strategies to put in place to manage potential risks. Risk management is important for an organization to reduce the possibility of failure and ensure set objectives are accomplished. Table 5 shows some possible risks that may affect KALRO during the implementation of the Strategic Plan, the assessment of the adverse impacts of the particular risk and some mitigation strategies to manage or protect the organization from the risk.

Table 5: Potential Risks and Mitigation Strategies

NO.	TYPE OF RISK	IMPACT OF RISK*	MITIGATION STRATEGIES
1	Political uncertainty	Medium	• Strategically place the organization in the centre of nation building • Ensure organization is run professionally • Develop mechanisms to shield organization from political interference/interruption
2	Terrorism attack and fundamentalism	Low	• Invest in appropriate security and surveillance systems • Review security systems regularly • Install digital data back-up systems in different locations • Sensitize staff on terrorist threats and ways to mitigate against them
3	Outbreak of pandemics and natural disasters	Low	• Create awareness among staff on possible outbreaks • Strengthen KALRO based health facilities handle emergencies • Train staff on disaster preparedness • Build capacity for quick response to disasters • Liaise with Disaster Management Organizations to train staff on quick response and coping strategies
4	Prolonged drought	High	• Sink boreholes • Harvest water • Conserve water • Reserve emergency seed through KALRO Seed Unit • Develop drought tolerant crop varieties and livestock breeds that can endure drought • Inculcate culture of tree planting in institutes and centres

NO.	TYPE OF RISK	IMPACT OF RISK*	MITIGATION STRATEGIES
5	Cash flow problems leading to high debts	High	• Avoid financial commitments without assurance for funding • Ensure timely settlement of payments of goods and services provided to the organization • Ensure organization enters into only into reasonable and legally binding contracts • Ensure timely renegotiation of interests and other charges including penalties due to circumstances beyond the scope of the organization
6	Financial instability due to over-reliance on external sources of funding	High	• Establish and operationalize Agricultural Research Fund (ARF) • Lobby National and County Governments to increase funding for agricultural research • Build capacity of scientists to develop grant winning competitive research proposals • Establish a fund raising or income generating unit for KALRO • Upscale promotion and commercialization of KALRO products and services • Initiate Public-Private Partnership for revenue generation ventures • Build capacity to compete for consultancies, contract research and services • Exercise prudent Financial Management
7	Low safety & high insecurity situations	Medium	• Strengthen security arrangements • Build backup for specific facilities like the gene bank and laboratories handling sensitive and high value materials • Establish multi-locational preservation facilities for valuable germplasm • Install offsite data backup • Spread laboratory services to several centres • Train and create awareness on safety and security • Implement the OSH policy • Conduct periodic security risk assessment within KALRO Institutes

NO.	TYPE OF RISK	IMPACT OF RISK*	MITIGATION STRATEGIES
8	Negative outcome of unforeseen litigation	Medium	• Strengthen the legal unit to effectively carry out negotiations and arbitrations • Ensure all KALRO land and other properties are legally secured • Ensure there are no illegal settlement on KALRO land • Ensure all legal contracts are well negotiated and bidding • Ensure adherence on all statutory and legal pronouncements • Ensure KALRO property and vehicles are always insured as per the law
9	Environmental health hazards	Medium	• Establish safe waste disposal • Hire/engage experts in waste disposal • Sensitise the community • Remove pollutants • Conduct an environmental risk assessment
10	Negative image	Medium	• Provide reliable and high quality products/ services • Build a strong brand identity • Develop and implement a good Corporate Social Responsibility (CSR) strategy • Maintain effective communication with internal and external customers
11	Negative reports which damage reputation	Medium	• Strengthen media relations • Develop and implement an effective social media strategy • Ensure effective response is provided to stakeholders' concerns • Respond effectively and convincingly to crises • Ensure structures and operations/processes are "fit for purpose" • Develop an effective feedback soliciting system to assess the perception on the organization by stakeholders and make improvements as necessary
12	Negative socio-cultural practices and mis-information	Medium	• Create awareness campaigns among stakeholders and staff • Demystify technologies and research products • Consider and incorporate socio-cultural issues of target beneficiaries when developing technologies • Engage opinion leaders (religious, political, community leaders and administrators) when dealing with communities

NO.	TYPE OF RISK	IMPACT OF RISK*	MITIGATION STRATEGIES
13	High competition for KALRO products and services from peer organizations	High	• Promote and market KALRO products • Ensure high levels of integrity in all undertakings • Offer market driven programmes • Attract and retain qualified scientific and support staff • Identify potential competitors
14	Inability to cope with rapidly changing technologies	Medium	• Upgrade existing technology • Acquire modern technology • Regularly train staff on new technologies
15	Changes in demand for KALRO technologies and products	Low	• Develop products using participatory methods • Ensure products are widely promoted through demonstrations, trade fairs and marketing advertisements in media and other channels

***Key:**

Low = Adverse impact due to the risk is minimal
Medium = Adverse impact due to risk is moderate
High = Adverse impact due to risk is major

5.5 Critical Success Factors

Critical Success Factors (CSFs) are aspects that ensure the success of an undertaking. In implementing the Strategic Plan, the following have been identified as some of the CSFs:

a) Adequate and skilled human resources;
b) Adequate financial and material resources;
c) Satisfied internal and external customers;
d) Cooperation and support from partners, collaborators and stakeholders;
e) Good corporate governance;
f) Effective leadership;
g) Effective communication;
h) Conformance to acceptable ethical principles; and
i) Effective monitoring and control.

REFERENCES

FAO (Food and Agriculture Organization), 2004. *Status of Food and Agriculture* 2003-2004. Agricultural Biotechnology. Meeting the Needs of the Poor. Food and Agriculture Organization of the United Nations. Rome. 94pp.

FARA (Forum for Agricultural Research in Africa), 2003. *Building Sustainable Livelihoods through Integrated Agricultural Research for Development*, Vol. 1. 1. 999pp.

GoK (Government of Kenya), 2015. *Economic Survey 2015*. 339pp.

GoK (Government of Kenya), 2012. *The National Food and Nutrition Security Policy*. 58pp.

GoK (Government of Kenya), 2010. *The Constitution of Kenya, 2010.* 191pp.

GoK (Government of Kenya), 2009. *Agricultural Sector Development Strategy (ASDS). Agricultural Sector Ministries,* Nairobi, Kenya. 123pp.

GoK (Government of Kenya), 2008. *Kenya Vision 2030: First Medium Term Plan (2008-2012)*. 218pp.

GoK (Government of Kenya), 2008. *The Vision 2030: A Competitive and Prosperous Kenya. Ministry of Planning and National Development*. 180pp.

GoK (Government of Kenya), 2004. *Strategy for Revitalizing Agriculture 2004-2014.* 124pp

GoK (Government of Kenya), 2004. *Strategy for Revitalizing Agriculture 2004-2014*. Ministry of Agriculture and Ministry of Livestock and Fisheries Development. Nairobi, Kenya. 116pp

GoK (Government of Kenya), 2003. *Economic Recovery Strategy for Wealth and Employment Creation 2003 - 2007.* Ministry of National Planning and Development. Nairobi, Kenya. 91pp.

GoK (Government of Kenya), 2002. *National Development Plan 2002-2008.* Ministry of Planning. Nairobi, Kenya. 157pp.

GoK (Government of Kenya), 2001. *A Strategy for Performance Improvement in the Public Service.* Office of the President, Directorate of Personnel Management. Nairobi, Kenya.

GoK (Government of Kenya), 2001. *Poverty Reduction Strategy Paper 2001-2004*. Ministry for Finance. Nairobi, Kenya. 309pp.

GoK (Government of Kenya), 1999. *National Poverty Eradication Plan 1999-2015*. Office of the President. Department of Development Coordination. Nairobi, Kenya.

KALRO (Kenya Agricultural & Livestock Research Organization), Solomon, S., Qin, D., Manning, M., Chen, Z., Marquis, M. Averyt, K.B., Tignor, M and. H.L Miller, 2007. Summary for Policymakers. In: Climate Change 2007: The Physical Science Basis. Contribution of the Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. 996pp.

KARI (Kenya Agricultural Research Institute), 2009. *KARI Strategic Plan 2009-2014*. KARI. Nairobi, Kenya. Second Edition. 116pp.

KARI (Kenya Agricultural Research Institute), 2005. *KARI Human Resources Strategy*. KARI, Nairobi, Kenya. pp 139.

KARI (Kenya Agricultural Research Institute), 2003. *External Programme Review of the Kenya Agricultural Research Institute*. KARI. Nairobi, Kenya. 124pp.

KARI (Kenya Agricultural Research Institute), 2003. *KARI Medium Term Plan 2003-2008*. KARI. Nairobi, Kenya. 133pp.

KARI (Kenya Agricultural Research Institute), 2000. *KARI Strategic Plan 2000-2010*. KARI. Nairobi, Kenya. 28pp.

KESERF (Kenya Sugar Research Foundation Strategic), 2010. *KESERF Strategic Plan 2009-2014*. 89pp.

Ministry of Agriculture, 2007. Economic Review of Agriculture. 49pp.

Ministry of Science and Technology, 2006. A National Biotechnology Development Policy. 41pp.

Ndiritu, C.G., Lynam, J.K and A.N Mbaabu, 2004. Transformation of Agricultural Research in Africa: Lessons from Kenya, Kenya Agricultural Research Institute. Michigan State University Press. Michigan, USA. 438pp.

TRFK (Tea Research Institute Strategic), 2010. TRFK Strategic Plan 2010-2015. 68pp.

UNDP (United Nations Development Programme), 2001. *Kenya Human Development Report*. UNDP, Regional Office. Nairobi, Kenya. 274pp.

UN (United Nations), 2000. Millennium Development Goals. United Nations. New York. USA. http://un.org/ millennium goals.

UN (United Nations), 2015. *Sustainable Development Goals*. United Nations. New York. USA. http://un.org/ sustainable development/sustainable-development-goals.

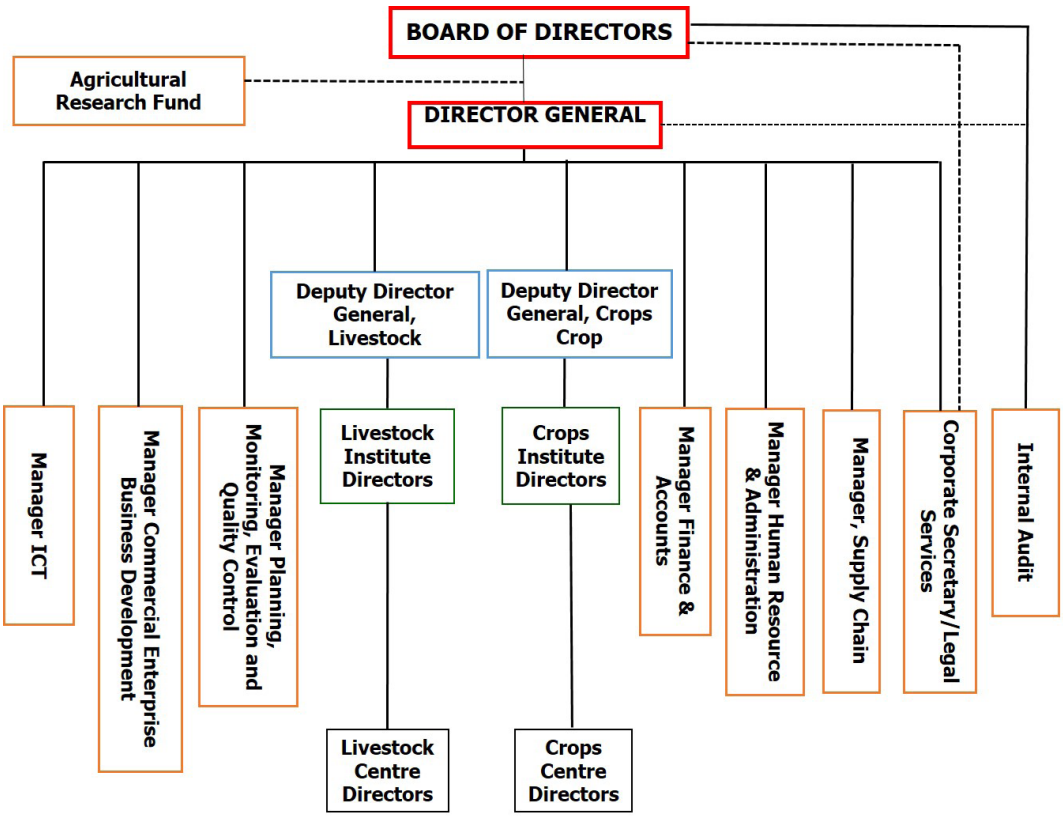
World Bank, 2008. World Development Report 2008: Agriculture for Development. 390pp.

World Bank, 2004. Project Appraisal Document for Kenya Agricultural Productivity Project. Report No. 28261-KE. World Bank. Washington D.C. USA. 95pp.

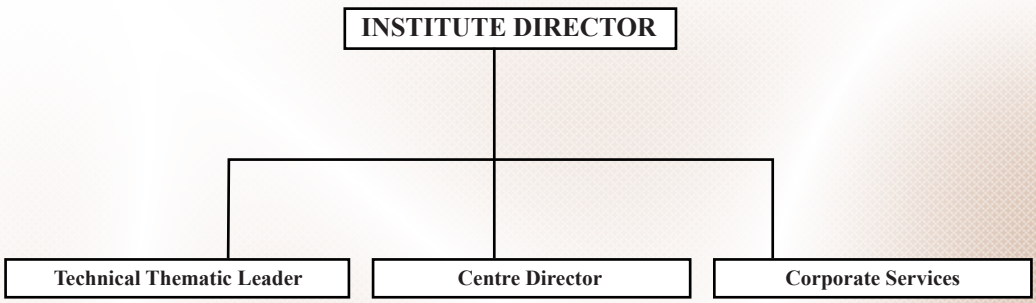
ANNEXES

ANNEX 1: KALRO ORGANIZATIONAL STRUCTURE

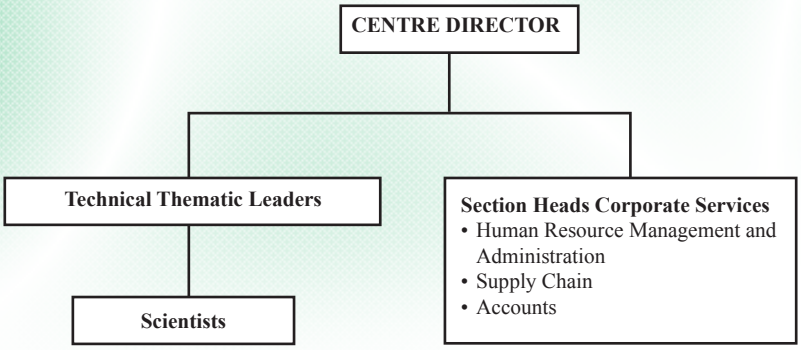
a) Organizational Structure



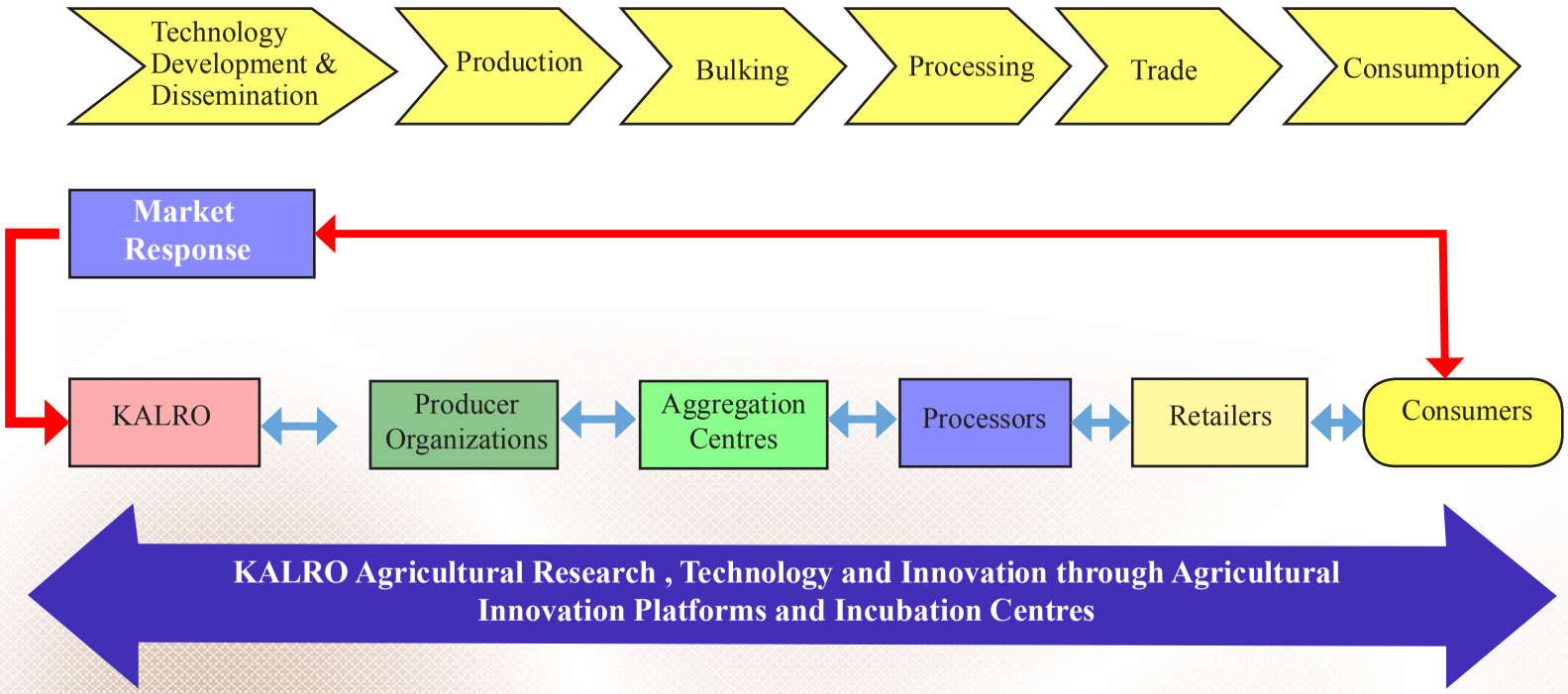
b) Institute Organogram



c) Centre Organogram



ANNEX 2: KALRO RESEARCH AGRICULTURAL VALUE CHAIN MAP



ANNEX 3: Implementation Matrix

RESULTS AREA 1: TECHNOLOGIES AND INNOVATIONS FOR AGRICULTURAL PRODUCTS VALUE CHAINS GENERATED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
(SO1.1) To improve crop production, productivity and utilization	a) Develop and promote improved crop varieties	No. of crop varieties developed by Year 5	138	1,137	FCRI, ICRI, HRI, CRI, TRI, SRI, MRI
		No. of crop varieties commercialized by Year 5	30	687	
		No. of on-station crop demonstrations by Year 5	100	150	
		No. of on-farm crop demonstrations by Year 5	400		
		No. of crop varieties selected and introduced Year 5	235	1,437	
		No. of planting material produced by Year 5 (Million)	6	300	
		Seed produced (MT) by Year 5	2,350	250	
	b) Develop good agronomic technologies and practices	No. of agronomic technologies and best production practices developed by Year 5	280	1,337	FCRI, ICRI, HRI, CRI, TRI, SRI, MRI
		No. of climate smart technologies developed by Year 5	200	1,337	

RESULTS AREA 1: TECHNOLOGIES AND INNOVATIONS FOR AGRICULTURAL PRODUCTS VALUE CHAINS GENERATED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
	c). Improve and maintain crop health and food safety	No. of crop protection technologies developed by Year 5	115	1,337	
		No. of pesticide efficacy trials conducted by Year 5	80	280	
		No. of pests and diseases diagnosed by Year 5 (Thousand)	20	150	
		No. of insect mass rearing and multiplication facilities developed by Year 5	2	30	
		No. of crop health compendiums developed by Year 5	15	100	
		No. of crops pest and disease surveillance conducted by Year 5	20	200	
		No. of monitoring and early warning pest and disease system developed by Year 5	1	200	FCRI, ICRI, HRI, CRI, TRI, SRI, MRI
		No. of plant doctors trained and backstopped by Year 5	200	50	
		No. of plant clinics established by Year 5	100	15	

RESULTS AREA 1: TECHNOLOGIES AND INNOVATIONS FOR AGRICULTURAL PRODUCTS VALUE CHAINS GENERATED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
	d) Develop pre-and-post-harvest handling and storage technologies and practices	No. of technologies for pre-and-post-harvest developed by Year 5	20	980	FCRI, ICRI, HRI, CRI, TRI, SRI, MRI
		No. of technologies for pre-harvest dissemination by Year 5	20		
		No. of technologies for post-harvest developed by Year 5	20		
		No. of technologies for post harvest dissemination by Year 5	20		
		No. of postharvest losses for crops documented by Year 5	50	937	
		No. of technologies on food waste developed by Year 5	20	150	
	e) Develop and promote emerging crops	No. of emerging crops developed and commercialized by Year 5	6	300	
		No. of emerging crops commercialized by Year 5	4		
	f) Support the development of processing and value addition of crops products	No. of processing and value addition technologies developed by Year 5	40	988	
		No. of food composition tables developed by Year 5	150	200	
		No. of recipes for commonly consumed foods documented. by Year 5	50	105	
	g) Develop and promote organic farming	No. of technologies on organic farming developed by Year 5	5	200	

RESULTS AREA 1: TECHNOLOGIES AND INNOVATIONS FOR AGRICULTURAL PRODUCTS VALUE CHAINS GENERATED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
	h) Document, adapt and promote approved Indigenous Technical Knowledge (ITK) on crops	No. of reports documenting ITK on crops by Year 5	2	10	GeRRI, FCRI, ICRI, HRI, CRI, TRI, SRI, MRI
		No. of crop ITKs adapted by Year 5	15		
		No. of crop ITKs promoted by Year 5	10		
	i) Develop and promote biopolymers' research and products	No. of biopolymers products developed by Year 5	2	400	FCRI, ICRI, HRI, CRI, TRI, SRI, MRI
	j). Support plant genetic resources conservation	No. of genetic plant resources conserved by Year 5 (Thousand)	19.5	1,287	GeRRI, FCRI, ICRI, HRI, CRI, TRI, SRI, MRI
		No. of genetic conservation technologies developed by Year 5	15	350	
		No. of conserved biodiversity species domesticated by Year 5	1500	500	
		No. of conserved biodiversity species commercialized by Year 5	50		
		No. of studies to determine rate of crops biodiversity loss. by Year 5	3	548	
		No. of crop species adaptable to climate change identified by Year 5	10		
TOTAL				**15,848**	
(SO2.1) To improve Livestock production, Productivity and products utilization	a) Develop and promote improved livestock breeds	No. of improved livestock breeds by Year 5 • Cattle • Sheep and Goats • Poultry	 3 10 15	509	DRI, SGCRI, ARLRI, NRRI, BRI

RESULTS AREA 1: TECHNOLOGIES AND INNOVATIONS FOR AGRICULTURAL PRODUCTS VALUE CHAINS GENERATED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
	b) Develop, improve and promote livestock husbandry practices	No. of management practices documented by Year 5	33	255.25	SGCRI, DRI, BRI, NRRI, APRI, ARLRI
	c) Develop and promote forages and improved feeds and feeding systems	No. of forage varieties developed by Year 5	29	167.5	SGCRI, DRI, BioRI, ARLRI, BRI, AMRI,
		No. of feed rations formulated by Year 5	45	61.45	SGCRI, DRI, ARLRI, NRRI, BRI
		No. of feeding systems by Year 5	8	32	DRI, ARLRI, BRI,
	d) Develop a robust and sustainable forage seed systems	No. of forage seed systems developed by Year 5	8	38	SGCRI, ARLRI, DRI, BRI, AMRI
		No. of vaccines developed by Year 5	8	176	BioRI, VRI, NRRI
	e) Improve and maintain livestock health and food safety	No. of diagnostics developed by Year 5	9	1450	BioRI, VRI
		No. of drugs tested	6	40	VRI
		No. of disease surveillances by Year 5	20	30	
		No. of tests for Mycotoxins, drug residues and heavy metals (in feeds and food) validated by Year 5	10	50	
		No. of feed samples analysed for contaminants by Year 5	1500	15	BioRI
		No. of post-harvest animal products tested for contaminants by Year 5	1250	12.5	
		No. viruses characterized for control of Newcastle disease by Year 5	125	26	
		No. of surveillances and advisories on zoonotic diseases by Year 5	5	30	VRI

RESULTS AREA 1: TECHNOLOGIES AND INNOVATIONS FOR AGRICULTURAL PRODUCTS VALUE CHAINS GENERATED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
	f) Develop and promote emerging livestock including beneficial insects	No. of emerging livestock types/species and products developed by Year 5	4	95	SGCRI, DRI, BRI, APRI,
		No. of emerging livestock types/species and products commercialized by Year 5	2		
		No. of emerging livestock products developed by Year 5	2		
		No. of emerging livestock products commercialized by Year 5	1		
	g) Develop and up-scale best practices in handling of livestock and livestock products	No. of practices developed by Year 5	7	14	SGCRI, DRI, BRI, APRI,
		No. of practices developed and implemented by Year 5	3		
	h) Support the development of processing and value addition of livestock products	No. of value added livestock products developed by Year 5	9	50	
	i) Document, adapt and promote approved Indigenous Technical Knowledge (ITK) on Livestock	No. of reports documenting livestock ITKs	2	5	
		No. of Livestock ITKs adapted and promoted by Year 5	20		
	j) Support animal and forage resources conservation	No. of forage collections conserved by Year 5	200	35	SGCRI, ARLRI, BRI
		No. of animal breeds conserved by Year 5	9	7	SGCRI, ARLRI, BRI
		No. of animal Embryos conserved by Year 5	300	85	DRI
		No. of oocytes conserved by Year 5	1,250	6	ARLRI
		No. of semen straws conserved by Year 5 (Thousand)	15	14	DRI, ARLRI
TOTAL				**10,054**	

RESULTS AREA 1: TECHNOLOGIES AND INNOVATIONS FOR AGRICULTURAL PRODUCTS VALUE CHAINS GENERATED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
(SO3.1) To develop environmental-friendly technologies and natural resource systems for sustainability	a) Develop and promote natural resources management technologies for sustainable crops and livestock and better range management	No. of irrigation technologies developed by Year 5	3	376	FCRI, ARLRI, SGRI, BRI, ARI, DRI
		No. of soil drainage management technologies developed by Year 5	1		
		No of management technologies of problem soils (saline, sodic, vertisols) by Year 5	2		
		No of crop specific surveys by Year 5	3		
		No. of livestock specific surveys by Year 5	3		
		No. of multi-purpose land use surveys by Year 5	5		
		No. of natural resource management technologies for sustainable crops production by Year 5	1		
		No. of natural resource management technologies for sustainable livestock production and better range management by Year 5	1		

RESULTS AREA 1: TECHNOLOGIES AND INNOVATIONS FOR AGRICULTURAL PRODUCTS VALUE CHAINS GENERATED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
	b) Develop and promote climate change adaptation and mitigation technologies	No. of adaptation technologies developed. by Year 5	11	135.0	FCRI (Kabete) ARLRI, SGRI, BRI, ARI, DRI
		No. of mitigation technologies developed. by Year 5			
		No. of climate smart technologies developed by Year 5	2		
		No. of integrated soil, water nutrient management technologies developed by Year 5	3	86.5	
		No. of conservation agriculture technologies developed by Year 5	5		
		No. of technologies for management of crops ecosystem by Year 5	4		
	d) Develop and promote agriculture and livestock waste management	No. of waste management technologies developed by Year 5	2	81	
		No. of waste management technologies promoted by Year 5	1		
		No. of solid/liquid waste management technologies (fertigation,sewage clean-up, biogas) by |Year 5	3		

RESULTS AREA 1: TECHNOLOGIES AND INNOVATIONS FOR AGRICULTURAL PRODUCTS VALUE CHAINS GENERATED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
	e) Develop technologies for environmental sustainability and green production	No. of renewable energy technologies developed by Year 5	2	54	FCRI Kabete and Muguga
		No. of protected agricultural technologies by Year 5	2		
		No. of Technologies on processing (pulp, biogas, solar, wind) by Year 5	4	16.4	CRI
		No. of technologies on wood-fuel energy conditioning by Year 5	2	76.4	TRI
		No. of surveys on energy sources for processing of crops by Year 5	3		
		No. of environmental sustainability technologies developed by Year 5	5	29.5	SRI, ARLRI, SGRI, BRI, ARI, DRI
	f) Develop and promote integrated biodiversity conservation technologies	No. of conservation technologies developed by Year 5	2	45.6	Kabete
		No. of conservation technologies promoted by Year 5	1		
		No. of varieties with genetic relatedness by Year 5	5	50.8	TRI
		No. of integrated biodiversity conservation technologies developed by Year 5	1	6.5	SRI, ARLRI, SGRI, BRI, ARI, DRI
TOTAL				**995.8**	

RESULTS AREA 1: TECHNOLOGIES AND INNOVATIONS FOR AGRICULTURAL PRODUCTS VALUE CHAINS GENERATED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
(SO4.1) To develop appropriate agricultural machinery and equipment/ implements	a) Acquire, test and adapt agricultural machinery, equipment/implements for efficient agricultural operations;	No. of machinery acquired deployed by Year 5	30	125	AMRI
		% reduction in cost of operations by Year 5	30		
	b) Develop/fabricate and promote appropriate agricultural machinery	No. of designed machinery fabricated by Year 5	25	15	AMRI
	c) Support development and up-scaling of agro-processing machinery, equipment/ implements	No. of processing machinery developed and deployed by Year 5	30	50	AMRI
	d) Support establishment of appropriate linkages with private sector for fabrication and supply of appropriate machinery and equipment and attendant support services	No. of Strategic linkages/alliances established by Year 5	50	50	AMRI
	e) Develop infrastructural facilities and equipment for agricultural mechanization research	No. of workshops equipped with machines by Year 5	25	50	AMRI
		No. of workshops equipped with tool kits by Year 5	25		
		No. of specialized personnel and equipment transportation modes by Year 5	15	1509	AMRI
Total			390	**440**	

RESULTS AREA 1: TECHNOLOGIES AND INNOVATIONS FOR AGRICULTURAL PRODUCTS VALUE CHAINS GENERATED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
(SO5.1) To support and promote use of biotechnology applications in agricultural development	a) Develop, apply and commercialize plant biotechnology knowledge, information and technologies.	No of protocols for propagation of quality plant materials by Year 5	2	30	BioRI
		Tonnage of quality plant materials disseminated by Year 5	5	15	BioRI
		No. transgenic sorghum varieties developed by Year 5	10	60	BioRI
		No. of varieties plants produced via tissue culture by Year 5	15	30	BioRI
		No. transgenic varieties tolerant to crop diseases by Year 5	10	60	BioRI
	b) Develop, apply and commercialize livestock biotechnology knowledge, information and technologies.	No. of diagnostic tools evaluated by Year 5	10	50	BioRI
		No. of vaccines evaluated by Year 5	4		
		No. of inseminations using Orma Boran semen	500	10	BioRI
		No. of embryos transferred	250	20	BioRI

RESULTS AREA 1: TECHNOLOGIES AND INNOVATIONS FOR AGRICULTURAL PRODUCTS VALUE CHAINS GENERATED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
	c) Develop, apply and commercialize microbial biotechnology knowledge, information and technologies.	No of bio fertilizer and Bio-pesticides identified and evaluated by Year 5	10	30	BioRI
	d) Develop,apply and commercialize arthropod biotechnology knowledge, information and technologies	No. of food chains developed by Year 5	10	30	BioRI
		No. of arthropods identified for food and feed supplement by Year 5	10	30	BioRI
		No. of novel attractants and repellents developed by Year 5	6	60	BioRI
		No. of species colonised successfully by Year 5	16	75	BioRI
	e) Establish of Biotechnology Centre of Excellence	Conduct equipment needs assessment for the Biotechnology research Centre of excellence by Year 5	-	10	BioRI GoK, Donors PPPs
		No. of staff trained on handling and maintenance of laboratory equipment by Year 5	10	50	
		Biotechnology training for technicians and mid-level experts by Year 5	20	100	
Total				**660**	
Total KRA 1				**14,888**	

RESULTS AREA 2: KNOWLEDGE, INFORMATION AND TECHNOLOGIES ON AGRICULTURAL PRODUCTS VALUE CHAINS RESEARCH COLLATED, STORED AND SHARED;					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
(SO1.2) Promote knowledge and information management and outreach	a) Collect and collate KALRO Knowledge and Information for storage,ease of retrieval and dissemination	No of databases, repositories and knowledge hubs developed	20	10	KIU
		No of packaged technologies by Year 5 • Brochures • Manuals • Success stories • Factsheets	 500 80 60 30	31	KIU
		Assorted ICT equipment and software acquired/ installed to ease retrieval of information by Year 5	450	50	KIU, ICT
		Assorted ICT software licenced by Year 5	50		
		No. of dissemination interventions documented by Year 5 • Field days, • Field demonstrations, • Exhibitions, • Agricultural shows, • Media articles	 150 1000 250 60 500	**29.4**	KIU, CSU, LSU
	b) Acquire, adapt and promote knowledge and information from partners and collaborators	No. of adapted and packaged technologies by Year 5	100	10	KIU, CSU, LSU

RESULTS AREA 2: KNOWLEDGE, INFORMATION AND TECHNOLOGIES ON AGRICULTURAL PRODUCTS VALUE CHAINS RESEARCH COLLATED, STORED AND SHARED;					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
		No.of dissemination interventions by Year 5 • Joint field days • Joint field demonstrations • Joint exhibitions and shows	 50 100 40	**5**	
	c) Strengthen and provide innovative library products and information services	No. of library resources acquired by Year 5 • new books • periodicals	 400 5000	**17**	KIU
		Digital information resources accessed (TEALS, CD ROM) by Year 5 • Articles acquired • Subscriptions • Downloads	 25,000 50 125,000	**10.5**	
	d) Develop and promote digital online plat forms for outreach	No. of online information sharing platforms established by Year 5	5	**10**	KIU, ICT
		No. of online information sharing platforms operationalised by Year 5	3		
	e) Sustain and improve publication of the organization's peer reviewed journals to international repute	No. of training workshops on scientific writing by Year 4	40	**19.4**	Editor: EAAFJ, Tea quarterly
		Journal Issues released by Year 5	40	**6.1**	
		Annual Percentage increase in publications by staff	20		
TOTAL				**173.4**	

RESULTS AREA 2: KNOWLEDGE, INFORMATION AND TECHNOLOGIES ON AGRICULTURAL PRODUCTS VALUE CHAINS RESEARCH COLLATED, STORED AND SHARED;					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
(SO2.2)Establish Practical Training Centres in all the Institutes	a) Develop appropriate curricula, training approaches and tools	No. of appropriate curricula, training approaches and tools developed by Year 5	1	**5**	Jointly by KIU, CSU, LSU
	b) Provide capacity building services within the Counties	No. of capacity building interventions (workshops)	50	**15.7**	
		No. of Counties workshops held by Year 5	47	**40.5**	
	c) Develop specialized short courses and certificate level training	No of specialized short courses and certificate level training by Year 5	25	**50**	

RESULTS AREA 2: KNOWLEDGE, INFORMATION AND TECHNOLOGIES ON AGRICULTURAL PRODUCTS VALUE CHAINS RESEARCH COLLATED, STORED AND SHARED;					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
(SO3.2). Establish Overarching Innovation platforms	a) Build capacity for establishment and nurture potential overarching and specific value chain innovation platforms in the counties	No. of innovations platforms established by Year 5	20	**10.5**	Jointly by KIU, CSU, LSU, County Agriculture Dept.
	b) Develop and facilitate novel and transformation outreach methodologies and approaches	No. of outreach methodologies and approaches developed by Year 4	-	**12.7**	Jointly by KIU, CSU, LSU, County Agriculture Dept.
		No. of outreach methodologies and approaches deployed by Year 4	-		
	c) Establish linkages with private sector for supply of technologies (including fabrication and supply of appropriate agricultural machinery and equipment) and attendant support services.	No. of linkages established by Year 5	25	**6.7**	Jointly by KIU, CSU, LSU
		No. of linkages sustained by Year 5	15		
	d) Create a mechanism for information flow/feedback to research	No. of mechanism for information flow/feedback to research created by Year 5	1		
Total				**142.3**	

RESULTS AREA 2: KNOWLEDGE, INFORMATION AND TECHNOLOGIES ON AGRICULTURAL PRODUCTS VALUE CHAINS RESEARCH COLLATED, STORED AND SHARED;					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
(SO4.2) To enhance collaboration and partnerships	a) Develop mechanisms for collaboration and partnering	No. of internal policies to operationalize collaborative projects and activities developed by Year 5	5	**5**	KALRO Institutes
		No. of internal guidelines to operationalize collaborative projects and activities by Year 3	1		
	b) Build and maintain collaborations with other NARS and IARs	No. of collaborative initiatives by Year 5	200	**75**	KALRO Institutes
		No of customer satisfaction surveys undertaken by Year 5	2		
	c) Forge public private partnerships	No. of PPPs formed by Year 5	30	**20**	KALRO Institutes
		No. of innovative solutions to major industry challenges by Year 5	10		
	c) Establish and maintain linkages with National and County Governments	No. of linkages formed with Country Governments by Year 5	47	**100**	KALRO Institutes
	e) Develop the capacity of the platforms to mobilize resources for research and extension services, identify/ prioritize research needs and participate in impact assessment	No. Capacity building programs implemented by Year 5	50	**100**	KALRO Institutes

RESULTS AREA 2: KNOWLEDGE, INFORMATION AND TECHNOLOGIES ON AGRICULTURAL PRODUCTS VALUE CHAINS RESEARCH COLLATED, STORED AND SHARED;					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
	f) Lobby the private sector and Counties to fund research in their areas of interest and or through joint activities.	No. of Researches funded by Year 5	100	**50**	KALRO Institutes
		No. of joint (KALRO, private sector and Counties) research activities carried out by Year 5	50		
Total			489	**350**	
Total KRA 2				**746.9**	

RESULTS AREA 3: SOCIO-ECONOMICS INFORMATION, MARKET AND POLICY OPTIONS SUPPORTING AGRICULTURAL PRODUCT VALUE CHAINS GENERATED AND ADVOCATED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
(SO1.3) To generate and promote use of socio-economics information	a) Generate and promote use of agricultural economics information	No. of reports on economic analysis studies conducted in different institutes by Year 5	128	256	KALRO Institutes and Centre Socio Economists
	b) Generate and promote social and cultural information	No. of reports of social and cultural studies conducted by Year 5	52	62.4	KALRO Institutes and Centre Socio Economists
	c) Develop approaches for mainstreaming equity within gender, youth and people living with disabilities in agriculture	No. of reports on options identified for mainstreaming gender, youth and PLWDs across the institutes by Year 5	16	16	KALRO Institutes and Centre Socio Economists
	d) Develop and promote use of participatory research methods in the organization	No. of reports on participatory research methods identified and promoted by Year 5	5	15	KALRO Institutes and Centre Socio Economists
	e) Develop, adopt and apply standardized tools for research, monitoring and evaluation	Report on standardized tools for research, monitoring and evaluation by Year 5	1	5	KALRO Institutes and Centre Socio Economists

RESULTS AREA 3: SOCIO-ECONOMICS INFORMATION, MARKET AND POLICY OPTIONS SUPPORTING AGRICULTURAL PRODUCT VALUE CHAINS GENERATED AND ADVOCATED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
(SO2.3) To undertake Marketing Research, Policy Analysis and Development	a) Analyze and provide agricultural market information	No. of reports on market studies conducted in different institutes by Year 5	50	150	KALRO Institutes, MoALF, County Government, Farmer Associations and Farmer Groups
	b) Contribute to development of appropriate input and output markets	No of appropriate input and output markets developed with KALRO's contributions by year 5	30		
	c) Analyze and provide agricultural policy options	No. of reports on policy analysis studies conducted in different institutes by Year 5 • Research papers • Policy briefs • Technical reports • Policy Forums	 16 32 48 10	216	
	d) Develop, adopt and apply standardized models and tools for market and policy research	Report on standardized tools for market and policy research by Year 5	1	5	KALRO Institutes, MoALF, County Government, Farmer Associations and Farmer Groups
	e) Review and analyse the effects of global, continental, regional, national and county policy, legal and institutional frameworks on agriculture as evidence towards policy formulation	No. of reports on reviews conducted in different institutes by Year 5	16	48	KALRO Institutes, MoALF, County Government, Farmer Associations and Farmer Groups

RESULTS AREA 3: SOCIO-ECONOMICS INFORMATION, MARKET AND POLICY OPTIONS SUPPORTING AGRICULTURAL PRODUCT VALUE CHAINS GENERATED AND ADVOCATED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
(SO3.3).To provide statistical input in Technology development and deployment	a) Develop and promote applied statistical research methods and services	No. of engagements with scientists to promote use of various applied statistical methods and tools by Year 5	50	130	KALRO Institutes and Centre Scientists
		No. of applied statistical capacity building forums held by Year 5	16	64	
	b) Build capacity of scientists on applied statistical research methods	No. of reports on applied statistical capacity building forum held in different Institutes by Year 5	200		KALRO Institutes and Centre Scientists
	c) Develop and maintain crop and livestock research database	No. of crop research databases developed and maintained by Year 5	10	20	KALRO Institutes and Centre Scientists
		No. of livestock research databases developed and maintained by Year 5	10		
Total KRA 3			399	**987.4**	

RESULTS AREA 4: ORGANIZATION CAPACITIES AND RESOURCE MANAGEMENT STRENGTHENED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
(SO1.4).To improve human resource capacity development and Management	a) Harmonize staff employment status	An institutionalized harmonized salary structure developed and implemented by Year 3	1	29,852	Board, DG, DDGs, CS, HRA
		No of sensitization Workshops for staff on the harmonisation by Year 3	67		
		No of staff placed on the approved salary scale by Year 3	3,500		
	b) Improve employee planning and staff development for optimal workforce requirements and succession	A Succession Policy developed and implemented by Year 2	1	800	Board, DG DDGs, CS, HRA and ID
		No. of staff with right skills recruited by Year 5	700		
		No. of interns recruited by Year 5	823		
		No. of students for attachments Year 5	1850		
		No. of Training Needs Assessment (TNA) conducted by Year 3	1		
		No of staff who have undergone long-term training by Year 5	2,500		
		No of staff who have received short-term training by Year 5	250		
		No of senior management staff trained by Year 5	80		

RESULTS AREA 4: ORGANIZATION CAPACITIES AND RESOURCE MANAGEMENT STRENGTHENED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
	c) Develop and implement a Performance Staff Appraisal System;	A Performance appraisal tool developed by Year 2 No. of staff appraised annually	1 3,500	2500	Board, DG, DDGs, CS and HRA
		No of Research evaluation criterion guidelines developed and implemented by Year 3	1		
		No. of researchers sensitized on evaluation criterion by Year 3	848		
		No of research scientist evaluated by Year 5	848		
		No. of internal employee satisfaction surveys conducted by Year 5	3		
		No. of external employee satisfaction surveys conducted by Year 5	2		
	d) Develop and implement a .reward and recognition system	No. of rewards and recognition policy developed and implemented by Year 3	1		Board, DG, DDGs, CS HRA and ID
		No. of employees recognized and awarded by Year 5	**500**		

RESULTS AREA 4: ORGANIZATION CAPACITIES AND RESOURCE MANAGEMENT STRENGTHENED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
	e) Develop and implement human resource policies and documentations	HR policies, manuals, plans and guidelines developed and implemented by Year 3 • HR Manual by year 1 • Discipline manual by year 2 • Training policy by year 3 • Training Manual by year 2 • Code of Conduct and Ethics by year 1 • Career Progression by year 2 Guidelines by year 3 • Housing policy by year 2 • Transport Policy by year 1 • Hospitality Policy by year 2 • Internship and by year 1 Apprenticeship Policy	 1 1 1 1 1 1 1 1 1 1	**35**	Board, DG, DDGs, CS HRA and ID
		No of sensitization Seminars on application of HR manuals and policies by Year 5	10		
	f) Establish and implement an integrated Human Resource Information Management System (HRIS)	An automated integrated HRIS providing centralised and simplified Year 3HR Services installed	1	**500**	Board, DG, DDGs, CS HRA, and ICT
TOTAL				**33,737.0**	

RESULTS AREA 4: ORGANIZATION CAPACITIES AND RESOURCE MANAGEMENT STRENGTHENED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
(SO4.2) To mobilize and manage financial resources	a) Increase internally generated revenue through commercialization of research in formation, products and services	Proportion (%) of SP budget (KES) internally generated by Year 5	10	**3,213.3**	DG,DDGS, CMCS, MF&A, ID,CD
		No. of licenced companies complying by Year 5	37		
	b) Strengthen the KALRO Seed Unit (KSU)	Revenue generated by Year 5 Revenue generation from royalties improved by Year 5	5	**1,606.6**	DG,DDGs, CS, MF&A, KSU ID, CD
	c) Establish and operationalize the Agricultural Research Fund (ARF);	ARF regulation for developed, approved and gazetted by Year 2	1	**175**	Board, ARF, DG,DDGs, CS, MF&A and ID
		Trust deed and rules document to operationalize ARF developed and implemented by Year 2	1		
		Board of Trustees appointed by Year 2	1		
		Inventory of technologies commercialized developed by Year 2	2		
		No. of Contracts signed by Year 5	15		
		No. of collaborations and private/public partnerships by Year 5	25		
		Competitive and Matching Grants Manual for management of ARF developed and operationalized by Year 2	24		
		Proportion (%) of KALRO budget received from National Research Fund by Year 5	30		

RESULTS AREA 4: ORGANIZATION CAPACITIES AND RESOURCE MANAGEMENT STRENGTHENED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
	d) Lobby and advocate for increased budgetary allocation by both National and County Governments	Proportion (%) of SP budget received from both national and County Governments by Year 5	60	**50**	Board, DG, DDGs, CS, MF&A, LU, IDs
		No. of MoUs signed with county governments by Year 5	47		
	e) Strengthen Public Private Partnerships (PPP) and collaborations by building capacity for Demand Driven Research and Training (DDRT)	Amount of Funds (billion KES) raised though PPPs by Year 5	1		
		No. of Partnership engagements (contracts) with private companies arranged by Year 5 No. of scientists trained on Demand Driven Research and Training (DDRT by Year 4	20 250		
	f) Mobilize funding through competitive grants	No. of multi-disciplinary and multi-institutional mega proposals developed by Year 5	32	**150**	DG, DDGs, LU, IDs
		Amount of Funds (KES) raised/mobilized through competitive grants by Year 5 (Billion)	3.2		
		Scientists trained on proposal development by Y5	500		
	g) Develop and operationalize an integrated financial management system	ERP System operational (Financial system) by Year 5	-	**200**	DG,DDGs CS, MF&A, MICT, IDs, CDs
TOTAL				**5,544.9**	

RESULTS AREA 4: ORGANIZATION CAPACITIES AND RESOURCE MANAGEMENT STRENGTHENED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
(SO3.4). To develop infrastructure and manage assets	a) Secure KALRO land	Length (km) of security fences erected in the Centres by Year 5	30	**146.8**	DG, DDGs, IDS PM
		No. of parcels of land at the Centres planted with trees along the boundaries by Year 5	25		
		Area (ha) of land planted with trees by Year 5	150		
	b) Develop and implement a framework for management of organisation assets	No. of maintenance manual/policy developed by Year 2	1	**634.5**	PM, FA, SCPM, DG, DDGs, CS
		No. of office/Laboratory blocks rehabilitated /refurbished by Year 5	12		
		Number of machinery and equipment by type repaired and/or serviced by Year 5 • Laboratory/office equipment • Generators • Motor vehicles • Farm machinery equipment	120 50 5 300 20		
	c) Develop and adopt a shared access regime to research infrastructure	No of Policy on sharing of research infrastructure developed by Year 3	1	**5.4**	DG,DDGS, PM, IDs
		No. of locations where sensitization on Policy on sharing of research infrastructure undertaken by Year 4 • Institute • Centre	 16 51		
	d) Develop a master plan on organisation's infrastructure	No. of Centre Master plans developed by Year 5	51	**100**	DG, DDGs, CS, PM

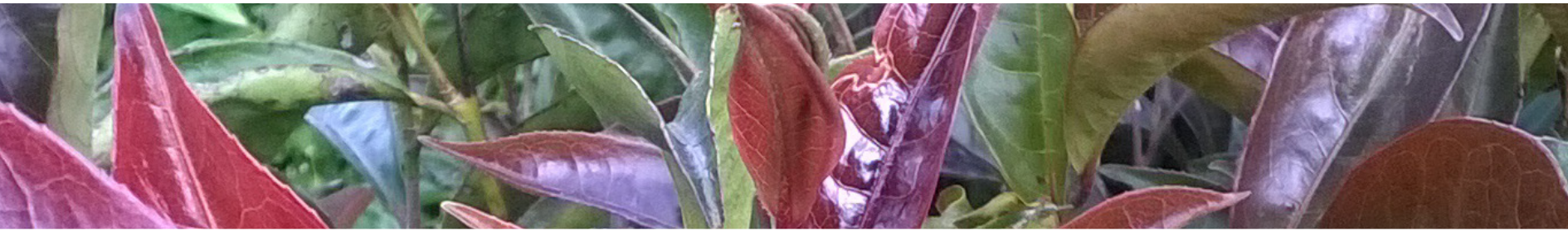
RESULTS AREA 4: ORGANIZATION CAPACITIES AND RESOURCE MANAGEMENT STRENGTHENED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
	e) Develop infrastructure for Biotechnology Centre of Excellence	No. of fully operational laboratories constructed by Year 5	1	**450**	KALRO BoM, DG, DDGs, GoK Donors PPPs, SCM, EM, BioRI, Board, DG, LU
(SO3.4). To provide organizational legal services and manage intellectual property	a) Develop and implement a strategy on acquisition of titles for land parcels which are yet to be titled	No. of Title Deeds for KALRO's parcels of land acquired by Year 5	43	**100**	Board, DG, LU
		No. of land disputes addressed by Year 5	26		
	b) Streamline and harmonize the legal instruments impacting on the Organisations' mandate	No. of Legal Instruments in conflict with KALR Act reviewed and report prepared by Year 4	5	**5**	Board, DG, LU
		No. of sensitization forums for State Departments and other Government bodies on the conflicts conducted by Year 5	5		
		One Amendment Act addressing areas of conflict in place by Year 5	1		
	c) Develop and operationalize effective and efficient institutional corporate and legal system	Competent and efficient legal system established by Year 3	1	**35**	Board, DG, LU
		No. of corporate governance capacity building workshops for management and Board Members conducted by Year 5	10		

RESULTS AREA 4: ORGANIZATION CAPACITIES AND RESOURCE MANAGEMENT STRENGTHENED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
	d) Formulate and operationalize effective and efficient Intellectual Property Rights policy and procedures	No. of IP Policies developed and operationalized by Year 2	1	**15.3**	Board, DG, LU
		No. of IP offices established by Year 2	1		
		No. of audits on KALRO IP assets conducted by Year 3	1		
		No. of ToTs on IP trained by Year 5	70		
		No. of scientists on IP trained by Year 5	500		
	e) Establish and implement mechanisms for dealing with litigation matters and management of the Organisation's contracts	No. of Case Management Policy developed and implemented by Year 4	1	**60**	Board, DG, LU
		No. of Litigation Units within the Legal Department established by Year 5	3		
		No. of contract and litigation management systems developed and implemented by Year 5	3		
		No. of locations where staff sensitized on case management policy by Year 5	3		

RESULTS AREA 4: ORGANIZATION CAPACITIES AND RESOURCE MANAGEMENT STRENGTHENED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
(SO 5.4). To strengthen the procurement and supplies system	a) Develop and institutionalize an efficient procurement and supplies system in compliance with the relevant laws and regulations	No. of Supply Chain Manual developed and implemented by Year 2	1	**113.2**	DG, DDGs, CS, MSC
		No. of Procurement plans developed and implemented by Year 5	5		
		No. of Quarterly and semi-annual compliance reports submitted to the relevant bodies by Year 5	30		
		No. of locations where Staff sensitized on the procurement procedures by Year 4 • Institutes • Centres	 16 51		
		No. of copies of Supply Chain Manual distributed to Institutes and Centres by Year 2	200		
	b) Automate supply chain management operations	No. of locations (institute; centres) where ERP (supply chain management) is installed by Year 1 • Institute • Centre	 16 51		
		No. of ToTs trained on ERP supply chain module by Year 1	25	**171.9**	DG, DDGs, CS, MSC, MICT, IDs, CDs
		No. of staff trained on ERP supply chain module Year 1	150		

RESULTS AREA 4: ORGANIZATION CAPACITIES AND RESOURCE MANAGEMENT STRENGTHENED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
	c) Develop a framework for asset management	A register of KALRO assets developed Year 3	1	**112.9**	DG, DDGs, CS, MSC, MF&A, MPM, IDs
		No. of Asset valuations conducted by Year 5	1		
		No. of functional disposal committees in all KALRO institutes/centres established by Year 2	17		
		No. of annual stock taking activities conducted by Year 5	5		
	d) Support the establishment Biotechnology Centre of Excellence	No. of fully equipped and commissioned laboratory by Year 5	1	**200**	KALRO BoM, DG, DDGs, GoK Donors PPPs, SCM, EM, BioRI
(SO 6.4) To strengthen and manage information and communications technology (ICT) infrastructure and services	a) Develop and implement cohesive knowledge, information and communication technologies platform /database	No. of digitization hardware installed by Year 3	1	**75**	DG, DDGs, CS, MICT, KM
		No. of digitization software installed by Year 3	1		
		No. of Knowledge management systems developed by Year 4	1		
		No. of open access Policy formulated by Year 4	1		

RESULTS AREA 4: ORGANIZATION CAPACITIES AND RESOURCE MANAGEMENT STRENGTHENED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
	b) Establish, operationalize and maintain ICT infrastructure	No. of locations by type connected to LAN and WAN by Year 2 • Institutes • Centres	 16 51	**220**	DG, DDGs, CS, MICT
		Proportion (%) of KALRO business processes automated by Year 4	60		
		No. of disaster Recovery Policies developed by Year 2	1		
		Proportion (%) of real time back-up and disaster recovery established and maintained by Year 4	5		
		No. of Cloud Computing Services hosted by Year 5	3		
		No. of locations by type connected to unified communication solution (UCS) by Year 3 • Headquarters • Institutes • Centres	 1 16 51		



RESULTS AREA 4: ORGANIZATION CAPACITIES AND RESOURCE MANAGEMENT STRENGTHENED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
	c) Develop and implement data integration and analytics tools	No. of data mining analytic software procured by Year 4	1	**75**	DG, DDGs, CS, MICT
		No. of data mining analytic hardware procured by Year 4	1		
		No. of call centre management system installed and maintained by Year 4	1		
		No. of dynamic databases developed by Year 5	5		
		No. of dynamic portals developed by Year 5	1		
		No of hits on KALRO portal by Year 5	10, 000		
	d) Establish support for knowledge and information management and transfer	No. of hardware and software for technology transfer tools acquired by Year 5	1	**36**	DG,DDGs, CS, MICT, KM
		No. of technology transfer tools developed and implemented by Year 3	4		
(SO7.4) To support and maintain a strong Internal Audit Unit	a) Develop and operationalize a framework for organisational audit risk assessment	No. of Risk Management Policies developed and implemented by Year 2	1	**22.1**	Board, DG, DDGs CS, MIA, IDs ,CDs
		No. of Risk assessment reports made available by Year 3	1		

RESULTS AREA 4: ORGANIZATION CAPACITIES AND RESOURCE MANAGEMENT STRENGTHENED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
		No. of Risk management Plans formulated by Year 3	1		
		No. of locations by type where staff are sensitized on risk management by Year 4 • Headquarters • Institutes • Centres	 1 16 51		
	b) Develop and operationalize efficient and effective internal audit	No. of audit operational manuals developed by Year 2	1	**82.5**	Board ,DG, DDGs, CS, MIA,IDs
		No. of Internal Audit charters developed by Year 2	1		
		No. of Computer Assisted Auditing Technique established by Year 2	1		
	c) Strengthen internal control systems	No. of new and existing manuals to determine levels controls instituted reviewed by Year 5	1	**6**	DG, DDGs, CS, MIA,IDs
		No. of government laws and regulations on internal control systems reviewed by Year 5	3		
		No. of internal controls systems evaluated for effectiveness by Year 5	15		

RESULTS AREA 4: ORGANIZATION CAPACITIES AND RESOURCE MANAGEMENT STRENGTHENED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
(SO8.4). To strengthen corporate affairs and communications	a) Develop and implement corporate brand	No. of branding policies developed and implemented by Year 1	1	**150**	Board, DG, DDGs, CS, MCC, IDs
		No. of branding manuals developed and implemented by Year 1	1		
		No. of staff sensitized on branding manual and policy by location by Year 5 • Headquarters • Centres	 100 1500		
		No. of assets and infrastructure branded by Year 5	3000		
		No. of products and services branded by Year 5	500		
	b) Strengthen Internal communications	No. of internal communication policies developed by Year 3	2	**20**	Board, DG, DDGs, CS, MCC, HR&A, IDs
		No. of location by type where staff sensitized on communication policy by Year 5 • Headquarters • Centres	 100 1500		
		No. of team building activities supported by Year 5	5		

RESULTS AREA 4: ORGANIZATION CAPACITIES AND RESOURCE MANAGEMENT STRENGTHENED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
	c) Strengthen public and media relations	No. of external communication and stakeholder policy developed and implemented by Year 5	3	**150**	Board, DG, DDGs, CS, MCC, IDs
		No. of public and media relations policy developed and implemented by Year 5	1		
		No. of Corporate Social Responsibility (CSR) Policy developed and implemented by Year 5	1		
		No. of KALRO staff sensitized on the communication policies by Year 5	500		
		Number of non- technical publications disseminated by Year 3	16		
		No. of Information Campaigns rolled out by Year 5	200		
	d) Develop and implement a framework for donor/investor relations	No of policy on donor/investor relations developed and implemented by Year 3	1	**110**	Board, DG, DDGs, CS, MCC, IDs
		No. of KALRO staff sensitized on the donor/investor policy by Year 5	848		
		No. of visibility materials developed by Year 5	25		

RESULTS AREA 4: ORGANIZATION CAPACITIES AND RESOURCE MANAGEMENT STRENGTHENED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
(SO9.4). To enhance security services	a) Develop and implement security policy and manual	No. of security policies developed and implemented by Year 2	1	**10**	Board, DG, DDGs, CS, MCC,IDs SS
		No. of staff sensitized on the security policy by Year 3	1000		
		No. of security services contracted and supervised by Year 5	5		
		A security risk assessment survey by Year 3	1		
	b) Develop and implement framework for security risk assessment	No. of Security Risk Mitigation Plans developed by Year 3	1		DG, DDGs, CS,
		No. of staff sensitized on mitigation measures by Year 3	1000		
	c) Establish a surveillance system to safeguard organizations assets	No. of Surveillance systems installed in Centres by Year 3	52	**100**	DG, DDGs, CS, MSS, IDs
		No. of Staff sensitized on security Plans by Year	68		
	d) Support the establishment of fencing of the organization estates	No. of safeguards for organisation property established by Year 3	1	**10**	Board, DG, DDGs, CMCS, MSS, IDs
TOTAL				**3,228**	
TOTAL KRA 4				**42,510**	

RESULTS AREA 5: SYSTEMS FOR COORDINATION, PRIORITIZATION AND REGULATION OF RESEARCH DEVELOPED AND OPERATIONALIZED					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
(SO5.1)To coordinate and regulate agricultural and livestock research in Kenya	a) Conduct an inventory of the NARS to identify who is involved and on-going research	Inventory of on-going research and by whom developed by Year 3	1	5	All institutes, NARS, NGOs CGIAR, NACOSTI
	b) Develop and maintain database of all research undertaken in Kenya;	Database of all research undertaken in Kenya developed by Year 3	1	10	
	c) Establish a Standards Development & Enforcement Committee (SDEC)	Committees established by Year 5	2	500	
	d) Develop framework and mechanisms for coordination and regulation of agricultural research	Framework and mechanisms for coordination developed by year 3	1	3	
	e) Establish and implement criteria, procedures and standards for agricultural research	Procedures and standards established and implemented by Year 5	3	150	
	f) Establish forum for priority setting in agricultural research agenda	Priority setting events held to define agricultural research agenda by Year 5	2		
TOTAL				**668**	

IMPLEMENTATION, MONITORING AND EVALUATION OF THE STRATEGIC PLAN					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
Monitoring and Evaluation	a) Annual Work plans and Performance Contracts.	Plans and Reports	255	510	BoM, DG, DDGs, IDs
	b) Baseline Survey	Baseline Survey Report	1	100	DG, DDGs, IDs, SEPD
	c) Supervision Visits	Evaluation Reports	10	50	BoM, DG, DDGs, IDs
	d) Service Delivery Surveys	Satisfaction reports	Undertake external customer satisfaction every 2	10	BoM, DG, DDGs, IDs
			Undertake internal customer satisfaction every Year 5	15	BoM, DG, DDGs, IDs
	e) Automate Strategic Plan Implementation	Acquire Dashboard software for tracking indicators	1	20	Board, DG, DDGs, CMCS, MCC, IDs
	f) Implementation Committee for KALRO Strategic Plan 2016-2022	Annual Progress Reports	5	150	BoM, DG, DDGs, IDs Committee Members
	g) Semi-Annual Review Meetings (SARM)	Review meeting report	10	50	BoM, DG, DDGs, IDs

IMPLEMENTATION, MONITORING AND EVALUATION OF THE STRATEGIC PLAN					
STRATEGIC OBJECTIVE (S)	**STRATEGIES**	**KPI**	**TARGET**	**BUDGET (KES Million)**	**RESPONSIBILITY**
	h) Midterm Review	Review meeting report	1	10	BoM, DG, DDGs, IDs
	i) External Programme and Management Review	External Programme and Management Review Report	1	25	BoM, DG, DDGs, IDs Committee Members
	j) Developing and implementation of a quality management systems.	ISO 9001:2015 Certificate	1	100	DG, DDGs, IDs, SEPD
		ISO 17025:2005	1 VRI, 1 BioRI, 1 SRI, 1 TRI, 1 CRI, FCRI	120	DG, DDGs, QMR1, VRI, BioRI, SRI, TRI, CRI, 1 FCRI
	k) Final Review	Evaluation Report evaluation	1	100	BoM, DG, DDGs, IDs
		Final Review report	1	10	BoM, DG, DDGs, IDs
Total				**1,270.0**	

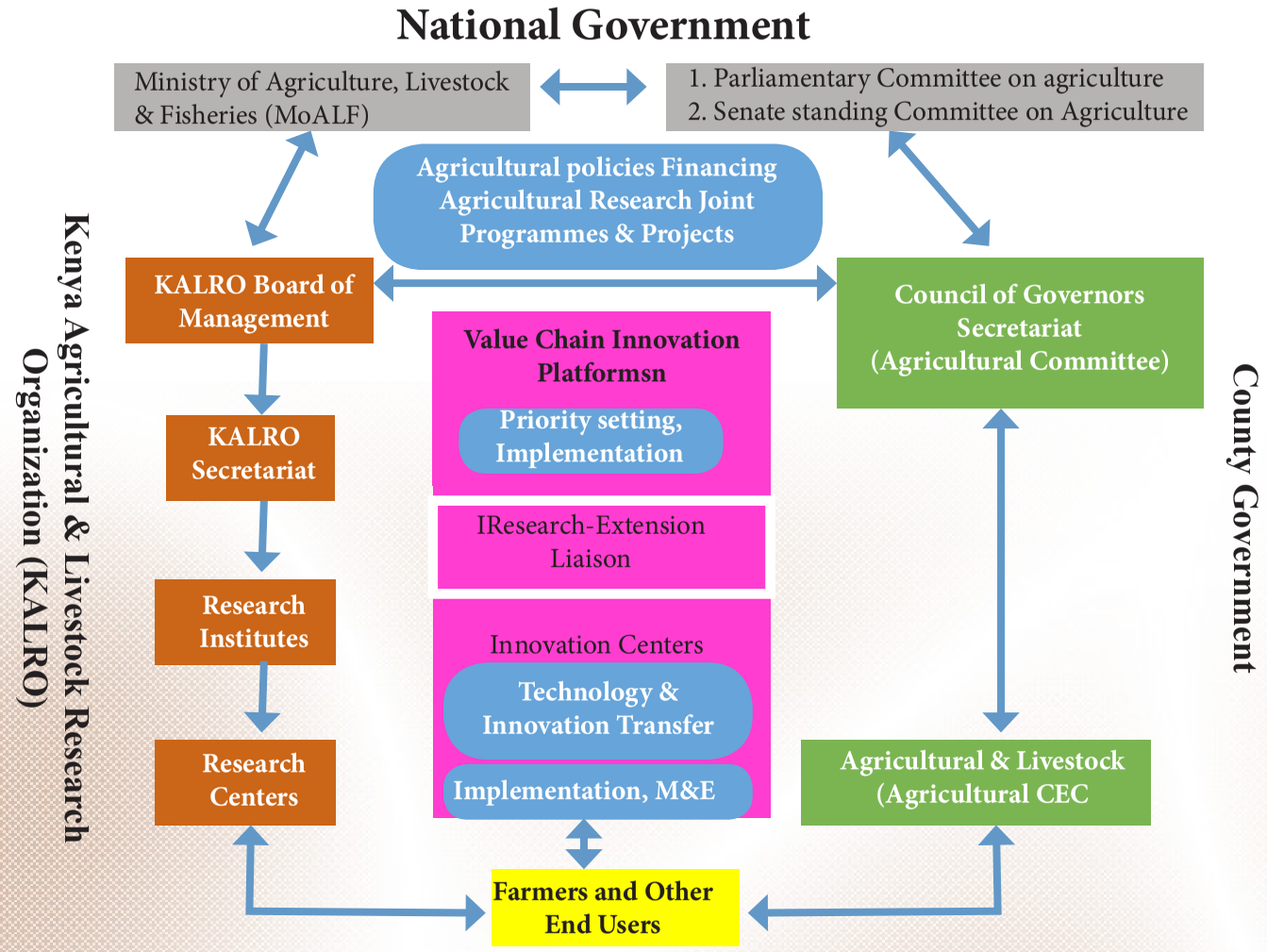
Note: Apiculture Research Institute (ARI); Arid and Range Lands Research Institute (ARLRI); Beef Research Institute (BRI); Biotechnology Research Institute (BioRI); Coffee Research Institute (CRI); Dairy Research Institute (DRI); Food Crops Research Institute (FCRI); Genetic Resources Research Institute (GERRI); Horticulture Research Institute (HRI); Industrial Crops Research Institute (ICRI); Non-Ruminant Research Institute (NRI); Sheep and Goat Research Institute (SGRI); Sugar Research Institute (SRI); Tea Research Institute (TRI); Veterinary Science Research Institute (VSRI); Agricultural Mechanization Research Institute (AMRI)
DG - Director General, Board - Board of Management, DDGs - Deputy Director Generals. CS - Corporate Services, ARF - Agricultural Research Fund, SRC - Salaries and Remuneration Commission, HR&A - Human Resource and Administration, LU - Legal Unit, MPM - Manager Property Management, MSC - Manager Supply Chain, IDs - Institute Directors, CDs - Centre Directors, MF&A - Manager Finance and Accounts, KM - Knowledge Management, MICT - Manager Information Communication Technology, MIA - Manager Internal Audit, MCC - Manager Corporate Communication MSS - Manager Security Services, KSU - KALRO Seed Unit, MPM - Manager Property Management

ANNEX 4: BUDGET BY INSTITUTE

Summary of the Organization Budget projection per the financial year for the period 2016-2021 in KES'000,000

Thematic areas of Research and their respective Programmes and Corporate Research Support Functions and Services Divisions	Base Year 2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Five Year Totals
1.0 Organizational Personnel and Management	**6,762**	**8,486**	**8,890**	**9,321**	**9,782**	**10,274**	**46,753**
1.1 Organizational Personnel Management	6,170	6,354	6,545	6,741	6,944	7,153	33,737
1.2 Organizational Management and administration	222	800	880	968	1,065	1,171	4,884
1.3 Organizational Research Coordination and corporate	370	1,332	1,465	1,612	1,773	1,950	8,132
2.0 Crop Research Institutes	**1,758**	**2,267**	**2,801**	**3,201**	**3,629**	**3,956**	**15,848**
2.1 Horticulture Research Programme	382	441	490	545	605	670	2750
2.2 Sugar Research Programme	351	407	453	504	560	620	2543
2.3 Tea Research Programme	271	319	356	398	441	491	2004
2.4 Coffee Research Programme	403	464	515	573	636	704	2891
2.5 Agricultural Mechanization Research Programme	-	116	133	152	173	195	768
2.6 Food Crops Research Programme	251	297	332	371	414	460	1873
2.7 Industrial Crops Research Programme	-	94	108	125	143	161	630
3.8 Genetics Research Programme	100	131	149	170	190	213	852
3.9 Miraa Research Institute			269	365	463	438	1535
3.0 Livestock Research Institutes	**1,105**	**1,477**	**1731.55**	**1997**	**2277**	**2569**	**10,054**
3.1 Veterinary Sciences Research Programme	118	163	192	223	255	289	1123
3.2 Apiculture Research Programme	171	221	256	294	333	375	1480
3.3 Arid and Range Lands Research Programme	144	191	223	258	293	331	1297
3.4 Biotechnology Research Programme	165	214	248	285	323	364	1435
3.5 Beef Research Programme	106	149	177	207	237	269	1040
3.6 Dairy Research Programme	259	317	362	412	461	515	2068
3.7 Non- Ruminant Research Programme	61	100	123	147	171	197	739
3.8 Sheep and Goat Research Programme	81	122	147	174	201	230	875
Gross Total Budget	**8,035**	**10,502**	**11,632**	**12,666**	**13,763**	**14,808**	**72,655**

ANNEX 5: KALRO NATIONAL AND COUNTY INTERACTION FRAMEWORK



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KALRO VACCINES

KALRO SEEDS