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Ethiopian Institute of Agricultural Research

CORPORATE STRATEGY

(2016-2030)

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(2016-2030)

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Foreword

The Ethiopian Institute of Agricultural Research (EIAR) upholds the thought of developing a well-defined research strategy to deliver outputs that are aligned with national and sectoral economic drives of the country. Therefore, in pursuit of delivering outputs matching national and sectoral targets defined in the Second Growth and Transformation Plan (GTP-II) as well as the prospective long-term development outlooks and ambitions of Ethiopia, EIAR, guided by its vision, mission and mandate, has developed this corporate level long-term research strategy spanning the period 2016-2030.

Our institutional mission is to avail agricultural technologies, information and knowledge enabling to ensure food and nutrition security for all Ethiopians; supplying raw material for increasingly expanded scale of agro-industries to satisfy domestic needs and foster import substitution; diversifying agricultural base of foreign exchange earnings; and enhancing maintenance of natural resources and environmental sustainability and reducing vulnerability to climate change

This corporate strategy is a reflection of the conviction to all-round contributions towards achieving the strategic objectives that EIAR drawn for the next 15 years; and serving as a roadmap to guide the research programs planning and implementation.

Therefore, on behalf of EIAR and my own, I would like to extend profound appreciation to those, in one way or another, took part in the process of developing the Research Strategy

Fentahun Mengistu (PhD)
Director General, EIAR

I Introduction

1.1 Background

Agricultural research plays a key role in poverty reduction and realization of economic prosperity. Since its establishment as a semi-autonomous research institution in 1966, the now EIAR has morphed through various forms and structures; as IAR (1966-1998), EARO (1998-2005) and EIAR (since 2005). During these years of alterations the EIAR's core duties and responsibilities are hinged on four major pillars. These are:

- Providing leadership in coordinating research within the Ethiopian Agricultural Research System (EARS), by spearheading the role to initiate, influence, and formulate agricultural policy dialogues, directions, and development;
- Implementing research programs to avail and disseminate agricultural technologies, information and knowledge supporting development and advancement of Ethiopian agriculture;
- Building the capacity of the national agricultural research system for formulation and development of research strategies, programs and projects in line with the country's development requirements and perspective plans.

In a bid to attune itself to the dynamics of national policies, strategies and program frameworks and perspective plans guiding national and sectoral development of Ethiopia, EIAR upholds the thought of developing a well-defined research strategy to deliver outputs that are aligned with national and sectoral economic drives of the country. Therefore, in pursuit of delivering outputs matching national and sectoral targets defined in the Second Growth and Transformation Plan (GTP-II) as well as the prospective long-term development outlooks and ambitions of Ethiopia, EIAR, guided by its vision, mission and mandate, has developed this corporate level long-term research strategy spanning the period 2016-2030. The strategy was prepared by building on the experiences and lessons gained from previous strategies, albeit for different reasons they were only sparsely followed through over the years. The strategy will serve as the central document guiding EIAR to consolidate its efforts for the next 15 years as it sets an all-inclusive framework for prioritizing and implementing agricultural research towards the achievement of delivering technologies, information, and knowledge that will strengthen the agriculture sector.

1.2 Rationale

The agriculture sector plays a central role in the lives and livelihoods of most Ethiopians, where about 14 million smallholder rural households (25 percent of which are woman-headed) account for an estimated 95 percent of agricultural production and 85 percent of all employment. The sector guided by the Agricultural Development-led Industrialization (ADLI) strategy and implementation of four consecutive development programs, namely Sustainable Development and Poverty Reduction Program (SDPRP). The Plan for Accelerated and Sustainable Development to End Poverty (PASDEP 2005 – 2010), and the Growth and Transformation Plans I (GTPI 2010/2011 – 2014/2015) and II (GTP II 2015/2016 – 2019/2020), is spearheading agricultural growth and economic transformation. Lessons learned over years indicate that judicious dissemination and application of proven technologies and inputs will bring about significant and positive changes in both production and productivity of agricultural and pastoral systems.

Cognizant of the availability of suitable physiographic, climatic settings, policies, and regulatory frameworks agricultural research ought to play a key role to ensure food and nutrition security; strengthen the opportunity for job creation and income generation; foster expansion of agro-industries,

agri-business and import substitution; diversify the base for foreign earnings; and enhance environmental sustainability.

However, at present not only is wide the gap between what has been achieved by research and how much of that is being used by the farmer; but also are little the results attained thus far by the research system in comparison with the potential that could be realized. In order to create a condition where these divergent scenarios could converge and the potential could be exploited to its best level, it is necessary to develop a well-defined and inclusive strategy representing and addressing the interests of key stakeholders. The strategy will be instrumental to sharpen the focus of EIAR's contribution to the achievement of the national agriculture sector objectives and ambitions defined in the country's policy frameworks and plans, by not only creating a stronger cohesion and partnership among stakeholders but also serving as a roadmap to:

- guide planning and implementation of research in line with national and sectoral plans, objectives and targets;
- track records of results and lessons; and
- mobilize resources from national and/or international sources

This Corporate Research Strategy is prepared guided by a set of principles and values that reflect its vision, mission, objectives, and core values underpinning its commitments and desires.

1.3 Vision, Mission, Strategic Objectives, and Core Values

Vision a modern and productive agricultural sector.

Mission: availing agricultural technologies, information and knowledge for ensuring food and nutrition security; meeting the raw material demand of agro-industries; increasing foreign exchange earnings; and enhancing the sustainable use of natural resources.

Strategic objectives: to contribute to the national goals of ensuring food and nutrition security and sovereignty, reducing poverty, and enhancing the natural resource base; while persistently being mindful about such crosscutting issues as climate change, gender and youth, policy, and capacity building.

In order to accomplish its mission and fulfill its obligations, the EIAR has established a set of guiding principles for the implementation of the strategy. Accordingly, EIAR will be guided by the following basic and unwavering principles and core values that it shall/must:

- be an integral part of the national development efforts of Ethiopia and thus all its research programs must be founded on the policies and priorities of the country while embracing the notions of cost-effectiveness and responsiveness to stakeholders in both the public and private sectors;
- ensure that its research outputs will lead to sustainable development and livelihood improvement, and thus the strategy must encompass basic, applied and adaptive research approaches for technology development, demonstration, transfer, dissemination, and adoption;

- utilize and promote combinations of the conventional, innovative and advanced science and technology, and ensure high science quality with due regard to addressing possible ethical, social and environmental impacts during research project formulation and implementation;
- promote capacity building and institutionalization of integrated, multi-disciplinary, multi-institutional, livelihood-based approaches with various partners and stakeholders on the basis of comparative advantages;
- give due attention to inclusiveness in terms of diversity and equal opportunity for all; must use gender-sensitive approaches to empower women and youth;
- engrain, in all its deliberations, commitment to excellence, knowledge sharing and access to information;
- ensure monitoring mechanisms and evaluation criteria from inception to adoption of research projects, activities and results; and
- be free from all forms of malpractices and must ensure transparency, accountability and devotion to ethical standards

1.4 Developing the Strategy

This long-term research strategy was developed in a two-way process. First a general framework of outline was developed at institution level in a bid to providing a common guideline for all research programs serving as national coordinators; which at present are housed in EIAR, regional research institutes (RARIs) or higher learning institutions (HLI). The contents of the guideline were conscientiously anchored to, and aligned with, EIAR's reflections on - growth trajectory experienced during the past several years and future outlooks in national and international trends, and key national policy and strategic plans notably, the second Growth and Transformation Plan (GTP-II), framed to harness development endeavors in Ethiopia to achieve the national vision of becoming a middle income country by 2020. The second process involved the development of commodity/ thematic area based research strategies (2016-2030) through a process of repeated consultations with, and validations by, a wide range of stakeholders. Thus, this corporate strategy is prepared from the above-mentioned two-way processes.

The strategy is organized in seven major chapters whereby the background together with descriptions of the rationale, vision, mission, strategic objectives and the present section constitute the introductory chapter 1. Chapter 2 provides an overview of EIAR's contributions to the agriculture sector and its comparative advantages; Chapter 3 discusses the challenges and opportunities that EIAR has to face up to and make advantage of in the process of formulating its research agenda. Chapter 4 presents impact pathways where the strategic development objectives; strategic research priorities and interventions for both sectoral and cross-cutting issues are discussed. Chapter 5 discusses the research approaches to be employed, partnerships, commitment and accountability EIAR will assume to implement the strategy. Chapters 6 and 7 respectively present key references used to develop the strategy and annexes to augment its clarity.

II Contributions to the Agriculture Sector

The agricultural sector has been annually growing at the rate of about 10% over the past decade, much faster than population growth. The increment in productivity is attributed to the technological interventions availed at farm level through a series of national extension package programs and to the radically increasing trend of input supply.

So far, the research system produced thousands of agricultural technologies in food crops, forage species, agro-techniques in crop and animal husbandry, pest and disease management techniques,

animal feeds, farm implements, and soil and water management technologies with socio-economic and policy recommendations.

In addition to availing technological interventions, considerable investments and efforts have also been made by the Ethiopian government, resulting in dedication of an annual investment of closely 15% of all government spending to the agriculture sector.

III Challenges and Opportunities

3.1 Challenges

Food and nutrition insecurity

Agriculture is the major source of livelihoods of an estimated 13 million-smallholder farmer and pastoral households and nearly 80 percent of all employments, 90 percent of exports and 38.8 percent of GDP. Crop production accounts for 60 percent of agricultural GDP. Official figures indicate that livestock account for about 32 percent of agricultural GDP; however, research findings suggest that the real figure is closer to 45 percent considering other livestock functions including the value of draught power to crop production and transportation of agricultural inputs and outputs. This sub-sector is important for rural households by providing food, farm power, manure, and an emergency source of cash. It also provides raw materials for domestic industries as well as commodities for export. Three broad rainfall regimes designated as high, moderately low, and low rainfall characterize the agricultural, agro-pastoral and pastoral systems of Ethiopia. Agriculture is primarily rain-fed and therefore subject to the vagaries of climate or weather changes. In the pastoral and agro-pastoral systems, drought has typically become more acute with shorter cycles; and chronic food insecurity has been a defining feature of these areas.

The problem of food and nutrition insecurity is exacerbated by the very high level of malnutrition as is reflected by the prevalence of stunting at 47% and underweight at 38%for under-five children; and body mass index (BMI) of less than 18.5 at 27% among women. Deficiencies of vitamin A, iron and iodine affect a large segment of the population and are problems at the level of public health significance. Children's death attributed to vitamin A deficiency (VAD) reaches up to 32%.These in turn have a number of immediate and underlying consequences on cognitive development of children and also on ensuring food and nutrition security.

Poverty

According to government estimates 23.4 percent of the country's population lives in poverty in 2015. There are marked differences between rural and urban areas with poverty being concentrated in rural areas where most households continue to live on less than 0.50 USD per day. Not surprisingly, many rural households find it impossible to survive without access to seasonal wage employment or aid from the Productive Safety Net and related social protection programs.

Degradation of the natural resources base

Increasing soil erosion, declining fertility, acidity, salinization because of poor irrigation techniques, soil compaction, droughts, and non-climate and edaphic factors such as population growth, create pressures to intensify land uses, expand farming and grazing into marginal lands, and clear vegetation. These anthropogenic activities combined with effects of climate change in turn diminish land productivity, quality resilience, soil fertility and health, and biodiversity.

Inappropriate land use planning coupled with periodic droughts accentuate degradations of: water– decline in the quantity and quality of both surface and ground water resources and increased risks

downstream flood damages; and climate – adverse changes in the micro and macro climatic conditions increasing failure in crop, livestock and ecological systems. Land degradation is further exacerbated by deforestation and poor agro-forestry and rangeland management practices. The size of forest and woodland area cleared annually to meet the demand for fuel is in the order of more than 60 thousand hectares. Conversion of land used or potentially to be used for production of crops, livestock, and forest or as wildlife sanctuary to urban, industry, or infrastructure is at the rise following high rate of population growth as well as shift in the economic drive from agriculture to industrialization.

Ethiopia has rich biodiversity of flora and fauna owing to the island nature of its highlands and unique evolutionary history of the lowlands. It is one of the seven major Vavilovian Centers of Origin and Diversity of crop plants and it is home for over 6,000 species of vascular plants. Ethiopia's biodiversity is increasingly threatened and partly degraded, as land is being converted for subsistence and commercial agriculture, timber used for fuel wood and construction, and loss of forests and other protected land caused by a growing population and unsustainable natural resource management is untenably increasing.

Climate change

- In Ethiopia, climate change is already having an impact on the livelihoods of communities. Most widespread and potentially devastating impacts of climate change are associated with changes in the frequency, intensity, and predictability of rainfall and water availability with consequential effect of decreased agricultural production and food shortages. Periodic assessments of food security situations over the last many years confirm that the Belg rains (February to May 2012) have become more erratic and below normal which adversely affected crop production, pasture and water availability. An important pattern of observed existing rainfall declines coincides with heavily populated areas of the Rift Valley in south-central Ethiopia, and is likely already adversely affecting crop yields and pasture conditions;

- Rapid population growth and the expansion of farming and pastoralism under a drier, warmer climate regime could dramatically increase the number of at-risk people in Ethiopia during the next 20 years;
- Many areas of Ethiopia will maintain moist climate conditions, and agricultural development in these areas could help offset rainfall declines and reduced production in other areas;

- climate change is expected to result in 30 percent less average income in Ethiopia in the next 50 years; and

- even with good future growth trends, huge impacts on overall income levels are inevitable

Climate change causes new patterns of pests and diseases to emerge, affecting plants, animals and humans, and posing new risks for food security, food safety, and human health. Climate change also affects food accessibility by influencing food allocation within the household and affordability by affecting income and ability of people to choose the food they need to eat.

Gender

The role of women particularly in the rural settings of Ethiopia is fundamental that they are the foundation of every family and the community. Women play critical role in farming also in livestock maintenance and management, and marketing of rural produce. However, women farmers have only limited access to resources, services, land, and credit. Unequal gender relations often make women more vulnerable to the effects of poverty, land degradation, and climate change. Despite this fact, however, women are very often marginalized in processes of major decision-makings. As regards to families headed by women, they are not only powerless to play decisive role in making decisions at different levels but are also the most vulnerable to fall victims of chronic food and nutrition insecurity and the vicious trap of poverty.

3.2 Opportunities

There are far more opportunities, for the research system to take advantage of, than challenges that it have to deal with. The Ethiopian government has put in place a number of national policies, strategies, and laws along with clear institutional arrangements and devolution of power close to the grassroots. Also the government has ratified many regional and international conventions that are central for rapid socioeconomic growth and sustainable development. Such conducive policy environments coupled with GOE's commitment to advance research and technology in general create a condition where EIAR can mobilize its resources for the implementation of the strategy and thus realization of the objectives therein.

Although, availability of diversity of natural resources in agriculture offer opportunities for research as well as development it equally pose considerable challenges. EIAR will make rational use of every bit of such opportunities whenever and wherever possible without jeopardizing sustainability of any sort.

As could be discerned from the above section, the breadth, and depth of challenges facing agriculture in Ethiopia is breathtaking. The flipside of such a colossal magnitude of challenges sets a corresponding degree of opportunities for the research in forging support from every source eager to get rid-off the challenges and see betterment of the situation. The readiness of a vast number of farming and pastoral households in target communities who for years are toiling under such mind-wrenching conditions is another dimension of the opportunity the research will capitalize on.

Today in Ethiopia, more than twenty universities and nine RARIs are partners with EIAR to undertake agricultural research in and around their mandate areas. This will give the opportunity to reach out to wider communities, areas, agro-ecologies, and commodities more effectively and efficiently.

There are also new initiatives and directions in science and technology in Ethiopia such as the level of emphasis given to science and technology, industrialization and modernization of agriculture, agricultural investment by the private sector; new capacity of within EIAR, universities, regional research institutions and even the private sector with respect to availability, and application and use of modern tools in biotechnology, irrigation, analytical laboratories and equipment. These all represent opportunities that could be tapped to bolster EIAR's efforts to achieve its goal.

IV Results Framework

The result framework discusses four main topics of the strategy by first setting the strategic objectives that Ethiopia putting into unfaltering dedication and thus EIAR is committed to contribute to achieving them. The second part of the framework discusses priority areas that EIAR will focus on to deliver outputs that are consistent and robust enough to match with the strategic objectives. Also are discussed the strategic interventions to be employed to produce key intermediate results necessary to leverage desired impacts. The third part will discuss strategic approaches to be followed to address challenges pertaining to crosscutting issues and theme relevant to EIAR. The last part of the chapter gives highlights on items and considerations of performance indicators.

It is worth noting that, as strong and intricate the linkages among the three strategic objectives are, so are also those among priority areas, intermediate results, and interventions. It is thus conceivable that priority areas as well as interventions targeted to address or give a solution to a specific problem will directly or indirectly, through others, will do same to other problems that the interventions are not primarily targeted at. Equally important to note is also, failure to meet one objective can dampen the gain in another. It is, therefore, imperative to employ holistic rather than piecemeal approaches in the research system; and in the development sector, actors need to deliver-as-one in order to realize the vision shared as a nation.

4.1. Strategic Objectives

Objective 1

Ensured food and nutrition security

Food insecurity can be an underlying cause of malnutrition (nutrition security) due to inadequate intake of diets prescribed as good- quality and quantity to lead a normal life; and diseases that can arise from deficiencies of specific nutrients such as vitamins and minerals. It is, expected that the priority areas of research and thus interventions defined in the strategy will take into account all dimensions of food and nutrition security. EIAR's focus will be on strategic interventions addressing: all components of food and nutrition security in order to change the status-quo; and quality of agricultural products to be able to meet standards set by the industry as well as the competitive export market.

Objective 2

Reduce poverty

The country has registered an encouraging economic growth through formulation of policies and implementation of programs and putting in place appropriate institutional arrangements. The economic growth has significantly contributed to a reduction in head count poverty from 56 percent in 1992 to 23.4 percent in 2015. Yet the absolute number of people under poverty line is still high which requires research to generate technologies to increase agricultural income and employment

Objective 3

Enhanced natural resources base

The natural resource base is the sum total balances of the physical, chemical and biological factors arising from the soil, water, vegetation, biodiversity, and climate resources-base as well as myriad of their interactive effects on the functions of given systems. Crop, livestock, forest and aquatic systems have evolved based on the availability and opportunities provided by the natural resource base. The

natural resources need to remain productive for the systems to be functional, which builds on the processes shaped by interactions among biological, biochemical and biophysical processes, such as water regulation and nutrient cycling. A functional system ensures the delivery of ecosystem services, which are generally classified according to the benefits that they provide:

- provisioning services (e.g. the provision of food, fiber, energy and water);
- regulating services (e.g. the regulation of nutrient recycling, water-table recharging, water recycling and purification, pest and disease outbreaks, or regulation of GHG emissions and carbon sequestration);
- supporting services (e.g., pollination); and
- cultural services

The strategic priorities and interventions will thus focus on creating, restoring, maintaining, and enhancing productive balances of the natural resources supporting agricultural, agro-pastoral and pastoral system.

4.2. Strategic Research Priorities and Interventions

The EIAR has identified and set eight strategic research priorities that it will concentrate its resources and efforts during the period of the strategy and be able to deliver outputs that will contribute for achieving the national strategic development objectives.

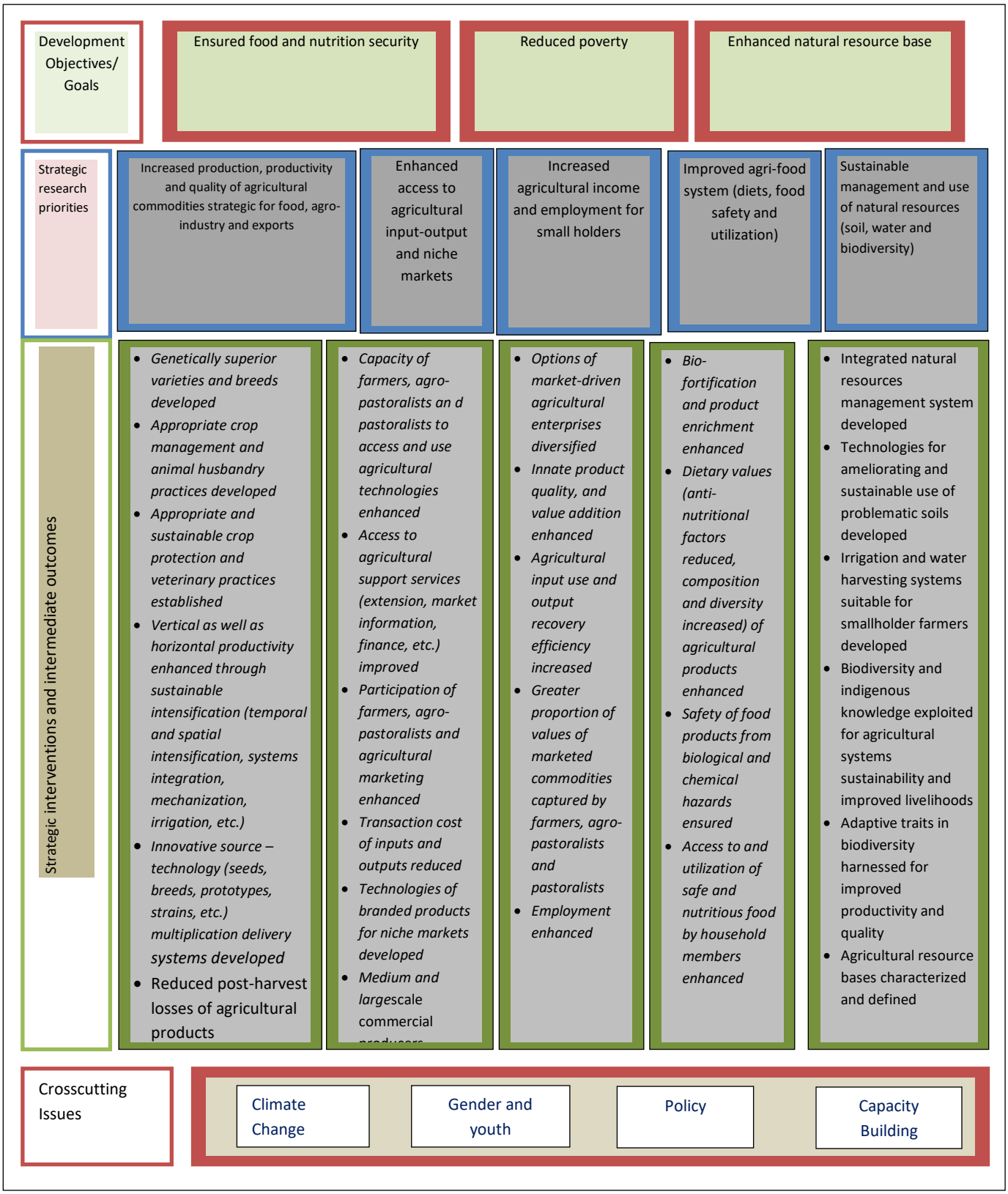

Figure 1: Development objectives and strategic research priorities, strategic interventions and intermediate outputs

Strategic priority 1

Increased production, productivity and quality of agricultural commodities strategic for food, agro-industry and exports

Increasing agricultural production and productivity is key for smallholder agricultural and pastoral households not only to be self-sufficient to cover their needs for food and nutrition security, but also be able to produce surplus for domestic as well as export markets and thereby increase their incomes and get out of poverty. Agricultural products for the domestic markets can be destined for direct consumption or raw material for industries. In all cases, it is imperative to develop their capacity to produce and supply products that are competitive enough to meet the quality standards set by the industries and export markets.

Improving nutritional and health status of households and community groups through multi-sectoral intervention strategies, which take into consideration the linkages between agriculture, off-farm income generation and nutrition as well as environmental health and sanitation, play a decisive role to bring about concrete and sustainable development and food and nutrition security. Integration of agriculture with nutrition for proper utilization of both crop and livestock commodity development at household level will certainly bring about a significant change in the nutrition and health status of the community.

Strategic interventions

In the years ahead, EIAR will make every effort to deliver outputs increasing production, productivity and quality of agricultural commodities that are strategic for food, agro-industry and export through:

- Genetic improvement of crops and livestock to develop varieties and breeds with higher yields (vertical yield growth with such commodities as wheat and tef, hybrid technologies in non-conventional commodities- vegetables, forages, etc.); acceptable quality; resilience to stresses such as climate change, emergence of new pests and diseases, and other biotic and abiotic stresses; nutritional value and efficiency of resource use; and adaptable to a variety of environments. The strategy will seek to accelerate genetic improvement by using both conventional and modern methods and technologies that make possible handling of large number and volumes of genetic material of crops and livestock and select with greater precisions; by involving stronger integration of conventional approaches with modern tools and methods of biotechnology;

- Keeping in focus the principle of eco-efficiency, developing packages of integrated crop and soil management and animal husbandry practices (feed resource management; farming systems-specific recommendations; precision agriculture; innovative agronomic practices, aquaculture, and plasticulture); sustainable crop protection and veterinary practices against both erstwhile-, emerging- and trans-boundary pests and diseases (IPM methods against insect pests, diseases, weeds, vertebrate pests, and emerging diseases such as BYDV on wheat, Uromyces rust on tef, MLND and fall army worm on maize, mealy bug on cotton, white scale on mango, bacterial wilt on ginger, etc.); and integrated crop and livestock management practices enabling to thrive under increased intensity of abiotic stresses like drought, frost, salinity, and acidity;

- Sustainable intensification and diversification (temporal and spatial intensification, systems integration, mechanization, irrigation including for off-season production) enhancing both vertical as well as horizontal productivities of crops and livestock;

- Reduced post-harvest losses of agricultural products by developing production and processing

implements and equipment, means of transportation, and storage structures and facilities appropriate for small-scale producers of crop and livestock;

- Innovative ways of availing source–technologies (accelerated multiplication and delivery systems for early-generation seeds –e.g., informal seed system, tissue culture, fast methods of propagation of planting material; breeds; prototypes; strains; etc.); and

- Innovative technology transfer and commercialization systems (technology villages in and around agricultural clusters; product branding and commercialization; use of FTCs as demonstration sites, along highway demonstrations, GIS- and ICT- assisted technology transfer systems)

Strategic priority 2
Enhanced access to agricultural input-output and niche markets

In order to make the markets work, it is also required to understand the market dynamism and drivers that motivate farmers and understanding their problems. In order to be able to integrate into such an array of market economy and thrive successfully, they need to be fast enough to exploit new opportunities, and to protect themselves from risks. They have to have the capacity to develop their own strategic plans and be able to operate under fast-changing environments by optimizing the use of their scarce resources in return to economic benefits that would enable them to improve their levels of: wealth (whether or not come out of poverty), food and nutrition security, and capacity to invest in developing, managing, using and maintaining natural resources that are under their direct control.

Strategic interventions

EIAR is poised to pursue strategic approaches to generate facts and information that would provide evidence and insight into the dynamism of input-output and niche markets, where farmers and pastoralists can actively partake and be successful actors. This will be achieved by:

- enhancing the capacity of farmers, agro-pastoralists and pastoralists to access and use agricultural technologies, information, and best-bet practices;
- improving the capacity farmers, agro-pastoralists and pastoralists to get access to agricultural support services (extension, market information and intelligence, and finance);
- enhancing participation of farmers, agro-pastoralists and pastoralists in agricultural marketing (by providing them evidence-based information on enterprise choices; feasibility, economic and profitability studies; technology application and market approaches; and cost-benefit analysis);
- providing technical support to farmers, agro-pastoralists and pastoralists in reducing transaction costs of inputs and outputs;
- providing technical support to farmers, agro-pastoralists and pastoralists in accessing technologies and markets and developing branded-products for niche markets; and
- providing technical support for medium- and large-scale commercial producers

Strategic priority 3
Increased agricultural income and employment for small holders

The overall development strategy of Ethiopia is based on the expansion of a strong free market economic system with markets expected to lead production. Application of agricultural technologies and extension services, market and demand side development, institutional competence and performance, support in agro-business incubation, and integrated and coordinated service delivery

mechanisms are crucial in realizing the benefits of market-oriented agriculture. Although agricultural marketing system in Ethiopia is yet undeveloped and poorly organized, farmers and pastoralists can perform well with little support to overcome key constraints in the value chain.

It is also imperative to place major effort to support intensification of marketable farm products -both for domestic and export markets, and by small and large farmers alike. Specialization and diversification into new export commodities such as fruits, vegetables, herbs, spices, oilseeds, pulses, livestock and livestock products, honey, and wax provide new sources of wealth, new jobs and opportunities for increasing growth and reducing poverty and hunger.

Processing or value addition and marketing of agricultural commodities, including commodities for niche markets, with product branding, improved quality grading and standardization as well as establishing effective market information exchange system will open up new opportunity for creating wealth and breaking out of poverty trap.

Strategic interventions

In order to realize these theories of change laying out the paths through which the strategic objective could be achieved, EIAR will interject with the following interventions

- support farmers and pastoralists to: diversify options of market-driven agricultural enterprises; develop agricultural technologies with desirable ago-industry and export standards; and establish linkages between development corridors, production clusters and agro-industry parks;
- support farmers and pastoralists to: get access to agricultural technologies with competitive innate product quality; and develop the capacity for value addition (storage, processing, handling, preservation methods minimizing post-harvest loss, and increasing shelf life);
- support farmers and pastoralists to: increase their efficiencies in agricultural input use and output recovery; and establish market linkages and outlets for swift transaction of perishable commodities and products; and
- support farmers and pastoralists to: capture greater proportion of values of marketed commodities through establishment of value chains with better market efficiencies where they would be price-setters rather than being price-takers

Strategic priority 4
Improved agri-food system (diets, food safety and utilization)

Enhancing nutritional value and quality of agricultural products through processing; value addition and product diversification, reducing post-harvest loss, improving food safety, and shelf life will be essential to improve agri-food system by creating better options for the farming and pastoral communities, market opportunities for agri-food industries and options of choices for consumers.

Strategic interventions

Concerning improving the agri-food system, the following pathways of intervention will be heeded

- Enhancing bio fortification and product enrichment;
- Enhancing dietary values (eliminating/minimizing anti-nutritional factors, improving composition and diversity) of agricultural products;

- Establish technologies and practices ensuring safety of food products from biological and chemical hazards; and
- Enhancing knowledge about and access to and utilization of safe and nutritious food by household members;
- Reducing post-harvest losses from pests and diseases; and
- Enhancing mechanization options to reduce post-harvest loses

Strategic priority 5
Sustainable management and use of natural resources (soil, water and biodiversity)

Severe degradation of the natural resources especially in the food insecure areas is most challenging to ensure sustainable livelihoods. Development initiatives in these areas should focus on rehabilitation, conservation, development, and management of the natural resources in general since these are fundamental bases for their development.

Sustainable production intensification (SPI) will be an important tool for increasing production in a climate-smart way as it saves natural resources, time, and money by increasing the efficiency of farming systems. More is produced with fewer inputs by applying appropriate inputs at the right time and in the right amount, optimizing resource use, and reducing waste. SPI uses knowledge-intensive approaches, such as conservation agriculture, integrated plant nutrient management, integrated pest management, water management, and so on. Such systems offer important opportunities for decreasing deforestation, rehabilitating eroded soils and reducing pressure on surrounding natural ecosystems.

Integrated approaches of soil and water management are vital for increasing efficiency in the use of resources, and sustaining productivity. Water management is a critical component for increasing productivity with less pressure on NR; cultivation of crop varieties with increased resistance to extreme conditions; irrigation techniques that maximize water; adoption of supplementary irrigation in rain-fed systems and water-efficient technologies to harvest water; and the modification of cropping calendars; feed management; and animal husbandry.

A climate-smart soil management strategy involves creating a positive carbon budget in soils and ecosystems by using residues as mulch in combination with integrated nutrient management (i.e. the appropriate application of both synthetic and organic fertilizer). In addition, soil carbon sequestration delivers numerous ancillary benefits by improving soil quality and other ecosystem services. Restoration of degraded soils, increases soil organic carbon pools, improves production, food, and nutrition security. Increasing the pool of soil organic carbon is also important for improving efficiency in the use of fertilizers.

Agroforestry is important in NRM as it improves soil fertility and health, carbon sequestration, feed source and for resilience of agricultural production to climate variability by using trees to intensify and diversify production and buffer farming systems against hazards.

Strategic interventions
In order to realize the positive changes imagined would result from integrated management of NR, the following interventions are conceived

- developing integrated natural resources management systems; developing technologies for ameliorating and sustainable use of problematic soils;
- developing irrigation and water harvesting systems suitable for smallholder farmers;
- exploiting biodiversity and indigenous knowledge for sustainability of agricultural systems and improved livelihoods;
- harnessing adaptive traits from biodiversity for improved productivity and quality of agricultural products; and
- characterizing, defining and mapping agricultural resource bases including land use potential

4.3 Cross-cutting Issues

The result framework for crosscutting issues is given in Fig.2 below. Climate change, gender and youth, policy and capacity development are the main topics discussed under this section. In reference to the challenges related to each of the topics (as discussed in chapter three), EIAR will establish interventions that will address these challenges and problems.

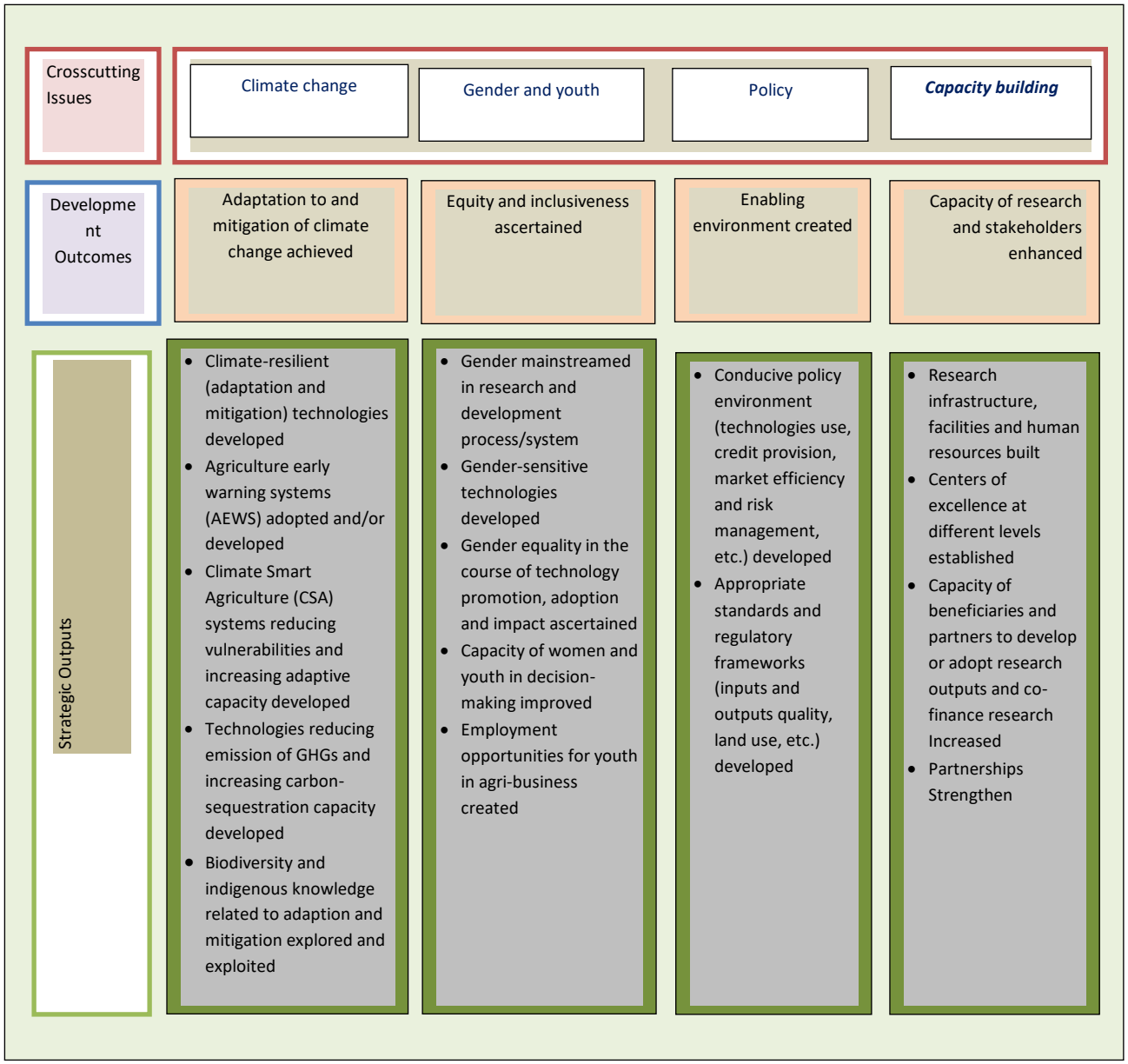

Figure 2 Strategic outputs and development objectives to be achieved from strategic interventions EIAR will leverage in crosscutting themes of climate change, gender and youth, policy and capacity building

Climate change

The research strategy will place due considerations to availing technologies that would help respond to climate change through adaptation and mitigation approaches. While adaptation refers to any adjustments in natural or human systems in response to actual or expected climate change stimuli or their effects in order to moderate harm or exploit beneficial opportunities, mitigation refers to those destined to reduce the magnitude of climate change impact in the long term by reducing emissions of GHGs and maximize the carbon sequestration. Adaptation includes all activities that help people and ecosystems reduce their vulnerability to the adverse impacts of climate change and minimize the costs of natural disasters. There is no one-size-fits-all solution for adaptation; measures need to be tailored to specific contexts, such as ecological and socioeconomic patterns, and to geographical location and traditional practices.

For mitigation, both sources of and sinks for GHGs must be managed by for example using fossil fuels more efficiently and expanding soil organic matter and forests to sequester greater amounts of carbon dioxide from the atmosphere. Therefore, developing strategies that reduce GHG emissions and maximize the carbon sequestration potential in living systems should be viewed as critical elements in minimizing the long-term impacts. These are expected to be achieved through the following interventions:

- developing climate-resilient technologies and practices combining high productivity with high value for adaptation to risks and shocks, reduced emissions of GHG and carbon-sequestration capacity ;
- developing agriculture early warning systems (AEWS);
- developing Climate Smart Agriculture (CSA) systems reducing vulnerabilities and increasing adaptive capacity;
- exploring and exploiting biodiversity and indigenous knowledge related to adaption and mitigation; and
- provide digitized climate information services.

Gender and youth

of farm labour at harvesting and in post-harvest activities. Women play critical role also in livestock maintenance and management, and marketing of rural produce. However, women farmers have only limited access to resources, services, land, and credit. Unequal gender relations often make women more vulnerable to the effects of poverty, land degradation, and climate change. If the gender gap were eliminated, total agricultural output would increase. By undertaking gender analysis these gaps could be identified as differences between women and men regarding their specific activities, conditions, needs, access to and control over resources, and access to development benefits and decision-making. Gender analysis entails, primarily, collecting sex-disaggregated data and gender-sensitive information. It is the first step in gender-sensitive planning for promoting gender equality (that the different behavior, aspirations and needs of women and men are considered, valued and favored equally) and equity(fairness of treatment for women and men, according to their respective needs). This may include equal treatment or treatment that is different but which is considered equivalent in terms of rights, benefits, obligations, and opportunities.

Considering population growth and the proportion in agriculture, it is imperative that agriculture and agribusinesses will continue to be important for the rural youth. The youth are less keen on the input supply and farm production parts of the value chain, and that they may have greater interest in the processing, packaging and consumer, food safety and marketing parts of the value chain. Training them primarily in off-farm skills is thus important. These are expected to be achieved by:

- mainstreaming gender in research and related development processes and systems
- developing gender-sensitive technologies;
- ensuring gender equality in the course of technology promotion, adoption and impact;
- improving capacity of women and youth in decision-making; and
- supporting the youth to create employment opportunities in agri-business

Policies and institutions

Policies and strategies create an enabling environment and are dynamic to catch up with a small number of changes that will have an immediate and significant impact in support of achieving national strategic objectives. Research must provide evidence as a basis for reforming agricultural policies and institutional arrangements to make them more conducive to: development, improved food and nutrition security, reduce poverty and promote sustainable use and management of natural resources. Accordingly, EIAR will generate facts and evidences useful to

- develop more conducive policy environment for technology use, credit provision, market efficiency and risk management; and
- develop appropriate standards and regulatory frameworks promoting inputs and output qualities, and land use.

Capacity development

There is a need to focus on developing human, physical, and organizational capacity at all levels of the institution based on priorities. Besides, addressing the need of the farming and pastoral communities for technical and innovative approaches will be part of the agenda for capacity development. Therefore, by taking a pragmatic approach, and broader definition of capacity, two areas of need are identified; the need for strengthening the capacity of the research system; and that of the communities; which can be achieved through

- building research infrastructure, facilities and human resources including ICT, computational initiatives in agricultural research, and geospatial technologies;
- establishing centers of excellence for different research programs;
- increasing capacity of beneficiaries and partners to develop or adopt research outputs and co-finance research; and
- strengthening partnership

V Research Approaches, Partnership and Accountability

5.1 Research Approaches

The Ethiopian Institute of Agricultural Research will implement the strategy primarily using the available resources and being mindful of possibilities that modest improvements and also alterations would come along the period in human, physical, financial and organizational resources and

institutional arrangements. The strategy, in most part, will be implemented in partnership with a host of institutions as the breadth and width of demand for agricultural technologies is persistently increasing. EIAR, in addition to its usual upfront-targets, will have to address areas, communities, and stakeholders that have not been in the front seat before. These, among others, include less-addressed drylands; pastoral areas; high- and low- moisture-stressed highlands; areas prone to frost, acidity, salinity; and urban and peri-urban areas.

In terms of clients also, there is a need to respond to demands from a range of stakeholders involved along value chains of all the crop and livestock commodities that EIAR is working with; which in turn brings up the need to work and harmonize with multitudes of line ministries and other institutions at federal and region levels. Furthermore, EIAR as a frontrunner public research institution is committed to be inclusive in serving clients with diverse spectra of interests, including: small holder farmers, pastoralists, fish-folks, private farms, youth, women, people with disabilities, HIV victims, etc.

In principle, EIAR follows systems or holistic approaches in implementing its research programs to be anchored in and aligned to this strategy, but this does not rule out the fact that some research outputs may not necessarily comply with such approaches. Without losing focus to engrain effectiveness or efficiency in all its endeavors, EIAR will embark on and undertake both applied as well as basic research as it may find them appropriate and necessary. Similarly, technologies, information, knowledge, and agricultural innovations consistent to the strategy will be availed through all possible and rational approaches, by developing/generating locally or through adoption and/or adaptation of borrowed ones. Methodologies to be followed include forging the best way of combining traditional and modern tools of availing technologies; and generating information and knowledge that can be of use to achieve our strategic objectives.

5.2 Partnership

The Ethiopian Institute of Agricultural Research has a strong conviction of implementing this strategy in partnership with a long-list of public and private sector research, education, and development institutions; international, multilateral or bilateral partners; non-governmental organizations and most importantly farming and pastoralist communities. In pursuit of forging clarity and focus, however, EIAR for implementing this strategy would like to sort its partners under two layers. The first layer of partners includes those directly undertaking agricultural research; and they are designated as "partner". All the others not primarily engaged in research, but collaborated in different capacities and degrees are designated as "collaborators."

Therefore, research partnership will be established with farmers and pastoralists, National Agricultural Research Council (NARC), regional agricultural research institutes (RARIs), Higher Learning Institutions (HLIs), national institutions mandated to do research on specific commodities, international institutions like CGIAR (Consultative Group for International Agricultural Research) centers; Advanced Research Institutions; and very importantly federal or regional institutions working on agricultural extension.

Partnership agreements will be entered through signing of Memoranda of Understanding (MoU) or other forms of Letter of Agreement (LoA) for carrying out approved research projects or activities drawn from this corporate strategy with a proposition to achieve defined results and outputs. In the documents of agreements to be signed by the partners shall also be specified the rights and privileges that partners would be entitled for the use of the research material (varieties, seeds, research products,

etc.), data and information as well as the conditions under which benefits accrued from or associated with the research outputs would be shared.

Partnerships with international centers such as the CGIAR (Consultative Group for International Agricultural Research) centers catering for agricultural research through bilateral or multilateral projects can be instrumental for the research to excel. Such partners support the research not only in terms of financing projects but also in providing inputs of cutting-age technologies, techniques, skills and experiences. Most importantly, such international partnerships with research centers, academic institutions and private companies could be important source of genetic material especially for those that are not native to Ethiopia and for which the country is not endowed with genetic diversity. Therefore, EIAR will strive to seek and establish links with international partners willing to work at any level of the research process to achieve the development objectives defined in this strategy.

Collaborators are national stakeholders involved in technology dissemination and utilization; including such stakeholders as the different departments of the Ministry of Agriculture and Natural Resources, seed enterprises (Ethiopian Seed Enterprise, Regional seed Enterprises and private seed growers), relevant line ministries and agencies, exporters and agro-dealers, traders and so on. Collaborators play key roles in the development and effective operationalization of value chains.

5.3 Commitment and Accountability

This strategy will serve as a binding document for EIAR to base all its efforts to deliver outputs as crafted in the document; and when entering agreements with partners for forging synergies and complementarities towards the achievement of a common goal. A note has to be made that the strategy is not static; it is rather a living document and as such is bound to revisions and changes commensurate with changing circumstances. Accordingly, it needs to be re-examined and amended at different phases during its lifetime. Some ground rules to which EIAR is committed include, but not limited to, the following

- **Integration:** In order to bring about synergy, EIAR makes sure to bring together internal as well as external efforts relevant to this strategy to operate as one system so that collective outputs would ensure achieving the strategic objectives;

- **Participation**: A participatory approach is key in which every stakeholder of the research and interventions thereof, has a voice. It is the mechanism for people at all levels to express opinions in any realm of the research. Participatory approaches will, therefore, be the norm rather than an exception for the implementation of this strategy; and

- **Communications**: Partners and collaborators are expected to exchange information verbally or written or using some modern media on research findings or status of the research and progress on a pre-agreed timetable basis such as weekly, monthly, quarterly, annually, etc. The quality and standards of contents to be communicated and to whom communications should be well planned and implemented.