

Republic Of Liberia



Central Agricultural Research Institute (CARI)

STRATEGIC PLAN

2015 - 2025



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Abbreviations and Acronyms

AfDB	African Development Bank
AR4D	Agricultural Research for Development
APVC	Agricultural Product Value Chain
AU/NEPAD	African Union/New Partnership for African Development
CAADP	Compact under the Comprehensive African Agricultural Development Program
CAES	Central Agricultural Experimental Station
CARES	Central Agricultural Experiment Station
CARI	Central Agricultural Research Institute
CBO	Community Based Organization
CORAF	Council for Agricultural Research and Development
DG	Director General
DGRP	Deputy DG of Research Programs
ECOWAS	Economic Community of West African States
FAO	Food and Agriculture Organization
FAPS	Food and Agriculture Policy and Strategy
FARA	Forum for Agriculture Research in Africa
FSNS	National Food Security and Nutrition Strategy (2008)
GDP	Gross Development Product
HRM	Human Resources Management
IAR4D	Integrated Agricultural Research for Development
IITA	International Institute in Tropical Agriculture

KARI	Kenya Agricultural Research Institute
LASIP	Liberia Agricultural Sector Investment Program
LASIP	Liberia Agriculture Support and Infrastructure Program
LNFSN	Liberia's National Food Security and Nutrition Strategy
MDG	Millennium Development Goal
MOA	Ministry of Agriculture
NAIS	National Agricultural Innovations System
NARS	National Agricultural Research System
NARI	National Agricultural Research Institute
NGO	Non-Governmental Organization
PRS	Poverty Reduction Strategy
STI	Science, Technology and Innovation
TA-MOA	Technical Assistance Services to the Ministry of Agriculture
USAID	United States Agency for International Development
WAAP-	West Africa Agricultural Productivity Program
WARDA	West Africa Rice Development Association
WECARD	West and Central African Council for Agricultural Research and Development
WFP	World Food Programme
WB	World Bank

Foreword

In January 2014 the Ministry of Agriculture (MOA) concluded consultations for drafting terms of reference for guiding the process for contracting technical consultancy for the Development of a Strategic Plan for the Central Agricultural Research Institute (CARI) for the period 2015-2025. A strong consensus had been built over the preceding seven years supportive of CARI's revision, reorganization and restructuring consistent with internationally acceptable minimum standards and best practices established for National Agriculture Research Institutes (NARIs) trending towards semi-autonomy and/or autonomy. Like most of Liberia's institutions, CARI was destroyed and suffered physical devastation and great human resource losses as a result of Liberia's 14 year civil crises. Skilled professionals and technical staff killed/maimed, internally displaced or migrated abroad.

Post crises MOA referenced Government of Liberia policy documents which formed the context for guiding efforts for the development of plans and structuring of strategies for the regeneration of agricultural research in Liberia include the "Lift Liberia" Interim Poverty Reduction Strategy (IPRS), Poverty Reduction Strategy (PRS) 2006, the Food and Agriculture Policy and Strategy (FAPS) 2009, the National Food Security and Nutrition Strategy (FSNS) 2008, and the Liberia Agriculture Sector Investment Program (LASIP, 2009, 2010) underpinned by the CAADP compact signed by Liberia in 2009.

With restoration of peace and constitutional governance in 2006, strengthened by clear policies, reviews and strategies supportive of the national reconstruction/reform programs, a strong consensus was built between 2006-2010 by stakeholders including MOA, donors, development partners, farmers, civil society organizations and others for fast tracking the processes of institutional reform, restructure and reorganization. The MOA has continued to exhibit the political will and resolve to fast track and navigate the process for CARI's revision, reorganization and restructuring consistent with internationally acceptable minimum standards and best practices established for NARIs trending towards semi-autonomy/autonomy, a status which CARI is yet to achieve. MOA's political will and resolve to champion and fast track and navigate the process is evidenced in the award of a contract for the development of a strategic plan for CARI

The CARI strategic plan describes annotations of the current situation in Liberia and the policy context for agriculture research. It references a comprehensive description of the current situation in Liberia as provided in the LASIP and other published reviews and sector assessments. Greater than sixty (60) percent of Liberia's population source their livelihood/employment from direct/indirect agro-related interventions and activities along the value chains. The sector contributes more than thirty-five percent (35%) percent of the GDP. About forty percent (40%) of the country's population are paradoxically regarded as food insecure in light of favorable abundance of natural endowments. It acknowledges and restates findings of all previous situation analyses, reviews and assessments indicating in general that: (1) food crop yields are low, (2) value chains are poorly developed and (3) support services are extremely limited. Contributing factors referenced include a lack of improved planting materials,

limited input use, considerable post-harvest losses, poor market access and insecure land tenure as the major constraints.

Consultants contracted through a competitive vetting process by the MOA with funding from the World Bank and the Japanese Trust Fund under the West Africa Agriculture Productivity Program (WAAPP) initiative developed the draft CARI Strategic Plan for Research. The draft strategic plan was validated by relevant stakeholders on July 8, 2014 and this production represents the finalized version containing comments, recommendations and inputs from the validation exercise incorporated.

The Government of Liberia through the MOA is under obligation and wishes to assure all stakeholders of its resolve and intention to fast track the next steps with reference to development of an implementation plan towards operationalizing the CARI strategic plan. The executive summary of the strategic plan ARSP is references annotations of the PLAN's substantive recommendations and highlighted proposals. Recommended timelines for actions/activities and interventions proposed for implementation and execution of the PLAN, some of which can be concurrently carried out for operationalizing the CARI strategic plan are referenced.

Specifically underlying all of the proposed plans for implementation and operationalization as contained in the strategic plan and within the context of the new vision and mission of CARI is the need to formalize CARI's legal status and institutional governance profile as it relates to the proposed new organizational structure. Cognizant of the expanded responsibilities/roles as integrated with those needs and expectations of a diverse range of local/international public/private stakeholders as defined and/or referenced in the to be established National Agricultural Innovations System (NAIS); Agriculture Research for Development (AR4D); Integrated Agriculture Research for Development (IAR4D) and other frameworks/instruments, the MOA intends to immediately hire legal consultancy services to attend to cogent and substantive issue of CARI's Governance/Legal Framework as proposed.

Agricultural research in Liberia falls under sub-program four of the LASIP/CAADP. Section 5.3 of FAPS includes a policy statement for agricultural research and strategies to achieve the policy objectives for agricultural research for the regeneration of agricultural research in Liberia.

CARI, located at Suakoko some 180 km north-west of Monrovia, was created in 1980 by enunciation of an August Decree by the People's Redemption Council (PRC) Military Government thereby transforming and granting a status of a Semi-Autonomous Institution evolved from the predecessor Central Agricultural Experiment Station (CAES) which had been established in the early 1950's. The overriding and general mandate as promulgated in the decree was to conduct both adaptive and applied research in agriculture. Unlike the CAES which reported directly and operated as a division of the MOA, CARI was established with an appointed a National Agricultural Research Council and a Technical Committee with the Minister of Agriculture as chairperson.

The New Management Structure for CARI references a Board of Directors composed of representatives of all key stakeholders in the agriculture sector is proposed, highly qualified and experienced management team comprising of a Director General, Deputy Director General responsible for all research programmes and heads of programmes and three Directors (Director of Finance and Administration, Director of Planning and Director of Project Implementation).

CARI's New Vision and Mission: The Vision of CARI is *“A commercially-oriented agricultural sector propelled by research, technology transfer, innovations, knowledge and approaches that will contribute to an improved quality of life for all Liberians”* while its Mission is *“ To contribute to increased productivity, commercialization and competitiveness of the agricultural sector through adaptive research and promotion of knowledge, information and technologies that respond to clients' demands and opportunities towards the attainment of food security, poverty alleviation, income generation and job creation.”*

Taking into account the new vision and mission of CARI and the conceptual approach and the current research paradigm of IAR4D and in view of the above CARI is expected to deliver on its Vision and Mission through the following; (i) development and promotion of research, innovation and technologies for high value products and services; (ii) development of modern national information and communication technology infrastructure for sustainable development; (iii) development and strengthening of the technical capacity of CARI staff (iv) formulation of human resource development institutional policy that attract and retain professionals; (v) strengthening of systems for the creation, translation of data, knowledge and dissemination of information; and (vi) development and strengthening of strong research linkage with local, international research and training institutions for mutual benefit.

This Strategic Plan has been developed in the context of the prevailing Government and donor policies that require a reorientation and positioning of the institute to effectively address the agricultural sector challenges and constraints facing the agricultural product value chains.

The Government of Liberia through the Ministry of Agriculture is pleased to acknowledge the support and constructive participation and engagement off all of the development partners and stakeholders (Public/Private agencies/institutions, donors, development partners, legislators, technicians, farmers, civil society and NGOs/INGOs). This level would not have been attained nor progress made were it not for the technical, financial and other support that you have provided and continue to provide from the relief, reconstruction and the development stages of Liberia's recovery. We wish to hasten to state that the real work now begins as it relates to implementation and operationalizing this CARI Strategic Plan that we have all worked to produce. I wish to call on your resolve to harness our collective efforts and anchor our resolve to amplify advocacy for support of the legislative enactment and the financial and material resources needed to establish, maintain and sustain CARI.

Dr. Florence A. Chenoweth
Minister of Agriculture, Republic of Liberia

Executive Summary

Introduction

This document is a result of efforts by the Government of Liberia through the Ministry of Agriculture (MOA) to develop a ten year strategic plan for Liberia's Central Agricultural Research Institute (CARI). CARI is an organ of the MOA, having evolved (in 1980) from the Central Agricultural Experimental Station (CAES). It developed rapidly into a reputable centre of excellence in applied and adaptive research in West Africa prior to Liberia's civil war crisis which devastated it. It is the main institution for agricultural research in Liberia.

The agriculture research strategic plan is meant to provide a framework for CARI which clearly sets the direction, new organization structure, research priorities and time frame for research, capacity development and related activities; all which are consistent with Liberian government policies and programs including the National Food Security and Nutrition Strategy (FSNS) (2008) and the Liberia Agriculture Sector Investment Program (LASP) (2009).

In conformity with the key government policies, the Central Agriculture Research Institute's (CARI) research strategy covers the agricultural, livestock and fisheries value chains, as well as the management of natural resources. The overall objective of the Agricultural Research Strategy for CARI is to contribute, on a sustainable basis, to meeting the food needs of the population, ensuring economic and social development and the eradication of poverty in Liberia.

Nearly 70 percent of economically active population of about 3.5 million in Liberia depends on agriculture as a source of its livelihood. Agriculture in Liberia is dominated by smallholder farmers who occupy the majority of land and produce most of the crop and livestock products. The key long-standing challenge of the smallholder farmers is low productivity stemming from the lack of access to markets, credit, and technology.

Agricultural research is critical to national development since it provides the basic information needed for poverty reduction/alleviation and food security. Sound agricultural research and associated policies ensure the availability of demand-driven and transformed technologies such as, viable seeds, good quality planting materials and animal breeds that are essential to agricultural production and productivity. The central role of agriculture research in transforming and modernizing agriculture in Liberia cannot therefore be overemphasized.

From the perspective of regenerating the agricultural research system, one of the major impacts has been human resource capacity. The war saw skilled professional and technical staff killed, scattered or migrated abroad and the disruption of the education system during this period means that the following generation were also severely impacted.

In effect, two generations have been lost along with much of the corporate memory of those in employment during the war. Rebuilding under such conditions will be challenging.

Agriculture research in Liberia falls under sub-program four of the LASIP/CAADP Agriculture Sector Investment and Development Program. Section 5.3 of FAPS includes a policy statement for the regeneration of agricultural research in Liberia. The section also summarizes the current issues and constraints facing the agricultural research system. It indicates that agricultural research is carried out by CARI and other public, private and civil society organizations in an uncoordinated manner. It also indicates that the limited and supply driven system seems to have been of little benefit to small farmers and has operated without clearly defined programs of research.

Currently CARI is managed by a “Team Leader” who reports directly to the Minister of Agriculture in a centralized coordination system. With a complement of 47 professional staff mostly at junior level with only 1 PhD, 18 MSc, 24 BSc and 2 BAs. The rest of the staff is low level contractors and security staff (180). CARI is organized in six programs with all reporting directly to the team Leader. Unlike many other national agricultural research institutes in Africa and elsewhere in the world, CARI does not have a Board of Governors nor does it have a functional Technical Advisory Committee. There is therefore an urgent need for the revitalization and restructuring of CARI management system if carry is to live to its mandate. In the new structure a semi-autonomous CARI with a Board of Directors composed of representatives of all key stakeholders in the agriculture sector is proposed.

The approach to revitalization of agriculture research in Liberia as envisioned in the FAPS strategy is the establishment of a National Agricultural Innovation System (NAIS) based upon the innovation systems. Considerable change has occurred in the conceptual frameworks underlying agricultural research systems since CARI was first established in 1980. The framework has broadened from a relatively narrow focus on technology invention and transfer – first generation of innovation: the push technology which is largely supply driven. During this strategic period (2015-2025) CARI will shift smallholder farmers to become much more integrated and agro industrially oriented using the Agricultural Innovation Systems approach and by reorganizing the current agricultural research system to operate in cognizance of other actors in the agricultural value chain so as to achieve greater impact.

The document consists of seven parts: the first part is the introduction and background which deals with the diagnostic of the sub sector and Government of Liberia key policy statements on agriculture research. The second part deals with the revitalization of agricultural research in CARI. The third part consists of the development of the agriculture research strategy in the medium and long terms, the fourth deals with the research thematic areas of intervention, the fifth deals with the corporate research and support functions and services, the sixth is the

recommendations and time plan on the implementation strategy and seventh part contains annexes.

The Strategic Research Plan for CARI

This strategic plan for agricultural research provides a framework for CARI which clearly sets the direction, priorities and timeframe for research, capacity development and related activities. The strategic plan is about innovation—to enable CARI to anticipate in the future and prepare for it. More important, the strategy is consistent with Liberian government policies and programs and reflects the needs of sector stakeholders. The strategic plan addresses prioritized issues and makes a clear commitment to delivering a series of results that encompass a new paradigm for agricultural research and development. This approach covers not only conventional research but also the use of innovation platforms, policy, markets, capacity strengthening, coordination, advocacy, knowledge management, and the involvement of a broad base of stakeholders.

The strategic plan was developed in a consultative way to guide CARI in the pursuit of its mission by involving key stakeholders including CARI staff, top policy makers at MOA, stakeholder including individual farmers and farmer representatives, NGO's like BRAC, Tertiary institutions, and development partners including the AfDB, World Bank, USAID and FAO and their view were incorporated in the draft report. In addition, several documents on the economy, demography, mission reports, policy documents and studies on agriculture, and research in Liberia were reviewed, and they provided pertinent information.

The methodology used is based on an understanding of the dynamics change for CARI over the next ten years (2015-2025). The strategy was developed in the logframe format in the context of the IAR4D paradigm using onion-skin nesting, which permitted a hierarchy of activities to relate directly to each other. In order to identify CARI's strengths and weaknesses in relation to its set mandate, an environment analysis was done and views collected from stakeholder inputs.

In line with the stated institutional strategic direction and mission, five strategic growth result areas that are necessary and sufficient to deliver on the institutional purpose of generating and promoting agricultural knowledge, information and technologies that respond to clients' demands and opportunities are identified. The results are designed to position CARI strategically as the key driver for increasing productivity, commercialization and competitiveness of the agricultural sector.

The five necessary and sufficient results include:

Result 1: Technologies and innovations for demand-driven agricultural product value chains generated and promoted;

Result 2: Markets and marketing strategies for agricultural product value chains developed and promoted;

Result 3: Policy options for enhancing demand-driven agricultural product value chains facilitated and advocated;

Result 4: Capacity for implementing agricultural product value chains research strengthened.

Result 5: Availability of knowledge, information and technologies on agricultural product value chains research enhanced.

In order to deliver on the five strategic growth result areas, research in the CARI has been rationalized into six broad-based thematic areas of intervention. These thematic areas of intervention express a stronger organizational commitment to impact as a strategy orientation and positioning of the CARI as a leader in agriculture research in Liberia.

The research thematic areas of intervention required to deliver the institutional results are:

1. Development and promotion of integrated crops product value chains.
2. Development and promotion of integrated livestock product value chains;
3. Enhancement of sustainable and integrated management of natural resources;
4. Enhancement of use of biotechnology and genetic resources management;
5. Enhancement of utilization of socioeconomic and applied statistics information in research;
6. Enhancement of appropriate adaptive, outreach and partnerships methodologies and approaches.

Each of the research thematic areas of intervention shall be delivered by seven research programmes which are namely:

1. Crops Programme
2. Livestock and fisheries Programme
3. Natural Resource Management
4. Agricultural Biotechnology and laboratory Services Programme
5. Mechanization and irrigation
6. Socio-economics and Applied statistics
7. Post-harvest and food processing

Corporate Research Support Functions and Services

Besides its core functions of research it also has non-research or research support functions and services which demands it to develop capacity to address growth in the two core functions. Successful implementation of the five thematic areas of research outlined earlier will depend largely on the effectiveness and efficiency of the institutional corporate research support functions and services.

In order to contribute significantly to the attainment of the institutional purpose, the institutional corporate support functions and services shall be structured into the following eight Units under the department of Finance and Administration.

1. Human Resource Development and Management
2. Financial Resource Mobilization and Management
3. Physical Resource Development and Management
4. Procurement and Supplies Services
5. Planning, Monitoring and Evaluation
6. Internal Financial and Assets Audit
7. Corporate and Legal Services
8. Information Management and Communication Technology

Implementation of the Strategic Plan

This Strategic Plan has been developed in the context of the prevailing Government and donor policies that require a reorientation and positioning of the institute to effectively address the agricultural sector challenges and constraints facing the agricultural product value chains. The institutional strategic results outlined in this strategy can only be realized through sound implementation plans. It is therefore recommended that an implementation Strategic Plan that shall be underpinned by an integrated and holistic approach based on a national research framework carried out through priority thrusts and associated interventions for addressing priority agricultural product value chains are prepared.

To operationalize the Strategic Plan, the CARI shall develop a detailed Implementation Framework (IF) covering the same period as the Strategic Plan (2015-2025) rather than medium term plans of shorter periods. This is in recognition that research projects and activities have a long gestation period to complete (Sierra Leone Agricultural Research Institute – SLARI (2008).

The IF shall, in turn, be operationalized through rolling Annual Work plans in which the necessary and sufficient activities and their respective milestones required to deliver each yearly target shall be specified. The annual work plans will be linked to the annual Performance Contract (PC) targets.

Given the current state of CARI and the necessary resources and linkages that require development, it is suggested that the institute has an agriculture strategic plan covering the next ten years, operational planning should involve two plans, one of five years (with a transitional Phase of 1 year) to be followed by an Operational Plan for the subsequent nine years.

During the implementation of the different activities, a continuous participatory and rigorous self-monitoring and evaluation shall be encouraged. To monitor and evaluate progress during the implementation, CARI and the collaborating institutions/organizations shall also undertake internal and external programme reviews over the Strategic Plan and the results of the reviews widely circulated to the relevant agricultural sector ministries, development partners and key stakeholders.

In order to institutionalize the monitoring and evaluation process, CARI shall develop and operationalize a suitable monitoring and evaluation system/mechanisms capable of tracking the implementation of the approved APVC-based projects and activities. The monitoring and evaluation system shall include the use of result frameworks, work plans, field visits, quarterly and annual reports, mid-term internal evaluation, biannual conferences and end of term external evaluation.

The Strategic Plan has been summarized into an institutional result framework and an outcome mapping of the thematic areas of intervention for better impact orientation with clear output and outcome indicators of the various interventions that are expected to form the basis for monitoring and evaluation of the implementation of the Strategic Plan.

A major challenge to the revitalization of CARI's research capacity is that of human resources. The civil war resulted in the loss or dispersal of much of the skilled technical and professional manpower and negatively impacted the education of the subsequent generation. It is felt that the available human resource capacity clearly shows the yawning gap between technical staffing requirement and current reality whereby most of the staff is unskilled labor. A strategy is needed on how this might be addressed. Central to the maintenance of the cadre of professional and technical staff will be the development of HRM strategy and career paths for trained staff within CARI.

1.0. Introduction

This document is a result of efforts by the Government of Liberia through the Ministry of Agriculture (MOA) to develop a ten year strategic plan for Liberia's Central Agricultural Research Institute (CARI). CARI is an organ of the MOA, having evolved (in 1980) from the Central Agricultural Experimental Station (CAES). It developed rapidly into a reputable centre of excellence in applied and adaptive research in West Africa prior to Liberia's civil war crisis which devastated it. It is the main institution for agricultural research in Liberia.

The agriculture research strategic plan is meant to provide a framework for CARI which clearly sets the direction, new organization structure, research priorities and time frame for research, capacity development and related activities; all which are consistent with Liberian government policies and programs including the National Food Security and Nutrition Strategy (FSNS) (2008) and the Liberia Agriculture Sector Investment Program (LASP) (2009) that reflect the needs of sector stakeholders and clear path for agriculture research in Liberia. It is anticipated that after the strategic plan development process is completed, an implementation plan will also be prepared as a separate activity based on the strategy logframe.

In conformity with the key government policies, the Central Agriculture Research Institute's (CARI) research strategy covers the agricultural, livestock and fisheries value chains, as well as the management of natural resources. The overall objective of the Agricultural Research Strategy for CARI is to contribute, on a sustainable basis, to meeting the food needs of the population, ensuring economic and social development and the eradication of poverty in Liberia.

In order to undertake this task, available relevant policy documents were reviewed, and meetings held with representatives of the MOA and personnel from the Central Agricultural Research Institute (CARI). During this period an assessment of current activities, capacities and constraints, current and potential agricultural research activities and linkages to other national and international stakeholders was carried out. Meetings were also held with representatives of other selected national and international stakeholders (Annex 1). This participatory strategic plan development approach was done to seek views and a buy in from the policy makers, key stakeholders and key donors who shall significantly contribute to the revitalization and funding of the operationalization of an efficient and effective national agricultural research system (NARS) in Liberia.

A critical analysis of similar approaches to the process of strategic planning for national agricultural research from other African countries including Nigeria, Kenya, Tanzania, Uganda, South Africa, the reconstruction/ rehabilitation of national agricultural research

institutions following the war and genocide in Rwanda and the civil war in Sierra Leone was done and adapted to the Liberian environment and needs.

The interpretation of the review information and diagnostic field visits by the consultants was greatly informed by discussions with top policy makers at the Ministry of Agriculture (MOA), relevant government institutions, donors and agencies such as the FAO, AfDB, World Bank, USAID, World Food Programme, CARI, and NGO's like BRAC and other key stakeholders including farmer associations.

The document consists of seven parts: the first part is the introduction and background which deals with the diagnostic of the sub sector and Government of Liberia key policy statements on agriculture research. The second part deals with the revitalization of agricultural research in CARI. The third part consists of the development of the agriculture research strategy in the medium and long terms, the fourth deals with the research thematic areas of intervention, the fifth deals with the corporate research and support functions and services, the sixth is the recommendations and time plan on the implementation strategy and seventh part contains annexes.

1.2. Background

1.2.1. Liberia's Development Challenges

Liberia is in the process of recovery following decades of conflict which resulted in the neglect and destruction of institutions, infrastructure, the economy, and a significant increase in poverty and food insecurity. The development challenges facing the country are highlighted in "Lift Liberia" Poverty Reduction Strategy (PRS) (2006) —the country's national reconstruction and development roadmap. They include macroeconomic stability; continuity in governance reforms; enhanced social equity by gender; wealth creation for the poor; infrastructure; energy; science, technology and innovation (STI); land reforms; human resources development; security; and public sector reforms. The country has also continued to address the challenges of creating gainful employment for the youth who constitute a big proportion of the population; provision of food and nutrition security; ensuring environmental sustainability, provision of good health and education; and being globally competitive.

For the agricultural sector to continue contributing significantly to the overall goal of economic growth, wealth creation, food security and poverty alleviation, smallholder agriculture must be transformed from subsistence to a commercial and profitable undertaking. Agriculture remains the engine of the national economy and its performance impacts heavily on nearly all other sectors. Agriculture is not only important for development of the country but is also expected to

deliver other regional and global commitments. One such commitment is the achievement of the first Millennium Development Goal (MDG 1) on poverty and hunger.

1.2.2 Agriculture in the Context of National Development

Nearly 70 percent of economically active population of about 3.5 million in Liberia depends on agriculture as a source of its livelihood. Agriculture in Liberia is dominated by smallholder farmers who occupy the majority of land and produce most of the crop and livestock products. The key long-standing challenge of the smallholder farmers is low productivity stemming from the lack of access to markets, credit, and technology.

According to the Liberia Agriculture Support and Infrastructure Program (LASP, 2010), Liberian agriculture comprises food and tree crops, fisheries and livestock, and the sector accounted for 42.2% of real GDP and is a central element the country's overall development strategy. High value tree crops with increased export potential, including cocoa, rubber, oil palm and coffee can be major contributors to the nation's overall economic growth (FAPS, 2009). At the same time, there is a need to take a broader, more integrated focus including basic food crops, livestock and fisheries to address in an equitable manner the considerable food security, poverty, sustainable natural resource management and import substitution issues.

The Poverty Reduction Strategy (PRS) defines Liberia's overall national development goals which comprise "shared, inclusive, and sustainable economic growth and development; food and nutrition security; increased employment and income; and measurable poverty reduction (Government of Liberia, 2006). The Liberia Agriculture Sector Investment Program (LASIP) (2009) identifies priority areas from which investment projects are aligned to the broad objectives of the agriculture sector in Liberia which are namely (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) conservation of natural resources. LASIP seeks to transform Liberian agriculture and in so doing maximize the sector's contributions to economic growth, employment and income generation, food and nutrition security, and poverty reduction.

To overcome pervasive structural impediments and a poor policy environment that have undermined agricultural growth and development, LASIP adopts a pro-poor approach to raising agricultural productivity, strengthening institutions, and making markets work for farming households and communities through commercialization and private sector initiatives. Key performance indicators include expansion in agricultural production by about 3.6 percent per annum through 2011 and 6 percent per annum by 2015 to sustain food and nutrition security, increase employment and income, and reduce poverty.

To top it up, in 2009, Liberia signed a Compact under the Comprehensive African Agricultural Development Program (CAADP), an agriculture-led economic growth initiative of the African Union/New Partnership for African Development (AU/NEPAD). CAADP has four main components or Pillars:

- (i) Extending the area under sustainable land management and reliable water control systems;
- (ii) Improving rural infrastructures and trade-related capacities for market access;
- (iii) Increasing food supply and reducing hunger; and
- (iv) Strengthening agricultural research, technology dissemination, and adoption (CAADP, 2009).

Under its CAADP Compact, the Government of Liberia tasked itself to work towards an annual growth rate of 6% in the agricultural sector and allocate at least 10% of the national budget towards agriculture.

The objective of the ECOWAS/CAADP process is to support implementation of Liberia's National Food Security and Nutrition Strategy (LNFSN) and the Food and Agriculture Policy and Strategy (FAPS). To achieve this, transforming smallholder agriculture from subsistence to an innovative, commercially-oriented, and modern agricultural sector is critical.

The latter could be accomplished through (i) transforming key institutions in agriculture and livestock to promote agricultural growth; (ii) increasing productivity of crops and livestock; (iii) introducing land use policies for better utilization of high and medium potential lands; (iv) adoption of irrigation technologies for both crops and forage and other feeds for livestock; (v) improving market access for smallholder farmers through better supply chain management; and (vi) adding value to farm and livestock products before they reach local and international markets.

However, there are challenges facing the agriculture sector in Liberia which if not tackled could impede the implementation of the above initiatives. They include:

1. Weak land management and water control systems,
2. Limited market access due to limited road networks and marketing infrastructure,
3. Rudimentary production techniques,
4. Poor food value chains:-lack of integration of production, processing, storage, and marketing channels,

5. The lack of agriculture credit, and
6. Low institutional capacity.

One of the key solutions to the above challenges lies in deliberate action by the Government to invest in the modernization of agriculture at the small holder farm level and the creation of an investment environment conducive for the private sector investment in commercial and agribusiness. Except on plantations operated by foreign concessionaires and wealthy Liberians, farming techniques in Liberia are still at subsistence level. The "bush rotation" system of shifting cultivation is followed, in which the farmer clears up to two ha (5 acres) of wild forest or low bush each year, lightly cultivates it with crude hand tools, and plants rice or cassava as the rainy season begins. Palm oil and kernel, sweet potatoes, plantain, sugarcane, rice, cassava, and rubber are farmed in Liberia for sale in the domestic market and for export to countries abroad. Food crop yields are low, value chains are poorly developed and support services are extremely limited. Contributing factors include; lack of improved planting materials, limited input use, considerable postharvest losses and poor market access. Insecure land tenure is also a constraint in many areas.

1.2.3. Agricultural Research in Liberia

Agricultural research is critical to national development since it provides the basic information needed for poverty reduction/alleviation and food security. Sound agricultural research and associated policies ensure the availability of demand-driven and transformed technologies such as, viable seeds, good quality planting materials and animal breeds that are essential to agricultural production and productivity (Joint Special Committee on CARI, 2013). The central role of agriculture research in transforming and modernizing agriculture in Liberia cannot therefore be overemphasized.

The overall evidence from a broad range of research impact studies in countries like Kenya clearly shows that returns from investments in agricultural research is two to three times higher than from other agricultural and non-agricultural investments (KARI, 2009). The benefits of additional income generated from agricultural research are passed on to producers through higher profits, and to consumers in the form of lower prices. Therefore, investment in agricultural research plays a big role in a country's economic growth since the benefits it produces are widely and more equitably distributed.

From the perspective of regenerating the agricultural research system, one of the major impacts has been human resource capacity. The war saw skilled professional and technical staff killed, scattered or migrated abroad and the disruption of the education system during this period means that the following generation were also severely impacted.

In effect, two generations have been lost along with much of the corporate memory of those in employment during the war. Rebuilding under such conditions will be challenging.

CARI is now poised to take a leadership position by taking on board the paradigm shift aimed at increased agricultural productivity in Liberia. During this Strategic Plan period, CARI will have to make a positive impact at the community and national levels through a transformational, multi-faceted, multi-dimensional and multi-institutional approach tailored towards increasing the productivity, commercialization and competitiveness of the agricultural sector in line with the recommendations outlined in FAP and LASP. Realization of this paradigm shift shall require innovative, committed, well-trained and motivated employees with a changed mind-set to the new way of conducting research through the Agricultural Product Value Chain approach.

1.2.4. The Ministry of Agriculture

The Ministry of Agriculture (MOA) is responsible for the development and regulation of the agricultural sector in Liberia. The Ministry is presently in the process of restructuring and redefining its role as a result of an institutional assessment conducted in 2009 and the USAID funded TASMOA project (LASIP 2010 p10). The assessment indicated many weaknesses including:

1. The MOA was understaffed technically and overstaffed administratively and characterized by a low-salaried, aging staff frequently lacking modern skills and with a performance management system that is weak;
2. The MOA was almost absent in the area of agricultural research and non-existent in the quarantine of agricultural products;
3. There was a lack of presence in many rural areas with no MOA extension service (replaced de-facto by NGOs);
4. There was no information management system and a lack of coordination/ integration of activities within the Ministry;
5. An inadequate budget causes extensive reliance on donors and NGO's to fund specific activities, frequently in externally determined directions;

A range of reforms have been proposed and partly implemented, including the establishment of a Project management unit (PMU) within the Ministry to avoid duplication and to ensure proper implementation of donor funded projects and an Agriculture Donor Working Group comprising representatives of the donors and the Ministry of Agriculture to enable both donors and the Ministry to become aware of each other's priorities and avoid duplication.

1.2.5. Agricultural Research at Policy Level

Agriculture research in Liberia falls under sub-program four of the LASIP/CAADP Agriculture Sector Investment and Development Program. Section 5.3 of FAPS includes a policy statement (Box 1) for the regeneration of agricultural research in Liberia. The section also summarizes the current issues and constraints facing the agricultural research system. It indicates that agricultural research is carried out by CARI and other public, private and civil society organizations in an uncoordinated manner. It also indicates that the limited and supply driven system seems to have been of little benefit to small farmers and has operated without clearly defined programs of research.

Box 1: FAPS Policy Statement for Agricultural Research

- *A revitalized, functioning and participatory research system that recognizes the need for the integration of research with extension, education, and activities of farmers and non-governmental organizations to make visible and measurable contributions to the transformation of the agricultural sector; and*
- *Ensuring that research programs are innovative and solve real problems of food security and nutrition and contribute to sustainable use of agricultural resources*

The FAPS presents a six part strategy to achieve the policy objectives for agricultural research (Box 2).

Box 2. Strategies

- *Establishing a National Agricultural Innovations System (NAIS) to provide responsive, pluralistic, effective and efficient agricultural development related research and extension services;*
- *Adopting a strategic vision for a rebuilt agricultural research service, a component of NAIS, and its integral organizations including CARI, guided by the need to strengthen demand for services, improve quality of service and assure service sustainability;*
- *Establishing appropriate legal and governance framework to provide efficiency and flexibility in managing human, physical and human resources and to ensure accountability to clients, funders and other stakeholders;*
- *Establishing linkages with other internal and external research providers, clients,*

technology transfer agencies and developmental organizations;

- *Developing a national agricultural research strategy to guide research activities including adaptive research; and*
- *Implementing the CARI rehabilitation strategy which comprises inceptual undertaking, capacity building and expansion and strengthening of linkages (FAPS, p.45)*

2.0. Agricultural Research in Liberia

2.1. Historical Background

The Central Agricultural Research Institute (CARI) located at Suakoko, some 180 km north-west of Monrovia was created in 1980 from the Central Agricultural Experiment Station (CARES) to conduct both adaptive and applied research in agriculture. In the 1980's the Institute had seven commodity based programmes (rice, cassava, cattle, swine, cocoa, coffee and vegetables) and planning had been initiated for a cropping systems programme (Francis et al., 1995). However, CARI was devastated by the civil war both in human and physical terms. The physical infrastructure was severely damaged, the contents of buildings looted and professional and technical staff scattered both in-country and abroad and in some instances killed.

CARI restarted very limited operations in 2006, focusing on the provision of planting materials for rice (from WARDA), cassava, yams and a limited range of cultivars of maize, beans and soybeans (from IITA) (Ministry of Agriculture, 2008) a focus which has continued with little change to date. On the other hand various initiatives have been mooted since 2007 to re-vitalize CARI but so far progress has been extremely limited. Ideally CARI should be a semi-autonomous organ of the Ministry of Agriculture. Figure 1 shows the organization structure of CARI with a Director General (DG) as its Chief Executive. Under the DG, there is one post of Deputy DG of Research Programs (currently vacant) and one post of Assistant DG responsible for Finance and Administration which is also vacant.

2.1.1. The Current Vision, Mission and Management Structure of CARI

According to documents sourced from CARI and USAID Liberia country office, the institute's Vision is:

“Make agriculture business”

Its mission is:

“To undertake applied and adaptive research for enhanced productivity of food, feed, fiber, and other agricultural products in Liberia for the attainment of food security, poverty alleviation, income generation and job creation”

The mission statement reasonably reflects the purpose for CARI's existence and defines the ultimate benefits to be realized by its services. However, it does not clearly stipulate how the institute's services will be rendered. CARI's mandate connotes that it will collaborate with all actors, and will strive to develop a national agricultural research system capable of generating an innovation system for agricultural development in Liberia which has led to the call from many stakeholders and donors for the revitalization of CARI.

Currently CARI is managed by a “Team Leader” who reports directly to the Minister of Agriculture in a centralized coordination system. With a complement of 47 professional staff mostly at junior level with only 1 PhD, 18 MSc, 24 BSc and 2 BAs. The rest of the staff is low level contractors and security staff (180). CARI is organized in six programs with all reporting directly to the team Leader. Unlike many other national agricultural research institutes in Africa and elsewhere in the world, CARI does not have a Board of Governors nor does it have a functional Technical Advisory Committee.

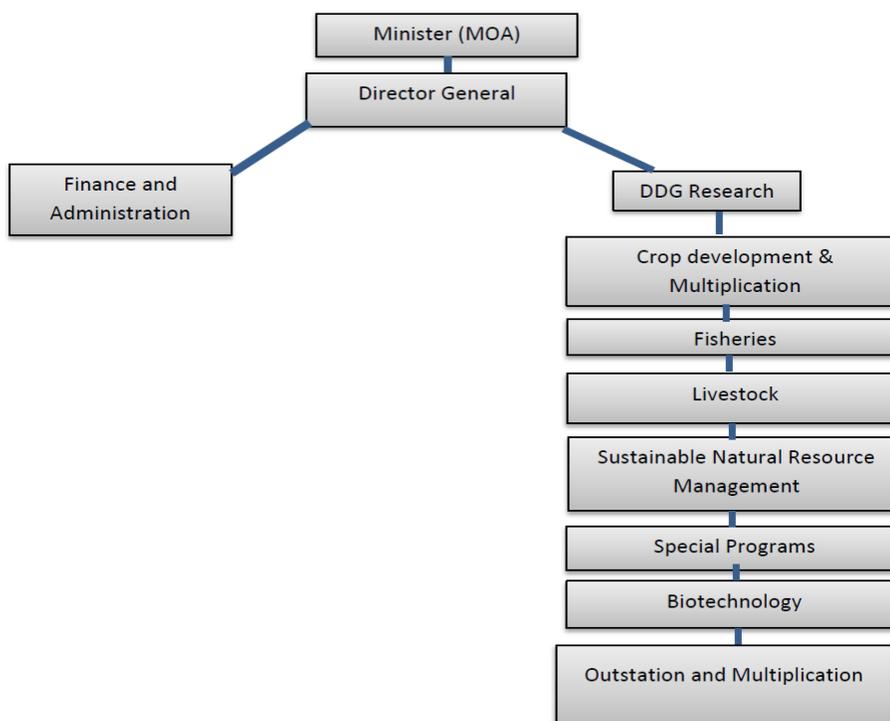


Figure 1. The current organization structure of CARI

2.2. Revitalization of the Agricultural Research Institute

The need for Government to revitalize CARI for it to fulfill its core role of carrying out research and technology transfer under the new paradigm of Integrated Agriculture Research for Development (IAR4D) is not new (see Joint Special Committee on CARI, 2013) and recommendation of Fitzsimons, J. & A. Tegbaru (2011).

The approach to revitalization of agriculture research in Liberia as envisioned in the FAPS strategy is the establishment of a National Agricultural Innovation System (NAIS) based upon the innovation systems. The innovation systems model is also coincidental with FARA’s IAR4D model (Hawkins et al., 2009) which guides the application of CAADP Pillar 4. IAR4D is defined as “an action research approach for investigating and facilitating the organization of groups of stakeholders (including researchers) to innovate more effectively in response to changing complex agricultural and natural resources management contexts for improved developmental outcomes’ (FARA, 2007). The principal issues in Pillar IV are seen as technology development, access and dissemination, innovationsystems platforms, the building of research capacity and training. Under CAADP the lead institution for this Pillar is the Forum for Agricultural Research in Africa (FARA).

The implementation of the CAADP-Lib Compact 2010-2020 is detailed in the Liberia Agriculture Sector Investment Program (LASIP) originally developed in late 2009. Under the LASIP/CAADP Agriculture Sector Investment and Development Program, Institutional Development (sub-programme 4) component 2 titled “Revitalizing Agricultural Research” the target is to rebuild the Central Agricultural Research Institute (CARI) to its pre-war status and implement a participatory, demand-driven agricultural research paradigm through the following activities:

- (i) Arrive at a consensus on the strategic vision for a rebuilt agricultural research service;
- (ii) Establish appropriate legal and governance framework to provide efficiency and flexibility in managing human, physical and human resource in order to ensure accountability to client, funders and other stakeholders;
- (iii) Develop linkages with other internal and external research providers, clients, technology transfer agencies and developmental organizations;
- (iv) Formulate a national agricultural research strategy to guide research activities including adaptive research; and;
- (v) Implement phases I, II, and III of the CARI rehabilitation strategy.

Under the innovation systems concept, the promotion of innovation in agriculture “requires coordinated support to agricultural research, extension and education, fostering innovation partnerships and linkages along and beyond agricultural value chains, and creating an enabling environment for agricultural development” (Rajalahti, 2009).

2.2.1. The Conceptual Approach

Considerable change has occurred in the conceptual frameworks underlying agricultural research systems since CARI was first established in 1980. The framework has broadened from a relatively narrow focus on technology invention and transfer – first generation of innovation: the push technology which is largely supply driven. Innovation came with new, technologically advanced products and means of production, which were pushed into the market (Terziiovskim, Samson, and Glassop, 2001) to a more comprehensive and pluralistic focus on innovation systems – “the process of creating and putting into use combinations of knowledge from many different sources”. This is known as the second generation of innovation: the need or demand pull (Chema, Gilbert, and Roseboom, 2003). The focus at this stage is consumer or market determined needs.

Thus, nearly every African NARI now has a market-orientation approach, which typically manifests itself in the creation of socioeconomics and postharvest departments. The third

generation of innovation combines the first and second generations in a push–pull relationship. In turn, the fourth generation integrates marketing, R&D activity, suppliers, and leading customers whilst the fifth generation involves broader systems integration and networking models, including strategic partnerships with suppliers, customers, and collaborative marketing and research arrangements. Liberia must actually leapfrog to the fifth generation of innovation and reformulate its scope, scale, and resourcing, thereby restructuring CARI’s organization and management to maximize desired agricultural research impact.

Despite the fact that the utility of a holistic innovation systems perspective is widely recognized, the approach is perhaps most useful when the issue or problem has “multiple actors who have complementary contributions and mutual benefits from the outcomes” (Beshah, 2009 CTA). However, the successful operationalization of an innovation-systems or IAR4D approach requires creating the necessary individual, organizational and institutional conditions for successful implementation involving new ways of organizational thinking, collaboration and linkages which can be challenging.

Within the innovation system model, agricultural research can be conducted by public, private or civil society organizations in the agricultural research system both nationally and internationally. A national agricultural research institute such as CARI with a core focus on applied and adaptive research could form but one institution within the public sector agricultural research system.

Specific research projects by institutions within the agricultural research system would be undertaken within an Agriculture Research for Development (AR4D framework) (Figure 2) where the research needs identified by end users as well as development and research partners would be investigated by the research institute, often in conjunction with its development and research partners and solutions generated.

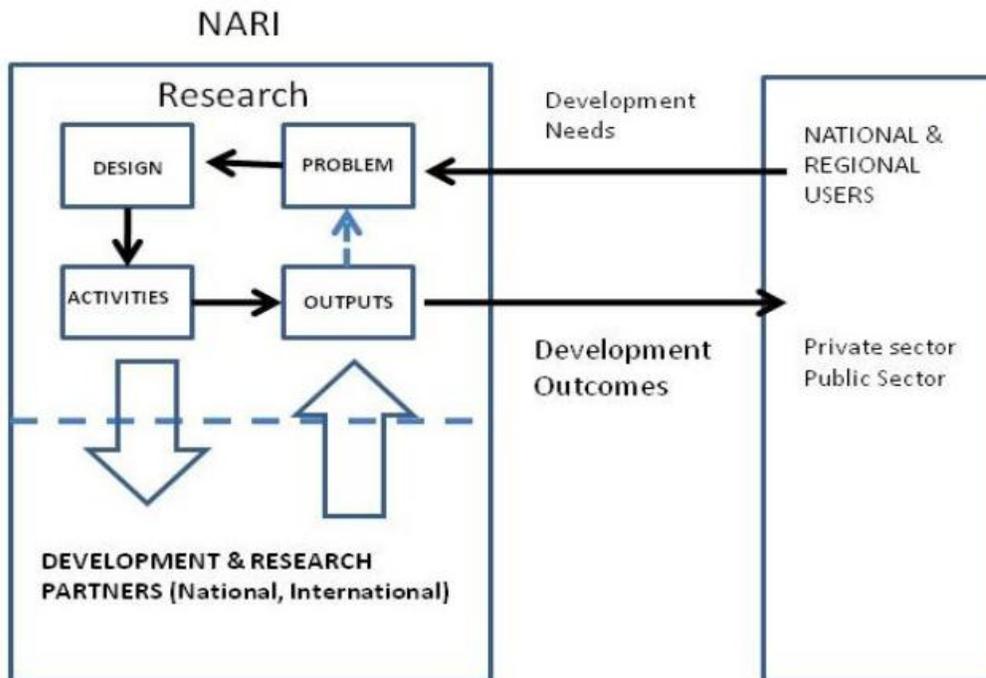


Figure 2. An AR4D research model (Based on IITA, 2006)

The new paradigm for agricultural development calls for a systems approach in which the environment, agricultural activities, and people are integrated and fed by knowledge and information (Figure 3). The approach borrows instruments from various concepts of economic promotion and provides a framework for analyzing institutional, technical and social constraints.

In the Liberian case, the specific research issues to be addressed by CARI would be identified and prioritized according to Governmental sector goals, Ministry of Agriculture and Extension priorities and stakeholder priorities with research results/ materials/solutions returned to the immediate relevant stakeholders.

Applied science results would be disseminated to the applied scientific community through published media and workshops/conferences (TA-MOA, 2009 p 30).

The diverse actors who interact with farmers include policymakers, researchers, input dealers, market intermediaries, higher education instructors, students, credit providers, and extensionagents (Figure 4). Under IAR4D, various actors interact to create the necessary collaborative synergy to achieve impact at the grassroots level.

The IAR4D system requires linking research to development objectives, implying the need to maintain coherence among short-term project objectives and longer-term development objectives

and to ensure synergy among related projects at a point in time. The role of researchers will be expanded to include catalyzing and facilitating agriculture innovation processes and impact.

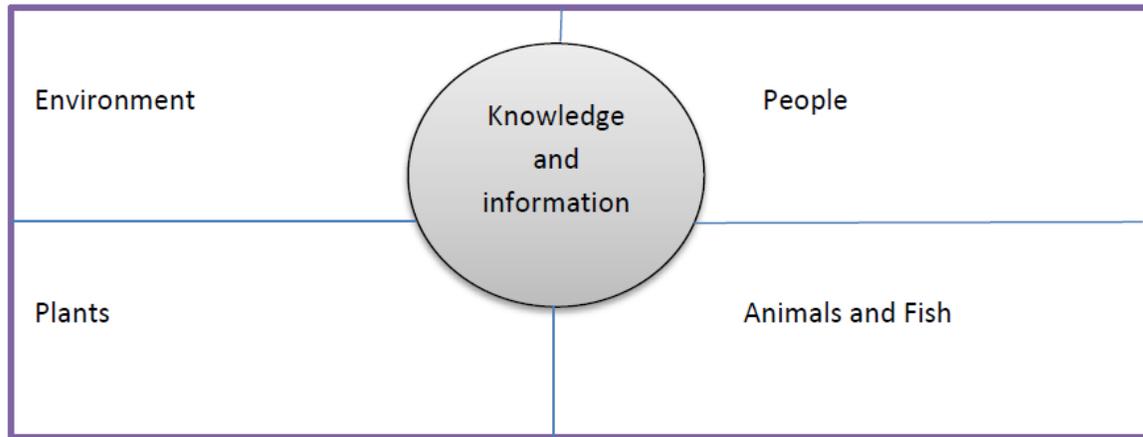


Figure 3. The new paradigm for Agriculture research

The justification for the adoption of the IAR4D system as a subsystem of the broader agricultural innovation system essentially derives from the need to bring together diverse agents with a variety of competences and resources to work synergistically toward the common goal of increasing sustainable agricultural productivity as a means of improving the livelihoods of the poor in Africa (NEPAD 2002; FARA 2006). The resulting struggle to achieve impact in the lives of poor people in developing countries has significantly widened and deepened the scope for IAR4D. Thus, the scope now commonly incorporates multiple dimensions: different types of research (basic, strategic, applied, and adaptive), sectors (commodity, factor, and eco-regional), sub-sectors along the value chain (agricultural production, postharvest, agro-processing, marketing, and market access), policies, and institutions. Further, the notion of IAR4D tends to evoke not only the generation of scientific information, but also the incorporation of indigenous knowledge and the use of both types of knowledge among diverse—and especially disadvantaged—societal groups.

The IAR4D approach uses a basket of options and mechanisms that combine participatory methodologies with a holistic view of the agricultural system, people, and the location of research within the system. The paradigm encourages learning through the interchange of ideas and experiences by diverse actors, with a focus on putting farmers and end users at the center of research.

The IAR4D framework encourages the creation of synergy among different research organizations at the national, sub-regional, and regional level. This provided consistency not only with the Forum for Agricultural Research in Africa (FARA) strategic plan, but also with those of the sub region, through alignment with the Conseil Ouest et Center Africain pour la Recherche et le Développement Agricoles (CORAF) / West and Central African Council for Agricultural Research and Development (WECARD). This approach provides the basis for CARI to plan, and to ensure that its plans and efforts also contribute to the wider regional goals.

This increased scope inevitably calls for involvement of diverse agents (public, private, and nongovernmental) in the agricultural and natural resource management sectors. These agents include research organizations, extension systems, producer organizations, and colleges of agriculture.

While the need to involve these diverse agents is compelling, organization and management systems need to be in place to facilitate the development of a responsive and coherent agenda and a rational division of labor that allows both collaboration and competition as needed.

In the absence of such organization and management, the generation of systemic synergies will remain untapped opportunity. Equally lacking are mechanisms for sustainable financing of broad-based IAR4D.

Given that the many organizations within the IAR4D system already thrive under independent governance systems, organization and management systems, and even independent financing mechanisms, the process of deconstructing these to accommodate new arrangements will need to be organically grafted at different levels of operation (that is, the system, organization, program, project, and activity levels). Thus, while the process could borrow best practices from elsewhere or even from within respective organizations, the process will need to be based on solid “learning by doing,” preferably through action research to ensure systematic learning.

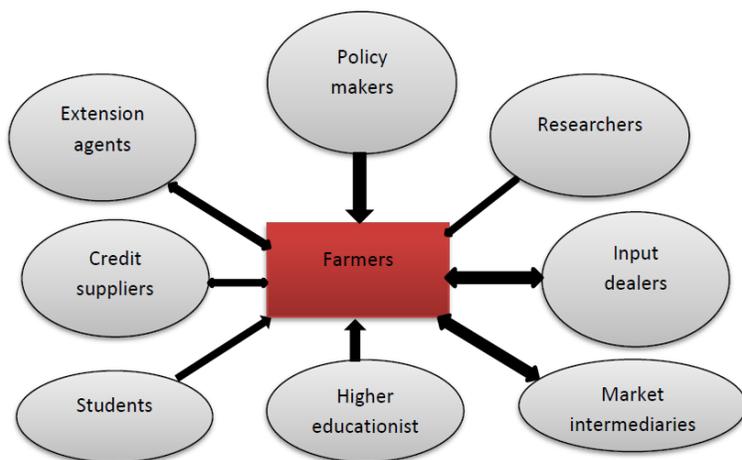


Figure 4. The diverse actors in the IAR4D system

Researchers at a revitalized CARI like in many other African and Asian countries will spend considerable time on ‘facilitative’ roles in order to generate impact and demonstrate the utility of research results. This Impact orientation requires a continuous negotiation of technology and service demands and their adaptation. Therefore, active partnerships need to be catalyzed to ensure that the concerted efforts are geared towards one common purpose – to create impact.

The significantly changed role and the profile of present and future researchers, demands that CARI has also to change and create the conditions required to address this key challenge by focusing on the following impact indicators:

- (i) Productivity impact which focuses on the efficient use of resources;
- (ii) Livelihood impact which determines whether gains of increased productivity benefit the mass of society and
- (iii) Environmental impact which determines whether the gains achieved by the first two indicators can be sustained.

The CARI will shift smallholder farmers to become much more integrated and agro industrially oriented using the Agricultural Innovation Systems approach and by reorganizing the current agricultural research system to operate in cognizance of other actors in the agricultural value chain so as to achieve greater impact.

2.3. New vision, Mission and new Management Structure for CARI

From the above discussion it is apparent that CARI needs a new vision statement which is more vibrant, invigorating, energetic, clear and powerful to arouse and sustain the actions necessary for the achievement of the vision. This is because the current vision statement is actually a “Motto”.

Proposed CARI new vision:

“A commercially-oriented agricultural sector propelled by research, technology transfer, innovations, knowledge and approaches that will contribute to an improved quality of life for all Liberians”

Taking into account of the conceptual approach and the current research paradigm of Agriculture Research for Development (IAR4D), the following mission statement is also proposed for the revitalized CARI:

“To contribute to increased productivity, commercialization and competitiveness of the agricultural sector through adaptive research and promotion of knowledge, information and technologies that respond to clients’ demands and opportunities and the attainment of food security, poverty alleviation, income generation and job creation”

The CARI is expected to deliver on its Vision through the following; (i) development and promotion of research, innovation and technologies for high value products and services; (ii) development of modern national information and communication technology infrastructure for sustainable development; (iii) development and strengthening of the technical capacity of CARI staff (iv) formulation of human resource development institutional policy that attract and retain professionals; (v) strengthening of systems for the creation, translation of data, knowledge and dissemination of information; and (vi) development and strengthening of strong research linkage with local, international research and training institutions for mutual benefit.

The IAR4D paradigm that will be adopted by CARI requires multi-stakeholder and multi-level engagement, all of which require carefully managed co-ordination which is difficult under the current centralized coordination under MOA.

With its well-defined core functions, CARI will adopt the Integrated Agriculture Research for Development (IAR4D) research approach that is clearly specified along the research for development continuum. This is because ‘innovation processes’ are a convergence of different ideas and contributions of different actors and sources of innovation, a ‘new way of doing business’ in Research for Development.

2.3.1 Core Functions of CARI

The core functions of revitalized and semi-autonomous CARI shall be:

- (i) Agricultural Research
 - a. Play a key role in the formulation of agricultural research policies and programs in the context of national agricultural policies, poverty alleviation, food security, and improved livelihoods
 - b. Conduct broad-based research on food and cash crops, livestock, fish, land and water management, natural resource management, forestry and agro-forestry, technology and socioeconomics of postharvest production, emerging technologies in agricultural science, bio-safety, and the environment
 - c. Monitor and evaluate the adoption and impact of agricultural research on productivity
- (ii) Information and Knowledge Dissemination

- a. Provide information to assist policymakers/stakeholders in formulating appropriate agricultural policies
- b. Maintain registers of research scientists, projects, and results
- c. Produce annual reports highlighting the management, scientific, training, and financial aspects of CARI
- d. Disseminate knowledge on improved technologies to stakeholders

(iii) Capacity Strengthening

- a. Establish strong working relationships with extension agencies in the private and public sectors for transfer of technologies
- b. Facilitate and provide relevant training and human resource development to support the agricultural research needs of the country

(iv) Advocacy

- a. Establish strong links with national, regional, and international research institutions involved in science and technology
- b. Process and forward to the government annual estimates for funding
- c. Represent the country in regional and international agricultural research forums
- d. Enhance public awareness of the importance of scientific research to agricultural and economic development
- e. Mobilize human, financial, and capital resources from donors, the private sector, and within the institute for the benefit of CARI

CARI will also provide various research-related services to the public which need to be recognized adequately in the Act establishing the research institute. These time and resource intensive service functions include:

- (i) Management of a national crop and livestock gene banks;
- (ii) Quality assurance of technologies developed, adapted, multiplied and disseminated through the uptake pathways;
- (iii) Commercialization and promotion of its technologies and products and catalyzing farmer linkages to markets;

- (iv) Offering laboratory and consultancy services to the public.

To live to its new mission statement in which adaptive research is targeted to solve the specific problems of Liberia.

2.3.2.CARI's Guiding Core Values

The institutional core values guide actions at all levels when choices are not clear or when there is a gap between intention and reality. The guiding core values that CARI and its stakeholders and partners hold in common and endeavor to put into practice while performing their functional obligations include the following:

- (i) Integrated and holistic approach:**CARI recognizes that integration and team work across levels, disciplines, gender, timeframes and space, is critical in increasing productivity, commercialization and competitiveness of the agricultural sector because of the complex inter-linkages of the different components of the agricultural product value chains.
- (ii) Impact, performance and service orientation:**CARI will remain focused on integrated research for development by ensuring that all research activities undertaken or promoted are demand-driven. CARI will achieve this through building and maintaining a culture that is based on impact of research and other knowledge roles; performance of every part of the organization and service delivery as the key feature of the non-research part of the institution.
- (iii) Scientific excellence, creativity and flexibility:**CARI believes that the stakes in the APVC (Agricultural Product Value Chain) approach to research are extremely high in terms of the investments that are necessary for meaningful outcomes. For this reason, all research work and recommendations made to stakeholders will emanate from sound evidence based on rigorous scientific findings of the highest quality possible.
- (iv) Partnerships for collaborative advantage and synergies:**CARI will pursue meaningful and productive partnerships, and team work so as to ensure synergies that have a direct bearing on finding innovative solutions to major agricultural sector problems. Clear roles, responsibilities, governance and supportive mechanisms will ensure application of 'true' partnership norms.
- (v) Effective knowledge and information management:**CARI is committed to nurturing a strong culture of knowledge management in the generation, sharing, brokerage and application of agricultural knowledge within and outside the Institute
- (vi) Respect for staff and diverse clients:**CARI recognizes that staff and clients are critical resources in achieving its Mission and therefore respects staff and the diverse clients, emphasizes mutual respect for individuals and ensures equitable recognition of their contribution. In this regard, CARI is committed to timely and quick response to concerns

of staff and clients including farmers, processors, policy makers, partners and collaborators.

(vii) Transparency, accountability and cost-effectiveness: CARI is committed to effective and efficient utilization of all resources entrusted to the Institute in the most transparent, accountable and cost-effective manner.

2.3.3. New CARI Management Structure

Figure 5 shows the proposed new structure for the semi-autonomous CARI. In the new structure a semi-autonomous CARI with a Board of Directors composed of representatives of all key stakeholders in the agriculture sector is proposed.

A highly qualified and experience Director General with a background in Agricultural Sciences should be appointed as the Director General. The Director General will be answerable to the Board of Directors. Under the Director General there will be a Deputy Director General who will be responsible for all research programmes and should also have a PhD in agricultural sciences and should have a distinguished research carrier accompanied by quality and peer reviewed publications in recognized International Journals. He/she should have a proven record of research funds mobilization and research project writing skills.

Heads of programmes will be headed by individuals with a minimum qualification at a PhD level in one of the thematic research areas and a proved research and publication resumes. There shall be three Directors (Director of Finance and Administration, Director of Planning and Director of Project Implementation) all answerable to the Director General.

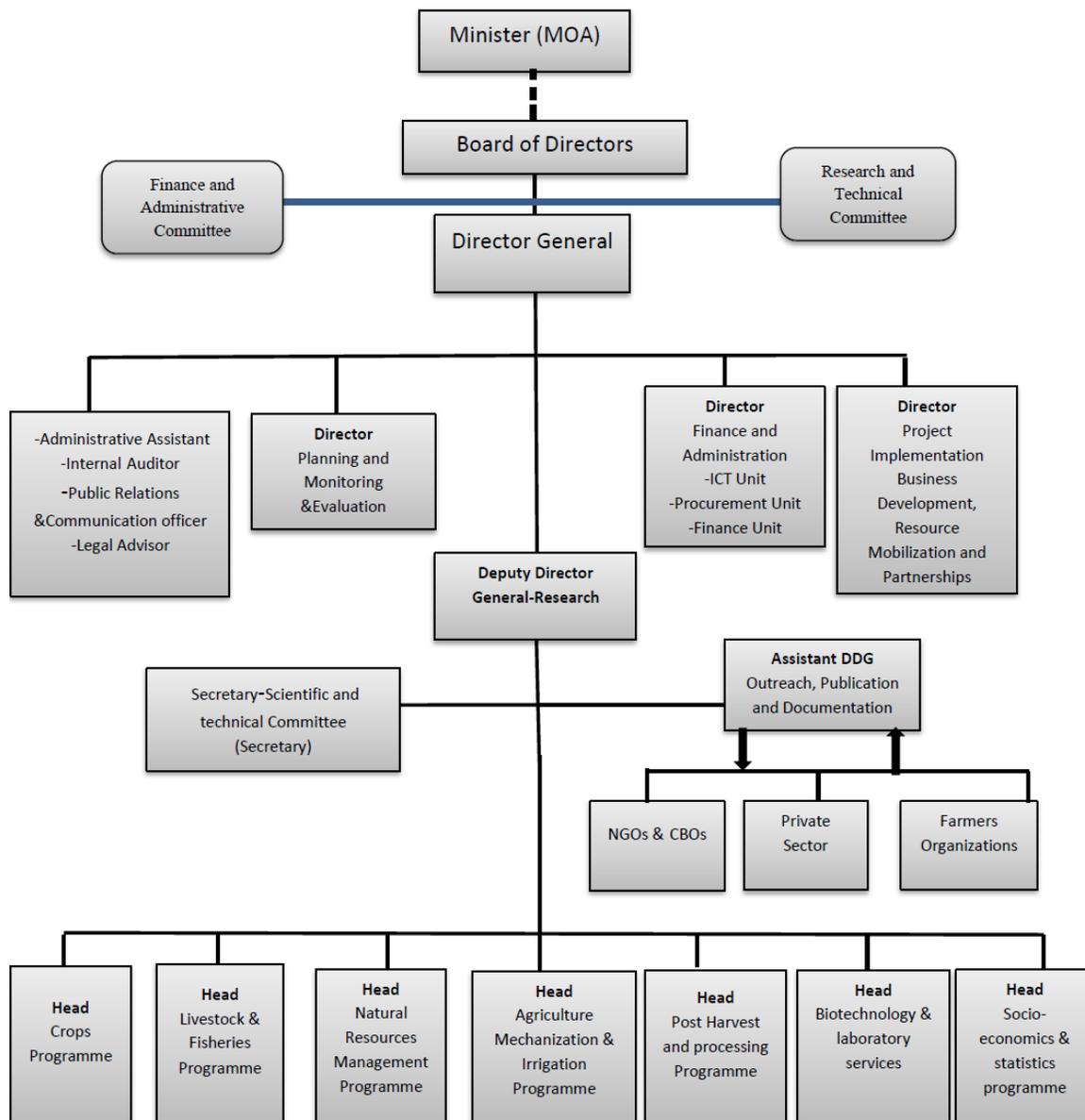


Figure 5. The proposed organization structure of CARI

3.0. The Strategic Research Plan for CARI

This strategic plan for agricultural research provides a framework for CARI which clearly sets the direction, priorities and timeframe for research, capacity development and related activities.

The strategic plan is about innovation—to enable CARI to anticipate in the future and prepare for it. More important, the strategy is consistent with Liberian government policies and programs and reflects the needs of sector stakeholders.

The strategy has been tailored to position CARI strategically so as to contribute significantly to the attainment of the agricultural sector strategic growth result areas outlined in the Liberia Agriculture Sector Investment Program (LASIP) and FAPS. It is envisaged that through this strategy, research will play a key role in improving food security, increasing smallholder real incomes and raising agricultural productivity, all of which are essential for the realization of significant improvement in the standard of living of Liberians. The strategic plan addresses prioritized issues and makes a clear commitment to delivering a series of results that encompass a new paradigm for agricultural research and development. This approach covers not only conventional research but also the use of innovation platforms, policy, markets, capacity strengthening, coordination, advocacy, knowledge management, and the involvement of a broad base of stakeholders (Figure 6).

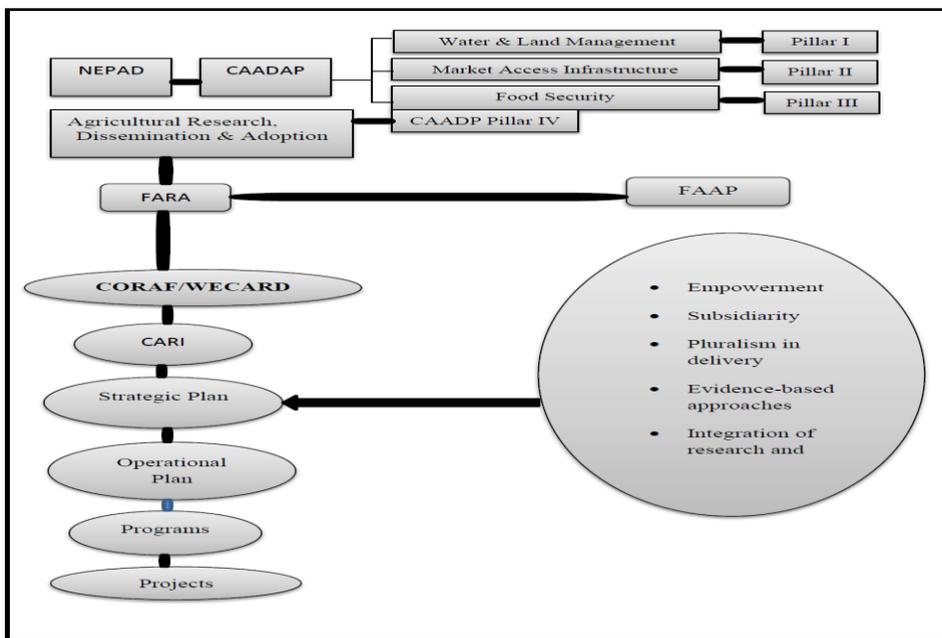


Figure 6. Hierarchical nesting of CARI Strategic Plan

All this is integrated in an approach that considers not only research but also development, that is, the IAR4D framework. This way, it became coherent with the CAADP's primary goal and the principles and guidelines encapsulated in the FAAP

3.1. Methodology for Strategic Plan Development

The strategic plan was developed in a consultative way to guide CARI in the pursuit of its mission by involving key stakeholders including CARI staff, top policy makers at MOA, stakeholder including individual farmers and farmer representatives, NGO’s like BRAC, Tertiary institutions, and development partners including the AfDB, World Bank, USAID and FAO and their view were incorporated in the draft report. In addition, several documents on the economy, demography, mission reports, policy documents and studies on agriculture, and research in Liberia were reviewed, and they provided pertinent information.

The methodology used is based on an understanding of the dynamics change for CARI over the next ten years (2015-2025).The strategy was developed in the logframe format in the context of the IAR4D paradigm using onion-skin nesting, which permitted a hierarchy of activities to relate directly to each other.

3.1.1. Internal Environment Analysis

In order to identify CARI’s strengths and weaknesses in relation to its set mandate, an environment analysis was done based on WAAP (2010) and Fitzsimons & Tegbaru (2011) and views collected from stakeholder inputs (Table 1).

Table 1. SWOT analysis results for CARI

Strengths	Weaknesses
<ul style="list-style-type: none"> • Rich natural resource base for agriculture/NRM activities; • Retains the national mandate for agricultural research; • The CAADP-Lib compact has the potential to increase funding to the agricultural sector; • Has established linkages with regional and sub-regional research organizations (AfricaRice, IITA, etc). 	<ul style="list-style-type: none"> • Currently functions as a unit within the MoA rather than as a semi-autonomous National Agricultural Research Institute; • Lacks a governance structure with stakeholder representation to focus on agriculture priorities; • Limited budget, determined annually by MoA; • Weak administrative processes/ skills.

	<ul style="list-style-type: none"> • Loss of significant element of corporatememory • Lack of infrastructure and equipment,including security for meaningful research; • Current efforts and budget focus almostexclusively on seed multiplication; • Lack of Strategic and Operational plans; • Current lack of senior scientific staff for anymeaningful research; • Dearth of trained staff within the country onwhich to develop the future generation(s) ofresearchers and technicians; • Current limitations of Liberian highereducation system to produce the futuregeneration(s) of researchers and technicians; • Gender inequality in professional staffing; • The dualistic (small and large scale) nature ofLiberian agriculture creates challenges foragricultural research; • The manpower available in CARI is heavily biased towards biological specializations. There is, therefore, a limited capacity to deal with non-production aspects of the product value chain or social and policy research.
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Opportunities	Threats
<ul style="list-style-type: none"> • Political will exists for restructuring and organizational change; • Potential of regional initiatives (eg.WAAPP-1C) to finance short, medium and long-term elements of action plans and finance some core infrastructure, equipment and capacity building; • Some potential to access technical expertise/ cooperation from the large export-oriented agricultural enterprises; • Potential to develop future linkages for joint activities with institutions for higher education both within the country and externally; • The expanding domestic market for crops and livestock products with a high income elasticity of demand provides excellent trading opportunities. This should encourage farmers to demand for appropriate technologies in order to compete in the wider regional and international markets; • The unexploited natural resource base, abundant sources of surface and underground water and existence of several agro-ecological zones present an unlimited opportunity for expansion and diversification in crop and livestock production; • Crop farming and livestock keeping are 	<ul style="list-style-type: none"> • Poor conditions of service, lack of incentive and institutional vision limit skilled staff recruitment and potential retention; • Uncoordinated donors' support dissipating effort and focus; • Delay in the restructuring of the MOA negatively impacting effective agriculture research system; • Reliance on external funding potentially limiting long term planning and activities; • Weak Agricultural Extension limits potential collaboration and input to research programs.\Future political stability; • The global trend of market liberalization has both positive and negative effects on the agricultural sector. The negative effects include dumping of cheap crop and livestock commodities and products from other countries which could suppress local production; • Inadequate policy coordination among different sector ministries can undermine research efforts and adoption of technologies. • High input prices relative to output prices could discourage the uptake of new technologies.

<p>a way of life amongst the majority of Liberians and is likely to get better if agriculture is made increasingly profitable;</p> <ul style="list-style-type: none"> • The development of private agribusiness and large-scale farming enterprises is likely to create potential opportunities for strategic partnerships between them and the smallholder farmers; • Globally, there are technological advances that can be tapped and adopted to improve productivity. There also several indigenous technical knowledge (ITK) that can be modernized and packaged. The yield gaps between what are attained at research and farmer levels are opportunities for enhancing research impacts; • The presence of a growing number of potential partners and collaborators including other research institutes, NGOs, agro-industry and commercially-oriented farmers; • There is global concern to diversify from fossil-based sources of energy. This offers an opportunity for CARI to venture into research in bio-fuels; • Environmental degradation and climate change provide the Institute with opportunities to engage in the development of appropriate mitigation measures to reverse these situations. 	<ul style="list-style-type: none"> • New biophysical constraints will emerge as a consequence of changes in the global climate, thus posing new challenges such as intensified droughts and floods, and new crop and livestock pests and diseases. • Some other institutions are able to provide better incentives which could lead to CARI scientists leaving.
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Source: WAAPP (2010) and Fitzsimons & Tegbaru (2011)

3.1.2. Stakeholder Analysis

A 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 Agriculture Strategic Plan. This analysis involved an inventory of the broad stakeholder categories (Table 2) that have a complementary role or synergy to CARI's effort in the development and implementation of the Agriculture Research Strategic Plan

Table2 Stakeholders and their expected contribution to the development and implementation of the Agricultural Research Strategic Plan

Stakeholder	Expected contribution to the strategy
1. Ministry of Agriculture	<p>Collaboration in programme development, implementation, coordination and provision of quality and efficient extension services, policy guidelines, synergies and capacity building, market information and access.</p> <p>Collective action policies, community mobilization for collective action, agricultural products input and output markets, access to credit and other financial arrangements</p>
2. Agricultural training institutions and universities	<p>Formulation of appropriate curriculum, provision of expertise, professionalism, capacity building and promotion of science, technology and innovations and collaboration/partnerships in the development and implementation of research programmes.</p>
3. City, municipal and county Councils	<p>Management and regulation of markets, levies, provision and maintenance/ management of infrastructure and sanitation, co-financing of critical research areas.</p>

4. Infrastructure-related Ministries	Provision of power, roads,telecommunications and early warning systems.
5. Ministry of public and environmental health	Setting health standards and collaborative work to minimize health hazard from agricultural-related activities.
6. Regional and international Organizations	Cooperation in the areas affecting agriculture research, implementation of agreements and treaties, capacity building, resource mobilization, international lobbying and technical support.
7. Local and International Non-Governmental Organizations	Mobilization of resources, communities and up-scaling technologies
8. Community-Based Organizations, Faith Based Institutions, and Farmers’ Organizations	Community empowerment, awareness creation, capacity building, resource mobilization, advocacy, networking, linkages and technology/information dissemination, lobbying and assistance in farmer production and marketing groups.
9. Agribusiness suchas processors, input dealers, seed companies,merchants	Provision of quality agricultural inputs, credit facilities, capacity building, dissemination of modern technologies; awareness creation;and provision of additional researchfunding.
10. Private sectors	Partnership in research and resourcemobilization, entrepreneurshipdevelopment, investment in facilitiesdevelopment and research endowment fundmanagement.

11. Farming communities	Local knowledge, resource ownership, goodwill, technology development, adaptation and uptake.
12. Regulatory bodies	Provision of quality advisory and regulatory services and setting of standards.
13. Parliament	Enactment of agricultural policies and legislations, and approval of budgets and bills.
14. Development partners	Provision of technical support, finance assistance, capacity development and consultancy.
15. Electronic and print media	Dissemination of information through their wide coverage and communication networks and awareness creation.
16. Agricultural training institutes	Capacity building for mid-level extension and research personnel.
17. Professional bodies	Assurance of professionalism and best practices in agricultural research, provision of technical expertise, ethics and standards.
18. ICT organizations	Development and maintenance of relevant databases, innovative packaging and dissemination of information.
19. Financial institutions	Provision of financial facilities, saving and credits, investment and capacity building.

3.1.3. Situation Analysis

The situation analysis and from the key policies, the CARI's current activities reveal the following issues that need to be addressed so as to enable it to increase its efficiency, effectiveness and impact. The key issues include the need to:

1. Be effective in Research for Development by adopting an innovation system perspective and coordinating research and dissemination through strategic partnerships and linkages;

2. Engage more in interdisciplinary approaches and adjust its structures and mechanisms accordingly;
3. Contribute to catalyzing technology dissemination and uptake through innovative extension delivery pathways for impact at end-user level;
4. Enhance research on natural resource management and conservation;
5. Be more focused on commercialization where product/technology development, marketing and value addition and dissemination are integral parts;
6. Contribute more to marketing and policy research and analysis;
7. Market itself better and advocate for its role and contribution while developing its competitiveness;
8. Respond to different challenges through inclusion of cross-cutting issues such as Human Immune-deficiency Virus/Acquired Immune-deficiency Syndrome (HIV/AIDS), ICT, and gender;
9. Realign the organization in terms of functions, structure, staff competence and culture towards of a NAR;
10. Commercialize and develop a functional Research for Development system to provide effective and efficient services. Sustainable funding mechanisms form part of these arrangements.

3.1.4. Adoption of the APVC Research Concept by the CARI

To respond to the issues raised in the situational analysis brought about by the demand from the government policies and programs, CARI will adopt the Agricultural Product Value Chain (APVC) approach to agricultural research for development (AR4D). This APVC concept describes the full range of activities required to bring a product or service from conception through the full range of products, involving a combination of physical transformation and inputs of various producer services, delivery to final consumers and disposal after use. The value perspective is used to derive strategies for commercialization and to foster pro-poor growth in the agro-food sector. Building on market opportunities, the APVC approach targets the growth potential directly.

The APVC approach is expected to position CARI strategically as a key driver in enhancing the agricultural sector contribution to the GDP leading to the attainment of the 6% economic growth per annum recommended in FAP. The adoption of this approach to research requires CARI to shift focus from commodities to differentiated agricultural products including increased value-addition to commodities within the rural areas and development and promotion of new products that fit the demands of the target market.

The research on product value chains shall be expected to focus on the whole chain up to the consumer products, rather than focusing on commodities. This will require a radical shift from the traditional research focus on production-side and its consequent linear technology dissemination, towards research, innovation and knowledge management systems that support robust agricultural product value chains integrated vertically from resource to consumption.

In view of this, the thinking of the CARI scientists will need to change from “pushing of commodities” to “market responsive products” approach. From the terminology point of view, the difference is perhaps little, but there is significant difference in practice. In the “pushing of commodity” approach, production of commodities is driven by existing agricultural potential. In the “market responsive products” situation, however, the purpose of production is to satisfy the needs and preferences of the consumer. In this case, the analysis and understanding of the consumer needs and preferences should be the basis for designing the whole chain as well as decisions on what and how resources should be deployed.

An important feature of the APVC approach is that it permits an analysis of the whole product system. This analysis facilitates the identification and prioritization of opportunities and problems throughout the system leading to the development of more realistic research agenda. The methodology brings many concepts, instruments and techniques together in one process and presents them as an integrated whole. Identification of APVC-based research agenda should therefore begin with a comprehensive overview of the target APVC. The starting point for research design should be the identification of market opportunities for given products. Then, if the opportunities are not fully exploited, the next step should be a thorough assessment of:

- 1) The system required to deliver the product, identifying the principal components of the system and major participants and their roles;
- 2) The priority problems within each component of APVC and their causal relationships;
- 3) Possible solutions to the problems and their order of priority;
- 4) The necessary interventions to solve the problems, starting with the most binding

The agricultural product value chains research shall be characterized by increased vertical coordination from resource management, production, post-harvest processing, marketing and interaction with consumers. This would be expected to demand for more integration and coordination of all research service-providers around 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.

Successful application of agricultural product value chain approach to research shall require a very complex system that brings together many players. The research to support such a system will, therefore, need to be organized in a way that it can add value to the system. This calls for creation of a mechanism for establishing flexible alliance frameworks that would allow CARI

and other organizations, including the private sector and institutions of higher learning like the University of Liberia to form temporary APVC teams to solve particular problems in a specified time. The formation of such temporary APVC teams would ensure the availability of a critical mass of scientists with the right disciplinary mix to provide multidisciplinary solutions for priority problems.

3.2. Institutional Level Results

In line with the stated institutional strategic direction and mission, five strategic growth result areas that are necessary and sufficient to deliver on the institutional purpose of generating and promoting agricultural knowledge, information and technologies that respond to clients' demands and opportunities are identified. The results are designed to position CARI strategically as the key driver for increasing productivity, commercialization and competitiveness of the agricultural sector. This will in turn contribute significantly to the attainment of the agricultural sector strategic growth result areas leading to the achievement of the sector growth rate of 6% per year over the next ten years envisaged in LASP (2009). In order to ensure better outcome mapping and impact orientation, the five strategic growth result areas will be cascaded down to thematic areas of research, programmes and projects but reduced both in scale and scope at each level. The five necessary and sufficient results include:

Result 1: Technologies and innovations for demand-driven agricultural product value chains generated and promoted;

Result 2: Markets and marketing strategies for agricultural product value chains developed and promoted;

Result 3: Policy options for enhancing demand-driven agricultural product value chains facilitated and advocated;

Result 4: Capacity for implementing agricultural product value chains research strengthened.

Result 5: Availability of knowledge, information and technologies on agricultural product value chains research enhanced.

3.3. Research Thematic Areas of Intervention

In order to deliver on the five strategic growth result areas, research in the CARI has been rationalized into six broad-based thematic areas of intervention. These thematic areas of intervention express a stronger organizational commitment to impact as a strategy orientation

and positioning of the CARI as a leader in agriculture research in Liberia (Figure 7). The thematic areas of research intervention are considered as integrally linked rather than isolated. In operational terms, there will be overlaps and this is desired since integrated agricultural research seeks to deal with issues in a holistic manner.

For example, product value chains in crops and livestock will not be tackled without also considering the institutional and natural resource management aspects. Given this consideration, therefore, there is no order of priority in the six thematic areas.

Each research thematic area of intervention will be expected to contribute to the attainment of the five institutional results. To do this in the most effective and efficient manner, each of the thematic areas of intervention will be expected to deliver on five results similar to those at the institutional level but reduced in scale and scope to the specific thematic area of interest for better outcome mapping and impact orientation.

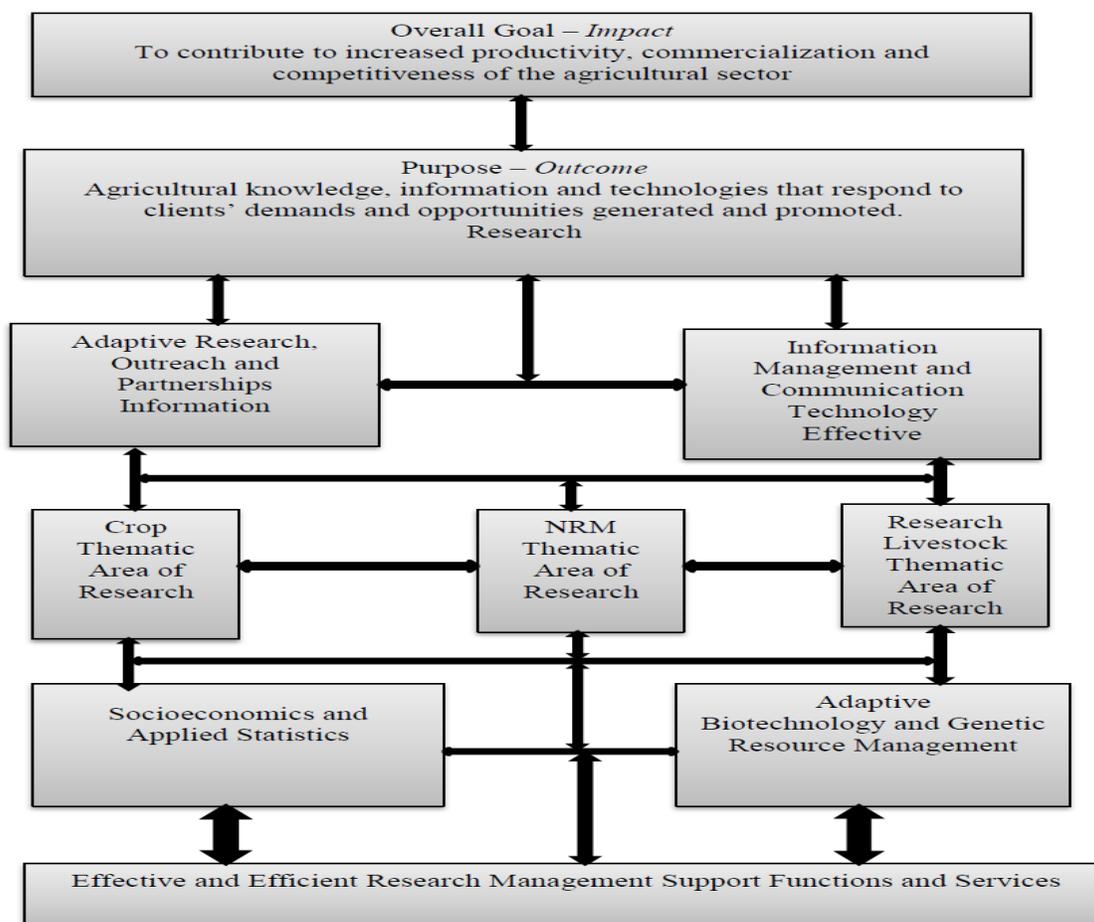


Figure 7. Schematic arrangement of thematic areas of research through outcome to impact

The research thematic areas of intervention required to deliver the institutional results are:

1. Development and promotion of integrated crops product value chains.
2. Development and promotion of integrated livestock product value chains;
3. Enhancement of sustainable and integrated management of natural resources;
4. Enhancement of use of biotechnology and genetic resources management;
5. Enhancement of utilization of socioeconomic and applied statistics information in research;
6. Enhancement of appropriate adaptive, outreach and partnerships methodologies and approaches.

3.4. Identification and Prioritization of Intervention Research Programmes

Each of the research thematic areas of intervention shall be delivered by seven research programmes. All the research thematic programmes under the thematic areas of intervention were rated as of high priority using the following key principle criteria to guide the programme prioritization:

- (i) Direct linkage of the programme to one or more of LASP (2009) objectives;
- (ii) Degree to which the programme is addressing reduction of core poverty as outlined in the Government's criteria for selection of core poverty interventions;
- (iii) Degree to which the programme is addressing the objectives;
- (iv) Expected output or results from the programme and their contribution to the achievement of LASP (2009) strategic objectives.
- (v) Demonstration of the program's forward and backward linkages with other sector programmes.
- (vi) Sustainability of the programme particularly in terms of human capacity, future costs of implementation and sources of funding
- (vii) Cost-effectiveness in the achievement of the intended programme objectives.

3.4.1. Prioritized broad research programmes for CARI

There will be seven broad research programmes for CARI as listed below.

1. Crops Programme
2. Livestock and fisheries Programme
3. Natural Resource Management
4. Agricultural Biotechnology and laboratory Services Programme
5. Mechanization and irrigation
6. Socio-economics and Applied statistics
7. Post-harvest and food processing

CARI will endeavor to ensure that the projects to be undertaken under each research programme have in-built pro-poor activities and interventions aimed at increasing access to social services, creation of employment opportunities, increasing incomes and reduction of poverty and inequality through:

- (i) Promotion of pro-poor economic growth and increased income through targeted project interventions;
- (ii) Improvement of the quality of life of the poor and the vulnerable;
- (iii) Improvement of equity and reduction of inequality;
- (iv) Protection of the environment and provision of access to clean water and sanitation;
- (v) Institutionalization and strengthening of participation of relevant stakeholders in all levels of programme and project governance.

3.5. Research Thematic Areas of Intervention

3.5.1. Development and promotion of integrated crops product value chains.

Efforts to increase crop productivity, frequently hampered by poor quality and high cost of inputs, remains a major preoccupation of producers. Whilst some of the input-related problems can be addressed through biophysical research interventions, others are dependent on the development of appropriate policies, the absence of which acts as disincentives to producers. Poor infrastructure, narrow product range targeting limited markets and poor marketing strategies have continued to slow the rate of commercialization of crop-based enterprises. In addition, meeting the stringent market requirement of crop products to facilitate trade has affected profitability and productivity. Increasingly, the profitability of the crops sub-sector products requires improved accessibility to both internal and external markets.

Dependency on rain-fed agriculture which in most places is inadequate and unreliable has also created fluctuations in production and supply of agricultural products. Little has been done to exploit the irrigation potential in the country. Across all crop production agro-ecosystems, management of diseases, pests and weeds requires integrated approaches that are both crop and agro-ecology specific, affordable and environment friendly. Erosion of genetic biodiversity and low adoption of improved crop varieties and associated technologies have impacted negatively on efforts to address issues on food security and wealth creation

The crops thematic area of research will be expected to contribute to the attainment of the overall institutional purpose through the attainment of its purpose of *generating and promoting crops*

knowledge, information and technologies that respond to clients' demands and opportunities.
This purpose will be delivered through the attainment of the following five results:

- (i) Technologies and innovations for demand-driven crops product value chains *generated and promoted;*
- (ii) Markets and marketing strategies for crops product value chains *developed and promoted;*
- (iii) Policy options for enhancing demand-driven crops product value chains *facilitated and advocated;*
- (iv) Capacity for implementing integrated crops product value chains research *strengthened;*
- (v) Availability of knowledge, information and technologies on crops product value chains research *enhanced.*

In order to contribute significantly to the attainment of the institutional purpose, the crops thematic area of research will be structured into two broad based and interrelated research programmes as outlined below. Each of the research programmes will be expected to contribute to the attainment of the five crops thematic area of research results.

- (i) Development and promotion of integrated food crops and crop health product value chains;
- (ii) Development and promotion of integrated horticulture and tree crops product value chains.

3.5.2. Livestock and Fisheries Thematic Area of Research

The major challenge facing the livestock sub-sector is increasing supply of livestock and livestock products. This has been constrained by inadequate feeds, diseases, inappropriate breeds, poor access to and utilization of knowledge, information and technologies (KIT). The challenge, therefore, is to provide information and knowledge that will empower producers to be market-oriented. Trade in livestock and livestock products require compliance to international quality standards involving, among others, traceability. Furthermore, limited value addition and product development hinders access to new market opportunities. In addition, certain policies currently covering the sub-sector are not conducive for increased growth. Hence the need for appropriate policies which will facilitate desired growth in the sub-sector.

The Livestock thematic area of research will be expected to contribute to the attainment of the overall institutional purpose through the attainment of its purpose of ***generating and promoting livestock knowledge, information and technologies that respond to clients' demands and opportunities***. This purpose will be delivered through the attainment of the following five results:

- (i) Technologies and innovations for demand-driven livestock and fisheries products value chains *generated and promoted*;
- (ii) Markets and marketing strategies for livestock and fisheries products value chains *developed and promoted*;
- (iii) Policy options for enhancing demand-driven livestock and fisheries products value chains *facilitated and advocated*;
- (iv) Capacity for implementing integrated *enhanced*.
- (v) Availability of knowledge, information and technologies on livestock product value chains research *enhanced*.

In order to deliver on the expected results, the livestock and fisheries thematic areas of research will be structured into three broad-based and interrelated research programmes as outlined below. Each of the research programmes will be expected to contribute to the attainment of the five livestock thematic area of research results.

- (i) Development and promotion of integrated animal and fisheries production products value chains;
- (ii) Development and promotion of integrated animal health service delivery systems;
- (iii) Development and promotion of integrated forage resources product value chains.

3.5.3. Natural Resource Management Thematic Area of Research

Managing natural resources is an activity that cuts across sectorial boundaries. A more rational, efficient and sustainable utilization of natural resources, especially the land and water resources, offers significant prospects for income generation and wealth creation required for economic growth and poverty alleviation. Unlike other programmes where technological benefits can accrue over a short period of time, benefits from adoption of technologies on NRM take long to be realized while some are very labor intensive. Thus, adoption of technologies that increase resource use efficiency still remains a challenge.

The strategy is designed to enhance the capacity of the CARI and its research and development (R&D) partners to react rapidly to the needs of the stakeholders on knowledge, information and technologies (KIT) required pursuing effective management of natural resources for agriculture and environment in Liberia.

The strategy provides the focus and guiding principles for achieving a client-oriented and demand-led research for development, with special emphasis on smallholder farmers and entrepreneurs in the agricultural sector. It emphasizes integrated approaches towards tackling the poverty-degradation nexus.

To support sustainable intensification, diversification and conservation of natural resource endowments, limitations or driving forces that are causing the poverty-degradation nexus must be reversed. Policies provide a framework and an enabling environment that can potentially remove many of the structural issues and allow for profitable natural resource transformation into products, goods and services as well as investment in conservation and rejuvenation of the natural resource base in a way that ensures livelihoods and reduces vulnerability for present and future generations.

Institutional arrangements that are performance driven would foster more efficient resource-production-consumption-market chains as well as improved links between research and development.

Technical and methodological innovations will provide the means to transform people's livelihoods and their management of the resource base to advantage. Enhanced knowledge management and sharing will help to scale up policy and institutional arrangements and technical innovations, thus ensuring utilization in Liberia.

The Natural Resource Management thematic area of research will be expected to contribute to the attainment of the overall institutional purpose through the attainment of its purpose of generating and promoting natural resource management knowledge, information and technologies that respond to clients' demands and opportunities. Priority attention will be focused on the following thematic results in the next 10 years (2015 – 2025):

- (i) Improvement of integrated natural resource management technologies and innovations for enhancing demand-driven crops and livestock product value chains *generated and promoted*;
- (ii) Markets and marketing strategies for natural resource management product value chains along the priority crops and livestock product value chains *developed and promoted*;

- (iii) Policy options for enhancing demand-driven natural resource management for crops and livestock product value chains *facilitated and advocated*.
- (iv) Capacity for implementing integrated natural resource management for enhancing crops and livestock product value chains *strengthened*.
- (v) Availability of knowledge, information and technologies on integrated natural resource management for enhancing crops and livestock product value chains *enhanced*.

In order to deliver on the expected results, the Natural Resource Management thematic area of research will focus on five research programmes outlined below. Each research programme will be expected to contribute to the attainment of the five thematic areas of research results.

1. Improvement of land use planning;
2. Improvement of soil and water conservation;
3. Improvement of integrated soil fertility management;
4. Improvement of irrigation, drainage and management of problem soils;
5. Improved adaptation and mitigation of effect of climate change.

3.5.4. Biotechnology and Genetic Resource Management

Biotechnology provides modern tools for improving agricultural productivity for millions of resource-poor farmers, consumers and the entire agricultural product value chains. Biotechnology research and utilization of genetic resources offer innovative ways of providing solutions to some of the most crucial agricultural challenges that would result in the development of improved crops, foods, livestock and vaccines/drugs, increased efficiency, better returns and improved environment among others.

The Biotechnology and Genetic Resource Management thematic area of research will be expected to contribute to the attainment of the overall institutional purpose through the attainment of its purpose of generating and promoting biotechnology and genetic resource management knowledge, information and technologies that respond to clients' demands and opportunities.

This purpose will be delivered through the attainment of the following five results:

1. Technologies and innovations for demand-driven biotechnology and genetic resource product value chains *generated and promoted*;
2. Markets and marketing strategies for biotechnology and genetic resource product value chains *developed and promoted*;
3. Policy options for enhancing demand-driven biotechnology and genetic resource product value chains *facilitated and advocated*;
4. Capacity for implementing integrated biotechnology and genetic resource product value chains research *strengthened*;
5. Availability of knowledge, information and technologies on biotechnology and genetic resource product value chains research *enhanced*.

In order to deliver on the expected results, the Biotechnology and Genetic Resource Management thematic area of research will be structured into broad-based and interrelated research programmes as outlined below. Each of the research programmes will be expected to contribute to the attainment of the five thematic areas of research results.

- (i) Development and promotion of biotechnology product value chains;
- (ii) Acquisition and conservation of genetic resources product value chains;

(iii) Maintenance, multiplication and promotion of pre-released product value chains.

3.5.5. Socioeconomics and Applied Statistics

CARI like other NARS in Africa faces a problem of recruiting and retaining applied social scientists. While the demand for agricultural economists is the largest component, there is need for a wide range of social science disciplines appropriately trained for four roles filled by people identifying themselves as “socio-economists”. The four roles are: 1) stand-alone disciplinary research in a social science, 2) participation in multidisciplinary teams with biophysical scientists, 3) institute management and research evaluation and planning processes, and 4) extension and communications.

There are 8 branches of social science research which CARI could attempt in collaboration with universities which has capacity and for sustainability purposes. The 8 branches were: 1) macro-economic trends and economic environment, 2) policy analysis and policy processes, 3) production economics and farm management studies, 4) production chain analysis, 5) marketing (local and intra-regional), 6) Sociology and other social research, 7) GIS modeling, and 8) institutional analysis. There is recognition of the importance of applied social sciences, with a slight under-appreciation of the role of “sociology and other social research.” Given that the most frequently cited constraints were “lack of understanding of farmers’ needs, constraints and opportunities” and issues of “technology transfer”, some awareness building at policy and research management levels may be needed on the need for sociology and communications.

In order to conduct targeted research, CARI will carry out thorough analyses of the priority product value chains to understand the constraints and demands of the various players along the chains. This will enable the identification of research opportunities and priorities in order to allocate the limited research resources to develop the required knowledge, information and technologies that would have the highest probability of adoption and contribute more to development impact. The socioeconomics and applied statistics thematic area provides a platform for the interface of the users (people) of research products and technologies/information emanating from the research activities.

The human dimension (i.e. cultural, social, economic, political environment, etc.) has a strong bearing on the development and adoption of the technologies/information and the improvement of the overall welfare among the different players along the value chain. The thematic area contributes towards understanding and addressing the social, cultural and economic issues that influence the development and adoption of appropriate agricultural knowledge, information and technology.

Sound technologies, information and knowledge that emanate from research are based on credible experimental design, data collection, analysis and interpretation. Applied statistics will support scientists in this regard.

In order to develop scientifically sound technologies and knowledge, appropriate statistical methods have to be developed and used by the researchers across the CARI. The challenge is therefore to have appropriate statistical inputs and data available in all stages of technology development and dissemination to ensure scientific credibility of the research products.

The Socioeconomics and Applied Statistics thematic area of research will be expected to contribute to the attainment of the overall institutional purpose through the attainment of its purpose of generating and promoting socioeconomics and applied statistics knowledge, information and technologies that respond to clients' demands and opportunities. This purpose will be delivered through the attainment of the following five results:

1. Socioeconomics and applied statistics information to contribute to the development of appropriate technologies and innovations for demand-driven agricultural value chains *generated and promoted*;
2. Markets and marketing strategies for agricultural product value chains *developed and promoted*;
3. Policy options for enhancing demand-driven agricultural product value chains *facilitated and advocated*;
4. Capacity for implementing integrated socioeconomics and applied statistics along the agricultural product value chains research *strengthened*;
5. Availability of socioeconomics and applied statistics knowledge, information and technologies on agricultural product value chains research *enhanced*;

In order to deliver on the expected results, the Socioeconomics and Applied Statistics thematic area will be structured into three components outlined below. Each of the components within the larger programme will be expected to contribute to the attainment of the five thematic area results.

- (i) Generation and promotion of Socioeconomics information for use in the development of appropriate technologies and innovations for demand-driven agricultural product value chains;

- (ii) Analysis and provision of market and policy information and knowledge along different agricultural product value chains
- (iii) Development and promotion of appropriate applied statistical research methods and services in research planning, implementation and analysis

3.5.6. Adaptive Research, Outreach and Partnerships

The innovation system perspective incorporates CARI's and the MOA's concerns with impact. A discovery becomes an innovation when it is put into practice and there is new technology, new mode of organization, new market or new product. A multitude of studies have demonstrated that *business-as-usual* will not lead to achievement of the Millennium Development Goals. *Business-unusual* requires a package of interventions including infrastructure, information, markets and policies.

The innovation system approach emphasizes the importance of learning processes, clusters of people and institutions to facilitate sharing of knowledge the development of feedback loops all along the production-to-consumption chain. The term "technology transfer" has become unfairly associated with the "outmoded linear research-to-extension-to-farmer model".

However, every major research university and research laboratory in the developed world has a "technology transfer office" dealing with issues of intellectual property and the commercialization of discovery. The principle is that technology transfer begins with design of the research protocol. Every project carried out at CARI must answer the question "Who is willing to pay for or adopt the expected output of this research?" The second question is whether the cluster of people and institutions needed to achieve the result exists or needs to be created.

In Liberia and the rest of the continent, the shift in attention by commodity research from field productivity to post harvest processing quality and market demand introduces a new cluster of stakeholders to which research must respond. The value added in post-harvest processing and marketing may be several multiples of the value of the primary product at the farm gate (which explains why developed countries protect their agriculture: whereas 3% of the GDP may be primary production, another 50% may be value added in processing, trading, retailing and serving agricultural products of guaranteed quality. Decentralized and privatized agricultural advisory services often engage in "enterprise development" without adequate backstopping from research. Researchers may proceed without linking their work with the needs of agricultural enterprise. The problems are both structural and behavioral.

The effectiveness of agricultural research is dependent on adequate uptake and up-scaling of the research products and innovations.

However, the level of uptake of available products and innovations is low. This has contributed to lower national food supplies against the demanded quantities. It is further recognized that the potential of current and future research capacity will not be fully exploited due to lack of comprehensive approach for dissemination of research findings, coupled with weak research-extension linkages. Establishment of the Outreach Programme to disseminate agricultural technology in CARI to link with extension service providers is proposed (Public, private and NGOs) is one of the key aspect of this strategy.

The importance of forging and strengthening partnerships with other actors such as NGOs and farmer groups, associations, farmer cooperatives and private farmers is stressed. The establishment of an Agricultural Information Resource Centre and Agricultural Training Centres across the country provides further opportunities for awareness creation to catalyze uptake and promote partnerships.

The main objective of the initiative is to empower farmers to demand and articulate their technology needs to service providers and to empower service providers to respond to these demands. In the process, researchers are expected to obtain feedback for use in designing appropriate research projects and effort to shift from a researcher- driven research agenda to a user demand-driven research agenda. The process will create new partnerships and strengthened existing ones as well as opportunities for feedback into the CARI research agenda, thus responding to a demand-driven and client-oriented research.

The feedback obtained from the researcher-farmer interaction as well as new findings from the various research programmes will provide material for adaptive research. The adaptive research, outreach and partnerships thematic area aims to jointly adapt technologies to the users' environments, promote and catalyze their uptake in partnership with diverse actors in the agricultural product value chains.

The Adaptive Research, Outreach and Partnerships thematic area of research will be expected to contribute to the attainment of the overall institutional purpose through the attainment of its purpose of *generating and promoting adaptive, up-scaling and partnerships knowledge, information and technologies that respond to clients' demands and opportunities*. This purpose will be delivered through the attainment of the following five results:

1. Technologies and innovations for enhancing demand-driven agricultural product value chains *adapted, up-scaled and beneficial partnerships established and operationalized;*
2. Markets and marketing strategies for demand-driven agricultural product value chains *adapted, up-scaled and beneficial partnerships established and operationalized;*

3. Policy options for supporting adaptation, up-scaling and partnerships management for demand-driven agricultural product value chains *facilitated and advocated*;
4. Capacity for adapting, up-scaling and managing partnerships for demand-driven agricultural product value chains *strengthened*;
5. Availability of knowledge, information and technologies on adaptation, up-scaling and partnerships management for demand-driven agricultural product value chains *enhanced*.

In order to deliver on the expected results, the Adaptive Research, Outreach and Partnerships thematic area will be structured into three research component in the larger programme as outlined below.

Each of the research following components will be expected to contribute to the attainment of the five thematic area results.

1. Promotion of adaptation of demand-driven agricultural product value chains;
2. Promotion of up-scaling of demand-driven agricultural product value chains;
3. Establishment and operationalization of strategic and beneficial partnerships

Operationalization of strategic and beneficial partnership will be central to the success of agriculture research in Liberia. This is because behind every great agricultural innovation, there are researchers dedicated to helping Liberia to achieve food security. One of the challenges facing Liberia is to create a robust research community to develop new and innovative approaches to food security. The CARI Research Strategy presents a national research portfolio to create more productive and animals, sustainably intensify agricultural production systems, ensure food security, and enhance access to nutritionally improved diets.

A central component of this strategy is the creation of Innovation platforms in collaboration with higher learning institutions in Liberia. These high institutions including universities will partner and work with CARI researchers and other partners, to conduct targeted research that will have a direct impact on local, national and regional food security. These partnerships will ensure that the latest agricultural innovations successfully move from research to practice.

4.0. Corporate Research Support Functions and Services

4.1. The Rationale and Justification

CARI as a public research institute will continue to conduct agricultural research of strategic national importance and produce national public goods in the form of knowledge, information

and technologies. CARI will also, together with its partners, continue to contribute to regional and international public goods. Besides its core functions of research it also has non-research or research support functions and services which demands it to develop capacity to address growth in the two core functions. Successful implementation of the five thematic areas of research outlined in chapter four will depend largely on the effectiveness and efficiency of the institutional corporate research support functions and services. This chapter focuses on the institutional capacities and competences that are required to implement the priority activities to be identified under the IAR4D system.

4.2. Challenges and Constraints

The institutional capacity of an institution includes its infrastructure, human and financial instruments which help it to make a difference. Competence, however, goes one step further and describes the demonstrated capacity of an institution to perform a task. The required capacities and competences will emanate from CARI and her collaborating and development partners. The capacities focus on the human, financial and physical resources and the institutional arrangements that will be required to adequately address the issues highlighted under the research thematic areas.

To achieve the overall development impact, CARI will develop appropriate strategies to address the following challenges:

- (i) Development of a performance management system and culture in which motivates and retains high calibre staff;
- (ii) Moulding a ‘self-regulating’ impact-oriented system and culture where outcomes and impacts are continuously monitored, evaluated and adapted with regard to set priorities;
- (iii) Promoting factors that enhance the welfare of CARI’s human resource including mitigation of the impact of HIV/AIDS.
- (iv) Increasing the sources of sustainable funding and financing mechanisms coupled with an efficient management of funds within the framework of Agricultural Product Value Chain within CARI;
- (v) Influencing formulation of appropriate policies and legal frameworks to facilitate the integration of Agricultural Product Value Chain approach with agricultural and natural resource research for development’

- (vi) Development and strengthening of inter- and multidisciplinary approach to Agriculture Research for Development (AR4D) and facilitation of the establishment of an effective research and outreach program in Liberia
- (vii) Identification of factors and processes that facilitate the rationalization of human, financial and physical resources and infrastructure available in CARI and her local, regional and international partners to effectively implement the priorities including a cutting-edge information and knowledge management system aimed at reducing duplication;
- (viii) Development and operationalization of suitable mechanisms for generating and translating an effective research demand from the different perspectives into jointly agreed priority areas in AR4D to be implemented;
- (ix) Spearheading the process of identifying suitable framework and arrangements that will enable effective functioning and developing functional processes and mechanisms.

4.3. Strategic Focus

Like the thematic areas of research discussed in chapter three, the institutional corporate research support functions and services will be expected to contribute to the attainment of the overall institutional purpose through the attainment of its purpose of contributing to the generation and promotion of agricultural knowledge, information and technologies that respond to clients' demands and opportunities. This purpose for the institutional corporate support functions and services will be delivered through the attainment of the following five results:

- (i) Institutional corporate support functions and services contribution to the generation and promotion of technologies and innovations for demand-driven agricultural product value chains strengthened;
- (ii) Institutional corporate support functions and services contribution to the development and promotion of markets and marketing strategies for agricultural product value chains strengthened;
- (iii) Institutional corporate support functions and services contribution to the formulation of policy options for enhancing demand-driven agricultural product value chains facilitated and advocated;
- (iv) Institutional corporate support functions and services capacity for implementing integrated agricultural product value chains research strengthened.

- (v) Availability of institutional corporate support functions and services knowledge, information and technologies on agricultural product value chains research enhanced.

In order to contribute significantly to the attainment of the institutional purpose, the institutional corporate support functions and services shall be structured into the following eight Units under the department of Finance and Administration. Each of Unit will be expected to contribute to the attainment of the five corporate support functions and services results.

4.3.1 Human Resource Development and Management

People are the most important resource for any national agricultural research institution such as CARI. Policies and practices for managing human resources of agricultural research institutions differ in many aspects from those of many other types of public and private sector institutions. Agricultural researchers have unique occupational needs and characteristics which have important implications for management.

They have high expectations for job fulfillment and need considerable autonomy in deciding on and carrying out their research activities. It is, therefore, very important for the CARI management to develop mechanisms for attracting, developing, retaining and effectively utilizing human resources with specific skills, attitudes and motivations that can allow the organizational objectives to be attained effectively and efficiently.

The current human resource capacity of the Institute (technical and support services) is very low as earlier mentioned under sub-section 2.1.1 (paragraph 3). In total, there are 47 scientists and 180 support staff all concentrated at CARI headquarters as CARI has no centres and sub-centres across the country. A few scientists are well trained (1 PhDs and 18 MSc). Collectively, CARI staff has not been able to effectively carry out the Institute's research mandate. There is therefore a need to rationalize the human resource requirements and develop a strategy for building capacities for research to effectively contribute to national development.

The main guiding principles for human resource planning in CARI are multidisciplinary mix of scientists, staff ratios and succession planning.

The scientist to support ratio of 1:5 is applied even though this is an average figure. The current plan should emphasize on improvement of staff management, leadership, team building and interpersonal relationships among other human resource issues. This is in order to make a positive impact at the community and national levels through increased productivity, commercialization and competitiveness of the agricultural sector.

In preparing for these changes, CARI will have to prepare a five-year human resource strategy that has, among other issues, determined staff numbers, staff quality and their outputs. The Institute will also implement staff performance contracting policy to enable the institute to get better results from individuals and teams within an agreed framework of planned goals, standards and competence requirements.

In view of this, the purpose for the Human Resource Development and Management Division during this Strategic Plan period shall be to develop and institutionalize effective and efficient human resource development and management system for enhancing the generation and promotion of agricultural knowledge, information and technologies that respond to clients' demands and opportunities.

To achieve this purpose, the Department of Corporate Affairs shall be expected to:

- (i) Determine and document institutional human resource requirements, availability and matching of requirements to availability;
- (ii) Develop and operationalize human resource staffing processes that relate to definition of positions/job descriptions, staff recruitment and staff deployment with respect to different categories of staff;
- (iii) Develop and operationalize apprentice-to-professional staff development to maintain up-to-date knowledge, skills and attitudes in their areas of specialization for improved individual and organizational performance;
- (iv) Develop and establish a performance management system that incorporates planning of individual quantitatively verifiable performance targets, progressive performance monitoring and performance appraisal;
- (v) Develop and operationalize staff compensation/motivation schemes, policies and procedures that influence staff attraction, retention, motivation and performance;
- (vi) Develop, establish and continuously update human resource management information systems;

4.3.2. Financial Resource Mobilization and Management

Financial resource acquisition and management has become a subject of increased concern because of budgetary constraints, increased competition for financing, challenges to increase efficiency in the public sector, the need for increased performance of public-sector organizations, taxpayers' demand for transparency and accountability, a need for better governance systems and

evolution from a control system of inputs to a control system of products and results. As a result of this, financial resource mobilization and management in CARI shall be seen as a set of activities aimed at putting financial resources to the service of achieving the objectives of agricultural research.

Agricultural research in CARI has largely been public funded. The Government of Liberia assisted by development partners will continue to fund agricultural research from the recognition that CARI'S Strategic Plan 2015-2025 agricultural research will fundamentally be a public good. However, there will be heavy dependence on foreign aid to fund agricultural research. In order to attract more funding from donors and grant making foundations and corporations, CARI will need to strengthen the capacity of its scientists in competitive grant project proposal writing, improve on negotiation skills for funding, establish beneficial donor relations and build donor confidence in its financial management and project implementation. CARI shall continue to pursue existing and new ways of mobilizing additional financial resources to meet the budgetary requirements for implementing this Strategic Plan.

Some of these alternative ways of mobilizing additional financial resources shall include the following:

- (i) Establishing an Investments Services (IS) Unit as an internal revenue generating mechanisms mainly from sale of products of research activities, consultancies and charges for laboratory and hospitality services;
- (ii) Strengthening of the established CARI Seed Unit (CSU) which shall produce basic and breeder seeds for sale to registered seed companies. The CSU will also produce certified seed for orphan crops and new varieties whose seeds are not produced by seed companies. CARI will expand this operation, not only to generate revenue, but also to promote and up-scale its new technologies;
- (iii) Continue to lobby and advocate for increase in government budgetary allocation to agricultural research to at least 5% of agricultural domestic product (AGDP) or 2% of the overall GDP as recommended by New Partnership for Africa's Development– Comprehensive Africa Agriculture Development Programme (NEPAD-CAADP);
- (iv) Exploring and implementing other practical forms of generating additional financial resources for supporting the agricultural research system accessing regional and international grants and offering consultancy services;

In view of the above, the purpose for the Financial Resource Acquisition and Management Division during this Strategic Plan period shall be to develop and institutionalize effective and efficient financial resource acquisition and management system for enhancing the generation and

promotion of agricultural knowledge, information and technologies that respond to clients' demands and opportunities. To achieve this purpose, the Division shall be expected to:

- (i) Formulate and operationalize an institutional long-term financial requirement plan and effective strategies to mobilize and manage the financial resources;
- (ii) Develop and operationalize policies, systems and procedures for allocating financial resources to optimize their use;
- (iii) Develop and operationalize policies, systems and procedure manuals for guiding the utilization of financial resources;
- (iv) Develop and operationalize policies, systems and procedures for directing resources towards objectives and applying financial resources to realize set research objectives;
- (v) Develop and operationalize financial accounting systems and procedures for preparing periodical financial reports and internal and external audits;
- (vi) Develop and operationalize financial resource acquisition and management information systems.

4.3.3. Physical Resource Development and Management

The main physical resources for CARI include land, offices, laboratories, workshops, stores/warehouses, vehicles and equipment. During the reorganization and rationalization period in phase one of the Strategic plan, the Government funding and donor support will mainly be targeted at the development of physical facilities, technical assistance and training. This will allow CARI to have reasonable physical facilities for research in terms of laboratory facilities, equipment and information and communication technology (ICT) facilities.

The institute in collaboration with counties, farmer cooperatives and groups, NGOs and the private sector will establish a total of 3 centres and 15 sub-centres throughout the country with adequate land resource, well developed offices and residential houses, value addition facilities that support research and technology transfer.

The CARI will invest in specialized facilities and equipment in the area of biotechnology, soil science, veterinary and animal health and animal nutrition which are necessary for conducting specialized investigations. Genetic resource conservation facilities and a unit to maintain breeders' seed and cattle, swine, poultry, small ruminants and aquaculture are envisaged.

Currently, the Institute lacks a clear and effective system for planning, development and management of physical resources, replacement and maintenance of the ageing buildings and

equipment. In view of this, the Institute will need to establish an updated database of all CARI physical resources and their current status. When the research facilities and equipment are in place, CARI will establish a routine maintenance and calibration schedule for equipment in its laboratories to ensure that the equipment used by scientists are of acceptable standards and produce internationally acceptable results.

To achieve this purpose, the department shall be expected to:

- (i) Prepare and operationalize institutional long-term physical resources plan and management structure;
- (ii) Develop and operationalize strategies to acquire, develop and manage new institutional physical resources;
- (iii) Develop and operationalize policies, systems and procedures for allocating, sharing and maintenance of physical resources to optimize their use;
- (iv) Develop and operationalize physical resources accounting, assessment and disposal systems and procedures;
- (v) Develop and establish physical resource acquisition, development and management information systems.

4.3.4. Procurement and Supplies Services

The Government of Liberia Procurement and Concession Act (2010) has re-emphasized and made it mandatory that every public entity shall establish a procurement unit staffed with qualified procurement professionals. The Act also spells out procedures for procuring and disposal of unserviceable, obsolete or surplus stores and equipment by public entities in order to maximize efficiency, promote competition, integrity and fairness. CARI will comply fully with this by developing and operationalizing Procurement and Supplies Manuals in order to streamline the procurement and supply of goods and services as well as disposal of obsolete or surplus stores and equipment in line with the Public Procurement and Concession Act 2010.

Expeditious and effective procurement of goods and services coupled with their effective utilization is important for carrying out the operations of the Institute. The increasing complexity of the procurement process, the sophisticated nature of modern scientific equipment and the associated high cost, in particular, demands the establishment and staffing of the procurement unit in CARI.

During this Strategic Plan period, the purpose of the Procurement and Supplies Division shall develop and institutionalize efficient procurement and supplies system for enhancing the

generation and promotion of agricultural knowledge, information and technologies that respond to clients' demands and opportunities. To achieve this purpose, the unit shall be expected to:

- a. Identify and prioritize procurement and supply of goods and services functions required to improve the overall institutional efficiency and effectiveness;
- b. Develop and operationalize effective strategies to improve the overall procurement and supply procedures;
- c. Develop, operationalize and continuously update institutional procurement and supply management information system.

4.3.5. Planning, Monitoring and Evaluation

Globally, there has been declining funding for agricultural research. Given this scenario, CARI shall build institutional capacity towards proper management of existing scarce resources for improved efficiency and effectiveness. CARI shall invest in developing an institute-wide Planning, Monitoring and Evaluation (PM&E) Unit to assist the management in decision-making processes thereby making optimum use of human, financial and physical resources. In essence, the operation of PM&E affects the performance of the organization as a whole. Therefore, by strengthening PM&E at all levels of management, the Institute's goal, purpose, outputs and activities will be achieved in the most effective and efficient way.

Research planning in CARI shall follow a cycle which is divided into four main stages that include (i) Diagnosis, (ii) Project formulation, (iii) Project appraisal and approval and (iv) project implementation, monitoring and evaluation. In order to improve on the research planning and management, CARI will establish a Planning, Monitoring and Evaluation (PM&E) Unit. The purpose for the PM&E Unit shall be to develop and operationalize effective and efficient planning, monitoring and evaluation systems for enhancing the generation and promotion of agricultural knowledge, information and technologies that respond to clients' demands and opportunities. To achieve this purpose the unit shall be expected to:

- (i) Develop and operationalize effective and efficient institutional planning system;
- (ii) Develop and operationalize effective and efficient institutional monitoring system;
- (iii) Develop and operationalize effective and efficient institutional evaluation processes and procedures;
- (iv) Develop and operationalize effective and efficient institutional planning, monitoring and evaluation management information system.

4.3.6. Internal Financial and Assets Audit

CARI will be comprised of three research centres dealing with different research and outreach activities. In the process of implementing various research programmes, it shall employ scarce financial, human and physical resources. The use of these resources will require proper management for efficiency and effectiveness. The role of the Finance and Internal Audit Units shall be to assess whether the funds and assets are used according to work plans and regulations. In order to facilitate this, the Finance and Audit department shall be strengthened with a view of bringing in a systematic disciplined approach to evaluation and improvement on effectiveness of risk management, control and governance processes.

During this Strategic Plan period, the purpose of the Finance and Internal Audit Units shall be to develop and operationalize efficient and effective financial and assets management and audit for enhanced generation and promotion of agricultural knowledge, information and technologies that respond to clients' demands and opportunities. To achieve this purpose, the Units are expected to:

- a. Develop and operationalize effective and efficient institutional financial management system;
- b. Develop and operationalize effective and efficient institutional an internal financial audit system;
- c. Develop and operationalize effective and efficient institutional assets audit system;
- d. Develop and operationalize effective and efficient institutional financial and assets audit management information system.

4.3.7. Corporate and Legal Services

CARI is not a legal entity duly established under the Parliament Act, which would oblige it to act within the laws of the Republic of Liberia. Unlike other NARS in the region and the rest of the continent, CARI does not comply with the national laws nor does it observe international legal issues and effects arising from international and regional treaties and conventions affecting agricultural research and products. In addition to this, the institute is expected to ensure that all technologies and innovations developed by its research programmes are protected and properly managed through Intellectual Property policy and procedures.

If and when the Act establishing CARI is enacted, the purpose of the Institutional Corporate and Legal Services Unit shall be to develop and operationalize efficient and effective corporate and legal system for enhancing the generation and promotion of agricultural knowledge, information

and technologies that respond to clients' demands and opportunities. To achieve this purpose the unit shall be expected to:

- (i) Develop and operationalize effective and efficient institutional corporate and legal system,
- (ii) Formulate and operationalize effective and efficient Intellectual Property Rights policy and procedures;

4.3.8. Information Management and Communication Technology

The LASP and FAP identified low absorption of modern technologies as one of the challenges to agricultural growth in Liberia. This, therefore, calls for an agricultural innovation system that consistently provides appropriate technology, knowledge and information to the agricultural sector to cause the desirable change. The role of research systems in the promotion of uptake of knowledge is, however, not recognized due to mind-set on the uni-directional dissemination of results through the agricultural product value chain from research to extension to farmer. As a result, only a limited or no amount of time and budgets are allocated to project activities concerning communication, promotion and up-scaling of research results.

Additionally, the revolution taking place in information and communications technologies present a tremendous new opportunity for CARI to bring together scientific knowledge, information and technology generated in response to national agricultural sector challenges and constraints.

These advances will enable innovative generation and dissemination of relevant and timely information.

The information revolution has also exposed CARI to the networked universe of knowledge. It is also asserted that increased utilization of existing agricultural information, knowledge and technologies is considered a key factor in delivering Millennium Development Goals (MDGs).

Given these developments in the information sector, CARI shall develop an Information Management and Communication Technology (IMCT) Unit to provide effective and efficient framework for managing knowledge and information resources within CARI in support of agricultural research. To achieve this role, the IMCT Unit shall work closely with research programmes to ensure that knowledge, information and technologies generated are appropriately packaged and disseminated to different stakeholder categories using appropriate communication media and channels.

In view of this, the purpose for the Information Management and Communication Technology Unit shall be to develop and operationalize effective and efficient system for packaging and promoting agricultural knowledge, information and technologies that respond to clients' demands and opportunities. To achieve this purpose, the Division shall be expected to:

- (i) Develop and improve the institutional information technology infrastructure and information systems;
- (ii) Strengthen and improve the institutional publication services and products;
- (iii) Strengthen and improve the library products and information services;
- (iv) Develop and utilize effective corporate communication and marketing products and services.

5.0. Implementation of the Strategic Plan

This Strategic Plan has been developed in the context of the prevailing Government and donor policies that require a reorientation and positioning of the institute to effectively address the agricultural sector challenges and constraints facing the agricultural product value chains. The institutional strategic results outlined in this strategy can only be realized through sound implementation plans. It is therefore recommended that an implementation Strategic Plan that shall be underpinned by an integrated and holistic approach based on a national research framework carried out through priority thrusts and associated interventions for addressing priority agricultural product value chains be prepared.

The implementation of the Strategic Plan shall be underpinned by an integrated and holistic approach based on a national research framework carried out through priority thrusts and associated interventions for addressing priority agricultural product value chains. The implementation of the plan will further incorporate joint planning and participation so as to ensure that multiple views, needs and concerns in resolving priority agricultural product value chain issues at different levels are taken into account and negotiated. The plan thrust areas will be addressed through nationally coordinated APVC-based projects. Organizational synthesis, networking and sharing of lessons learned will be used to improve the value of the research findings.

The implementation of nationally coordinated APVC-based projects would require the establishment and maintenance of better working relationships and partnerships between each

APVC key players/stakeholders. In order to facilitate this, there will be a need to create and operationalize a mechanism for establishing flexible alliance frameworks that allow different CARI centres and other organizations like BRAC and other private sector key players, to form temporary APVC Teams to solve particular problems in a specified period. The formation of such temporary APVC teams will ensure the availability of a critical mass of scientists with the right disciplinary mix to provide multidisciplinary solutions for priority problems.

Besides the research coordination functions that will be provided within the management structure of CARI, there will be need for the formation of consortia composed of key stakeholders to manage identified APVCs from analysis, through research to information dissemination and catalyzing technology up-take. In the formation of the APVC consortia, CARI shall work closely with the MOA, Agricultural Sector Group and the agricultural sector to ensure effective formation and functioning of the consortia.

5.1. The Strategic Plan Implementation Framework

To operationalize the Strategic Plan, the CARI shall develop a detailed Implementation Framework (IF) covering the same period as the Strategic Plan (2015-2025) rather than medium term plans of shorter periods. This is in recognition that research projects and activities have a long gestation period to complete (Sierra Leone Agricultural Research Institute – SLARI (2008).

The IF shall, in turn, be operationalized through rolling Annual Work plans in which the necessary and sufficient activities and their respective milestones required to deliver each yearly target shall be specified. The annual work plans will be linked to the annual Performance Contract (PC) targets.

The rolling annual workplans shall also allow the research agenda to be reviewed in close consultation with the relevant key stakeholders and adjusted in the context of emerging priorities and funding opportunities. The annual workplans shall be expected to provide full details on the outputs and their respective intervention strategies, activities, milestones, operational budgets and the implementing centres and collaborating institutions/organizations.

5.2. The Phasing of CARI's Redevelopment

Given the current state of CARI and the necessary resources and linkages that require development, it is suggested that the institute has an agriculture strategic plan covering the next

ten years, operational planning should involve two plans, one of five years (with a transitional Phase of 1 year) to be followed by an Operational Plan for the subsequent nine years.

5.2.1. The first five years Phase 1

This would involve:

- Establish the governance structure of CARI, including the recruitment of an experienced Director General and Deputy DG for research from sub-regional agricultural research institutes or elsewhere based on competence to oversee the re-organization of CARI and to nurture the implementation of this Phase;
- Properly securing the Suakoko site;
- Deciding upon and establishing initial core programs;
- Providing the required equipment for the core programs;
- Give priorities to the following infrastructures:
 - a. Construct central warehouses and storage facilities;
 - b. Rehabilitate existing staff residences;
 - c. Construct laboratories and screen houses
 - d. Complete all on-going infrastructural facilities, including the lowland irrigation and water management systems;
 - e. Acquire and stock agro-mechanization equipment and spares
 - f. Strengthen existing collaborations and partnership, and initiate new partnerships (NARS and sub-region);
 - g. Restore basic utilities and infrastructures
 - h. Develop an overall master plan for infrastructural development at CARI (laboratories, libraries, housing, water systems, electricity, garages, warehouses, conference hall, schools, clinic, etc.)
- Ensuring basic staffing for the core programs:
 - o Explore recruitment of qualified nationals from within country or from abroad
 - o Training/ mentoring programs for existing staff;
 - o Explore potential for undergraduate internships to select future staff;
- Initiating regional linkages to programs and collaborative programs (which incorporate research infrastructural development, staff training and mentoring);
- Initiating collaborative research programs (incorporate research infrastructural development, staff training and mentoring).

5.3. Monitoring and Evaluation

During the implementation of the different activities, a continuous participatory and rigorous self-monitoring and evaluation shall be encouraged. To monitor and evaluate progress during the implementation, CARI and the collaborating institutions/organizations shall also undertake internal and external programme reviews over the Strategic Plan and the results of the reviews widely circulated to the relevant agricultural sector ministries, development partners and key stakeholders.

In order to institutionalize the monitoring and evaluation process, CARI shall develop and operationalize a suitable monitoring and evaluation system/mechanisms capable of tracking the implementation of the approved APVC-based projects and activities. The monitoring and evaluation system shall include the use of result frameworks, workplans, field visits, quarterly and annual reports, mid-term internal evaluation, biannual conferences and end of term external evaluation.

Outputs of all research activities undertaken will be consolidated into annual reports and shared among stakeholders. The research results obtained will also be presented in conferences, symposia and published as Journal articles for wider information and knowledge sharing.

In addition, all data captured will be appropriately stored for ease of retrieval and will form the basis for subsequent impact evaluation of projects. The output and outcome indicators of the various interventions are shown in the institutional Result Framework and the Outcome Mapping of the Institute's Research Thematic Areas of Intervention for Better Impact Orientation matrixes shown in Annexes 2 and 3. The indicators will form the basis for preparing the detailed annual work plans and performance contracts.

The Strategic Plan has been summarized into an institutional result framework and an outcome mapping of the thematic areas of intervention for better impact orientation with clear output and outcome indicators of the various interventions that are expected to form the basis for monitoring and evaluation of the implementation of the Strategic Plan.

5.4. Human Resource Development (with adaptations from Fitzsimons & Tegbaru (201)

A major challenge to the revitalization of CARI's research capacity is that of human resources. The civil war resulted in the loss or dispersal of much of the skilled technical and professional manpower and negatively impacted the education of the subsequent generation. It is felt that the available human resource capacity clearly shows the yawning gap between technical staffing requirement and current reality whereby most of the staff is unskilled labor. A strategy is needed on how this might be addressed.

The various mechanisms available for research capacity development can operate at both the institutional and individual level and will change over time with the stage of re-development of the institution (Annex 4). In the early stages of re-development the focus might be upon attracting key personnel back and collaborative partnerships at the regional or international level. As a cadre of core staff is assembled and becomes functional, the focus would shift to building upon the re-development of the country's higher education system and on-going capacity development of institutional personnel. Central to the maintenance of the cadre of professional and technical staff will be the development of HRM strategy and career paths for trained staff within CARI.

Mechanisms for institutional capacity development mostly involve partnership or collaborative arrangements with institutions at the regional or international scale such as IITA, Africa Rice, other CGIAR centres, UN agencies, EU, Strong NARS from other African countries (Kenya, South Africa, Nigeria etc) and regional forums such as FARA and CORAF.

These might be focused purely on research training or be an integral component of larger infrastructural investment and development programs and activities.

Recruiting appropriately skilled personnel still in the country as well as those who have moved abroad is, on the surface, a rapid way to address the capacity deficit. However, persons who have left the country and re-established elsewhere maybe both reluctant and expensive to attract back although they may be amenable to participation in short term mentoring schemes.

A range of methods for **on-going capacity enhancement of institution personnel** can and have been initiated rapidly with existing employees as well as expanded in the future.

These range from mentoring schemes and short term training in specific skills to longer term enhancement through advanced degree programs. Given the present lack of advanced degree programmes in Liberia, such training would have to be taken abroad which involves issues of cost, as well as ensuring graduate return both to the Institute and even the country upon completion.

In the long term, the supply of future agricultural researchers of Liberia must come in large part from the country's **higher education system**. This too is in process of regeneration. Central to the provision of skilled personnel will be curriculum upgrading and modernization of teaching methods and university research programs which can be linked to CARI programs under its partnership program. As the education system is revitalized, it has potential to integrate more effectively with the agricultural research system through placements and internships which can lead to recruitment of good students on completing of their programs.

The subsequent five years would build upon the achievements of the first 5 year transitional phase to strengthen/ expand core programs, regional and international collaborations

and staff capacity development. A detailed timetable/roadmap for the revitalization of CARI is detailed in Annex 5.

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Annex 2. Logical framework for CARI Strategic Plan

Intervention Logic	Objectively Verifiable Indicators by 2015	Means of Verification	Assumptions
<p>Overall Goal To contribute to increased productivity, commercialization and competitiveness of the agricultural sector</p>	1.1. 6 percent research contribution to the growth in the agricultural sector.	1.1 National impact Assessment reports. 1.2 Economic survey reports.	1.1 Government policies will continue to be favorable to the development of agricultural sector
<p>Purpose Agricultural knowledge, information and technologies that respond to clients' demands and opportunities generated and promoted.</p>	1.1. 10 percent increase in agricultural productivity attributed to adoption of research knowledge, information and technologies. 1.2. 10 percent increase in agricultural commercialization attributed to adoption of research knowledge, information and technologies. 1.3. 10 percent increase in agricultural competitiveness attributed to adoption of research knowledge, information and technologies.	1.1 Government reports. 1.2 Institutional reports. 1.3 External evaluation and impact assessment reports. 1.4 Programme reports.	1.1 Enabling policy environment for increasing agricultural productivity, commercialization and competitiveness will prevail. 1.2 Political stability will continue to prevail in the country.
Institutional Level Results			
1.0. Technologies and innovations for demand-driven agricultural product value chains	1.1. At least 20 Technologies and innovations developed and promoted along different product value chains. 1.2. 10 of the developed and promoted technologies and innovations adopted by clients along different product value chains.	- do -	1.1 Agricultural sector will continue to be a major driver of the national economy. 1.2 The government will continue to support agricultural research 1.3 Favorable weather

generated				conditions prevail.
2.0. Markets and marketing strategies for agricultural product value chains identified and promoted.	2.1. marketing strategies identified and utilized for different product value chains.	- do -		- do -
	2.2. markets identified and utilized for different product value chains.			
3.0. Policy options for enhancing demand driven agricultural product value chains facilitated and advocated.	3.1. researchable policy issues addressed and recommended to decision makers.	- do -		- do -
	3.2. policy options for enhancing different product value chains identified and advocated to decision makers.			
4.0. Capacity for Implementing agricultural product value chain research strengthened.	4.1. 50% increase in human resource with the right mix, skills, attitude and knowledge.	- do -		- do -
	4.2. 50% increase in institutional financial sustainability and health.			
	4.3. 30% increase in required institutional physical resources.			
5.0. Availability of knowledge, information and technologies on agricultural product value chain research enhanced.	5.1. 50% stakeholder categories and their communication needs identified and documented.	- do -		- do -
	5.2. 50% increase in produced communication products.			
	5.3. 50% increase in the demand for institutional knowledge and information.			
Intervention Logic	Objectively Verifiable Indicators by 2015	Means of Verification		Assumptions

Research intervention strategies for increasing productivity, commercialization and competitiveness of the agricultural sector.

- 1.0. Development and promotion of integrated crops product value chains.
- 2.0. Development and promotion of integrated livestock and fisheries product value chains.
- 3.0. Enhancement of sustainable and integrated management of natural resources.
- 4.0. Enhancement of use of biotechnology and genetic resources management.
- 5.0. Enhancement of utilization of socioeconomic and applied statistics information in research.
- 6.0. Enhancement of appropriate adaptive research, outreach and partnerships methodologies and approaches.

Each of the research thematic area of intervention shall be expected to contribute to the attainment of the five institutional results.

Corporate research support functions and services contribution for increasing productivity, commercialization and competitiveness of the agricultural sector.

- 1.0. Human resource development and management.
- 2.0. Financial resource acquisition and management.
- 3.0. Physical development and management.
- 4.0. Procurement and supplies services.
- 5.0. Planning monitoring and evaluation.
- 6.0. Internal financial and assets audit.
- 7.0. Corporate and legal services.
- 8.0 Information management and communication technology.

Each of the corporate research support functions and services shall be expected to contribute to the attainment of the five institutional results.

Annex 3: Outcome mapping of the institute’s research thematic areas of intervention for better impact orientation

Goal/Impact

To contribute to increased productivity, commercialization and competitiveness of the agricultural sector

1. Purpose/Outcome

Crops knowledge, information and technologies that respond to clients’ demands and opportunities generated and promoted.

Purpose/Outcome Indicators by 2025

1.1. 20 technologies and innovations for demand-driven crops product value chains generated and promoted.

1.2. 10 markets and marketing strategies for crops product value chains identified and promoted.

1.3. 5 policy options for enhancing demand-driven crops product value chains advocated and facilitated.

1.4. 30% increase in capacity for implementing crops product value chain research.

1.5. 30% increase on crops product value chains research knowledge and information communication products for different communication stakeholder categories.

Outputs	Responsible/ Collaborators	Intended users	Intermediate Outcome
1.0. Integrated food crops and crop health product value chains for increased productivity, commercialization and competitiveness of the crop sub-sector developed and promoted.	Researchers, Extension, Farmers/Clients, Private sector, Relevant Ministries and parastatals, Processors, NGOs/CBOs and development partners	Farmers/Clients, Traders, Processors, Extension Agents, Researchers, Planners and Policy Makers	Increased productivity, commercialization and competitiveness of the food crops and crop health product value chains.
2.0. Integrated horticulture and industrial crops product value chains for increased productivity, commercialization and competitiveness of the crop sub-sector developed and promoted.	-do -	-do -	Increased productivity, commercialization and competitiveness of the horticulture and industrial product value chains.

2.0. Development and Promotion of Integrated Livestock and fisheries Product Value Chains.

Purpose/Outcome Indicators by 2025

2.1. 30 technologies and innovations for demand-driven livestock product value chains generated and promoted.

2.2. 5 markets and marketing strategies for livestock product value chains identified and promoted.

2.3. 3 policy options for enhancing demand-driven livestock product value chains advocated and facilitated.

2.4. 30% increase in capacity for implementing livestock product value chain research.

2.5. 30% increase on livestock product value chains research knowledge and information communication products for different

communication stakeholder categories.

Outputs	Responsible/ Collaborators	Intended users	Intermediate Outcome
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<p>1.0. Integrated animal production product value chains for increasing productivity, commercialization and competitiveness of the livestock and fisheries sub-sector developed and promoted.</p>	<p>Researchers, Extension, Farmers/Clients, Private sector, Relevant Ministries and parastatals, Processors, NGOs/CBOs and development partners</p>	<p>Farmers/Clients, Traders, Processors, Extension Agents, Researchers, Planners and Policy Makers</p>	<p>Increased productivity, commercialization and competitiveness of the animal production product value chains.</p>
<p>2.0. Integrated animal health systems for increasing productivity, commercialization and competitiveness of the livestock sub-sector developed.</p>	<p>- do -</p>	<p>- do -</p>	<p>Increased productivity, commercialization and competitiveness of the animal health sub-sector.</p>
<p>3.0. Integrated forage resource and ranch based animal product value chains for increasing productivity, commercialization and competitiveness of the livestock and fisheries sub-sectors developed and promoted.</p>	<p>-do-</p>	<p>-do-</p>	<p>Increased productivity, commercialization and competitiveness of the ruminant and non-ruminant animal resource and animal product value chains.</p>
<p>3.0 Enhancement of Sustainable and Integrated Management of Natural Resource.</p>			
<p>Goal/Impact</p>			
<p>To contribute to increased productivity, commercialization and competitiveness of the agricultural sector.</p>			
<p>Purpose/Outcome</p>			
<p>Natural resource management knowledge, information and technologies that respond to clients' demands and opportunities generated and promoted.</p>			
<p>Purpose/Outcome Indicators by 2014</p>			
<p>3.1. 10 natural resource management research technologies and innovations for demand-driven crops and livestock product value chains generated and promoted.</p>			
<p>3.2. 3 markets and marketing strategies for natural resource management product value chains identified and promoted.</p>			
<p>3.3. 3 policy options for enhancing natural resource management for demand-driven natural resource management product value chains advocated and facilitated.</p>			
<p>3.4. 30% increase in capacity for implementing natural resource management product value chains research.</p>			
<p>3.5. 30% increase on natural resource management product value chains research knowledge and information communication products for different communication stakeholder categories.</p>			

Outputs	Responsible/ Collaborators	Intended users	Intermediate Outcome
1.0. Land use planning for increasing productivity, commercialization and competitiveness of priority crops and livestock product value chains improved.	<p>Researchers, Extension, Farmers/Clients, Private sector, Relevant Ministries and parastatals, Processors, NGOs/CBOs and development partners</p>	<p>Farmers/Clients, Traders, Processors, Extension Agents, Researchers, Planners and Policy Makers</p>	<p>Improved and sustainable land use for increased crops and livestock productivity</p>
2.0 Soil and water conservation for increasing and sustainable productivity, commercialization and competitiveness of priority crops, livestock and fisheries product value chains improved.	-do-	-do-	<p>Improved soil and water conservation for increased priority crops, livestock and fisheries productivity</p>
3.0. Integrated soil fertility management for increasing productivity, commercialization and competitiveness of priority crops, livestock and fisheries product value chains improved.	-do-	-do-	<p>Efficient and integrated soil fertility management for increased of priority crops, livestock and fisheries productivity</p>
4.0 Irrigation, drainage and management of problem soils for increasing productivity, commercialization and competitiveness of priority crops, livestock , and fisheries sub-sector	-do-	-do-	<p>Efficient irrigation, drainage and management of problem soils for increased priority crops, livestock and fisheries productivity</p>
5.0 Adaptation and mitigation of effects of climate change for increased commercialization and competitiveness of priority crops, livestock and fisheries product value chains	-do-	-do-	<p>Improved climatic conditions for increased and sustainable crops, livestock and fisheries</p>

improved.

productivity

4.0 Enhancing the Use of Biotechnology and Genetic Resources

Goal/Impact

To contribute to increased productivity, commercialization and competitiveness of the agricultural sector.

Purpose/Outcome

Biotechnology and genetic resources management knowledge, information and technologies that respond to clients' demands and opportunities generated and promoted.

Indicators by 2014

4.1. 8 biotechnology and genetic resources management technologies and innovations for demand-driven crops and livestock product value chains generated and promoted.

4.2. 5 markets and marketing strategies for biotechnology and genetic resources management product value chains identified and promoted.

4.3. 3 policy options for enhancing biotechnology and genetic resources management for demand-driven crops and livestock product value chains advocated and facilitated.

4.4. 30% increase in capacity for implementing biotechnology and genetic resources management product value chain research.

4.5. 30% increase on biotechnology and genetic resources management product value chains research knowledge and information communication products for different communication stakeholder categories.

Outputs	Responsible/ Collaborators	Intended users	Intermediate Outcome
1.0 Development and promotion of biotechnology product value chain for increasing productivity, commercialization and competitiveness of agricultural sector	Researchers, Extension, Farmers/Clients, Private sector, Relevant Ministries and parastatals, Processors, NGOs/CBOs and development partners	Farmers/Clients, Traders, Processors, Extension Agents, Researchers, Planners and Policy Makers	Increased productivity, commercialization and competitiveness of the crops and livestock product value chains.
2.0 Acquisition and conservation of genetic resources product value chain for increasing productivity, commercialization and competitiveness of agricultural sector.	-do-	-do-	Improved acquisition and conservation of genetic resources

3.0 Maintenance, multiplication and promotion of pre-released product value chain for increasing productivity, commercialization and competitiveness of agricultural sector.	-do-	-do-	Improved maintenance, multiplication and promotion of pre-released crop varieties
5.0. Enhancing the utilization of socioeconomic and applied statistics information in research.			
Goal/Impact			
To contribute to increased productivity, commercialization and competitiveness of the agricultural sector.			
Purpose/Outcome			
Socioeconomics and applied statistics knowledge and information that respond to clients' demands and opportunities for development of appropriate agricultural technologies generated and promoted.			
Purpose/Outcome Indicators by 2025			
5. 10 socioeconomics studies and applied statistics training and services for enhancing the development of appropriate technologies and innovations for demand-driven agricultural product value chains undertaken and promoted.			
5.2. 10 socioeconomics and applied statistics markets and marketing strategies for enhancing agricultural product value chains identified and promoted.			
5.3. 5 policy options for enhancing socioeconomics and applied statistics for demand-driven agricultural product value chains advocated and facilitated.			
5.4. 50% increase in the capacity for implementing socioeconomics and applied statistics for demand-driven agricultural product value chains research.			
5.5. 50% increase in socioeconomics and applied statistics knowledge and information communication products for different communication stakeholder categories.			
Outputs	Responsible/ Collaborators	Intended users	Intermediate Outcome
1.0. The use of socioeconomic information in the development of appropriate technologies and innovations for demand driven agricultural product value chains enhanced.	Researchers, Extension, Farmers/Clients, Private sector, Relevant Ministries and parastatals, Processors, NGOs/CBOs and development partners	Farmers/Clients, Traders, Processors, Extension Agents, Researchers, Planners and Policy Makers	Increased productivity, commercialization and competitiveness of the agricultural product value chains.
2.0 Market and policy information and knowledge along different agricultural	-do-	-do-	Improved availability

product value chains analyzed and provided.

of product value chains market and policy information and knowledge

3.0 Development and -do- promotion of use of appropriate applied statistical research methods and services in research planning, implementation and analysis.

Improved utilization of applied statistical research methods and services in research planning, implementation and analysis.

6.0. Enhancing the Use of Appropriate Adaptive Research, Outreach and Partnerships Methodologies and approaches

Goal/Impact

To contribute to increased productivity, commercialization and competitiveness of the agricultural sector.

Purpose/Outcome

Adaptation and scaling up of knowledge and information that respond to clients’ demands and opportunities for development of appropriate agricultural technologies generated and promoted.

Purpose/Outcome Indicators by 2014

- 6.1. 20 demand-driven agricultural product value chains technologies and innovations adapted and up scaled.
- 6.2. 50 markets and marketing strategies for demand-driven agricultural product value chains adapted and up scaled.
- 6.3. 3 policy options for enhancing adaptation and up scaling of demand-driven agricultural product value chains technologies and innovations advocated and facilitated.
- 6.4. 50 percent increase in the capacity for adapting and up scaling of demand-driven agricultural product value chains technologies and innovations.
- 6.5. 50 percent increase on adaptation and up-scaling knowledge and information communication products for different communication stakeholder categories.

Output	Responsible/ Collaborators	Intended users	Intermediate Outcome
1.0. Adaptation of demand-driven technology and innovation packages for improved productivity, commercialization and competitiveness of the agricultural product value chains promoted.	Researchers, Extension, Farmers/Clients, Private sector, Relevant Ministries and parastatals, Processors, NGOs/CBOs	Farmers/Clients, Traders, Processors, Extension Agents, Researchers, Planners and Policy	Improved productivity, commercialization and competitiveness of the agricultural product value chains

	and development partners	Makers	
2.0. Scaling up of demand-driven technology and innovation packages for improved productivity, commercialization and competitiveness of the agricultural product value chains promoted.	-do-	-do-	Increased scaling up and uptake of demand driven technology and innovation packages
3.0. Strategic and beneficial partnerships for improving productivity commercialization and competitiveness of the agricultural product value chains established and operationalized.	-do-	-do-	Functional strategic and beneficial partnerships
7.0 Improvement of Corporate Research Support Functions and Services			
Goal/Impact			
To contribute to increased productivity, commercialization and competitiveness of the agricultural sector.			
Purpose/Outcome			
Contribution of the corporate research support functions and services to the generation and promotion of knowledge, information and technologies that respond to clients' demands and opportunities improved.			
Purpose/Outcome Indicators by 2014			
7.1. 20 improved corporate research support functions and services contributing to the development of appropriate technologies and innovations for demand-driven agricultural product value chains.			
7.2. 2 improved corporate research support functions and services contributing to the development of appropriate markets and marketing strategies for demand-driven agricultural product value chains.			
7.3. 5 improved corporate research support functions and services contributing to the advocacy and facilitation of formulation of appropriate policy options for enhancing demand-driven agricultural product value chains.			
7.4. 50% increase in the capacity for implementing improved corporate research support functions and services for enhancing the development of demand-driven agricultural product value chains research.			
7.5. 15% increase in improved corporate research support functions and services knowledge and information communication products for different communication stakeholder categories.			
Outputs	Responsible/ Collaborators	Intended users	Intermediate Outcome
1.0. Human resource and development	Researchers, Extension,	Administrators,	Improved institutional

management improved.	Farmers/Clients, Private sector, Relevant Ministries and parastatals, Processors, NGOs/CBOs and development partners	Research Managers, Planners, Policy Makers	human resource capacity
2.0. Financial resource mobilization/acquisition and management improved.	-do-	-do-	Improved financial resources acquisition and management.
3.0. Physical resource development and management improved.	-do-	-do-	Improved physical resource development and management.
4.0. Procurement and supplies services improved.	-do-	-do-	Improved procurement and supplies services.
5.0. Planning, monitoring and evaluation improved.	-do-	-do-	Improved Planning, monitoring and evaluation system.
6.0. Internal financial and assets audit improved.	-do-	-do-	Improved Internal audit system
7.0. Corporate and legal services improved.	-do-	-do-	Improved Corporate and legal services.
8.0. Information management and communication technology improved.	-do-	-do-	Improved Information management and communication technology.
9.0 Sustainable funding for agricultural research	-do-	-do-	Improved sustainable funding for research.
Improved			

Annex 4. Methods for Institutional HR Capacity Development

Research partnerships
Twinning arrangements
Collaborative research,

Recruitment of Former Skilled Personnel

Incentives for Southern expatriates in the North to return to their countries of origin

Pre-employment Agriculturally Focused Disciplinary Education

Curriculum development and adaptation / modification of teaching methods and contents
Vocational/technical training
Degree courses of different levels
Internships / work placements
Bonding (retention of students after courses)

Capacity Development for Institution Personnel

Developing HRM strategies and career paths for trained staff,
Short courses,
Distance learning
Workplace learning / on-the-job learning/ Job rotation
Exchange visits,
Mentorship systems
Short-term research secondments
Internships / work placements /
Conference / workshop participation
Hosting conferences / workshops,
Study visits (South-South, South-North)
Write shops for project proposal and documentation
Support for project design and management
Formal Degree courses of different levels

Annex 5. Central Agricultural Research Institute (CARI). Agricultural Research Implementation/Operational Plan

EVENT/ ACTION TO BE UNDERTAKEN	TASKS/ ACTIVITIES	RESPONSIBLE PARTIES	PERFORMANCE INDICATOR(S)	STATUS	COMMENTS	START	END
PHASE I: AGENDA FOR PLANNING REFORM AND RESTRUCTURE OF CARI							
Assessment: Conduct full assessment of institutional capacity;	<ol style="list-style-type: none"> 1. Review existing policy framework/statements and relevant protocols and accessions and agreements; 2. Assess policy environment and political will supportive of true reform meeting minimum acceptable standards informed by best practices, 3. Conduct site visits and desk research 4. Hold interviews and consultations with relevant stakeholders 5. Analyze CARI's capacity to carry out its mission and mandate considering the constraints, challenges and policy environment of a post crises nation. 6. Produce report/tor to inform decision making on the road map for the revitalization of CARI; 	MOA CARI Donors Development Partners	Assessment report(s) completed	1. Various assessment reports and situation analyses on CARI completed and published (USAID FUNDED TA-MOA); (ToR Report produced Tegbaru IITA-Canada support Assessment completed, others.	Instruments, policy statements and assessment reports: FAPS, PRS, CAADP, FSNS, LASIP/NAIS, TA-MOA(MOA), TA-MOA(CARI); TegbaruToR; others	2007	Ongoing
Workshop: On review and visioning of CARI's Mandate/function and validation of institutional capacity assessment reports;	<ol style="list-style-type: none"> 1. Hold round table forum to review and validate findings and proposals from assessment reports, 2. Review mission, vision, mandate, functions and organization of CARI 3. Seek stakeholders (donors, farmers, legislators, public sector, and private sector, commodity working groups, etc.) endorsement and approval for 	MOA CARI Stakeholders representatives	Report endorsed and implementation of recommendations approved	Ministerial approval granted for implementation; Directive issued for implementation of the restructuring and reform program	1. Stakeholder review, consideration and validation assumed to have been completed 2. Approval and endorsement attained, 3. Stakeholders congruence establish	2011	Dec. 2013

	institutional reform and restructure, and the drafting of a plan to implement the recommendations starting with the consensus decision for drafting of an Agriculture Research Strategic Plan(ARSP)						
Recruit Consultants	1. Develop Concept notes, ToR for consultancy 2. Contract/hire technical consultancy to draft ARSP	MOA CARI	Consultants hired, work in process	Consultants hired	In January CARI interim advisory board held a one day round table forum in Suakoko and develop the concept document, which informed the subsequent TOR for the consultancy contract	Jan, 2014	May 2014
<u>Develop the CARI Agriculture Research Strategic Plan</u>	1. Review existing policy framework/statements of previous assessment reports and decisions from previous stakeholders workshops relevant to CARI; 2. Conduct site visits and desk research; hold interviews and consultations with relevant stakeholders ; 3. Analyze CARI's capacity, structure, organization and functions relating to capacity to carry out mandate as defined/redefined; 4. Produce draft ARSP report with implementation plan for operationalizing ARSP when finally approved	Consultants ,PMU MOA, CARI	ARSP finalized	ongoing	Consultants have presented and discussed the inception report and are completing the draft of the ARSP, A one day forum for stakeholders review and input to the draft has been planned	June, 2014	July, 2014
Workshop	1. Hold round table forum to review and validate the ARSP 2. Invite stakeholders representatives- donors, farmers, legislators, public sector, and private sector, commodity working groups, etc. 3. Seek stakeholders endorsement and	PMU, MOA	Draft ARSP reviewed, inputs made, ARSP Finalized and submitted	Workshop planned	A one day forum for stakeholders review and input to the draft has been planned Inputs and contribution from workshop incorporated	July 2014	July2014

	approval for Implementation of the ARSP and the implementation plan that operationalizes the ARSP 4. Produce final ARSP report				in final ARSP		
PHASE II: OPERATIONALIZING THE IMPLEMENTATIONAL PLAN OF THE AGRICULTURE RESEARCH STRATEGIC PLAN							
Appoint Transition /Interim CARI Management Team (T/ICMT)	1. Appoint T/ICMT	MOA	T/ICMT appointed	To be Implemented/ Executed	Responsible Party (ties) to Direct, Coordinates, Lead, provide Oversight and/or Implement.	Oct. 2014	Oct. 2014
Conduct Statutory review; Establish Legal Frame Work;	1. Review Liberian laws, statutes and regulations relating to national research institutes (NARS) with respect to semi autonomy and Governance (Corporate Structure) 2. Review laws, statutes and regulations of selected similarly placed countries relating to national research institutes (NARS) with respect to semi autonomy and Governance (Corporate Structure) 3. Review references from related work done by the CGIARs 4. Establish a formal governance structure for CARI 5. Draft Bill for enactment supportive of a status of Operational Semi-Autonomy; 6. Hold stakeholders workshop on drafted bill 7. Appoint committee to lobby, create awareness and sustain the drive for ratification and signing into law	T/ICMT; MOA, MOJ, LNBA, LAW REFORM COMMISSION, PRIVATE LEGAL RESOURCE PERSONS, DONORS, FARMER UNION	Bill drafted Bill passed	To be Implemented/ Executed	Responsible Party (ties) to Direct, Coordinates, Lead, provide Oversight and/or Implement.	Aug, 2014	Dec, 2014
Review and put in place the operation management system, organizational structure and Define roles, job description and terms of references	1 Establish operation management system & organizational structure in line with vision, mission Statement and defined mandate 2. Define functional,	T/ICMT	Management system organizational structure setup and roles, jobs description and terms of reference for	To be Implemented/ Executed	Responsible Party (ties) to Direct, Coordinates, Lead, provide Oversight and/or Implement.	Oct, 2014	Mar, 2015

for key positions;	administrative and roles and tors for The Board of Directors/Management, Director General, Deputy Director General, Assistant Director General (Finance & Administration), Directors and other Professional and Technical Staff		key positions defined				
Establish Permanent management team (PMT)	1. Appoint DG 2. Recruit DDG-Research 3. Recruit Program directors	MOA		To be Implemented/Executed	Responsible Party (ties) to Direct, Coordinates, Lead, provide Oversight and/or Implement.	Oct , 2014	Mar, 2015
Develop appropriate strategies/plans staff acquisition, training and retention plans ;	1. Define methods for HR capacity development; 2. Identify training needs and develop Staff Training & development Plans & Programs based on staff needs assessment; Corporate level training areas a. (General management) b. Information Communication Technology Core Program Training needs/areas	PMT	Research partnerships and twinning arrangements established, collaborative research, recruitment of former skilled staff, mentoring system, curricula development for academia concluded, and contract hire possibilities explored, etc.	To be Implemented/Executed	Responsible Party (ties) to Direct, Coordinates, Lead, provide Oversight and/or Implement.	August , 2014	March 2015
Develop Research Program & Projects	1. Establish consensus on provisional structure on NAIS as proposed in FAPS and LASIP, 2. Establish the formal process for prioritization research activities: <i>on</i> 1. Land and Water Resource Management 2. Crop development research and 3. Livestock and Fisheries Research	PMT	1. Appropriate technologies and knowledge in crop, soil and water management, livestock and fisheries research developed and validated 2. Appropriate participatory and consultative technology development approaches and methodologies enhanced	To be Implemented/Executed	Responsible Party (ties) to Direct, Coordinates, Lead, provide Oversight and/or Implement.	Oct, 2014	
Develop Plans , Programs and Strategies for Strengthening Research/ Extension /Farmer Linkages	1. Develop, establish & strengthen collaboration, network and linkages with local and international sectors, institutions and	PMT	1. knowledge and technologies disseminated 2. The process of outreach and adoption of	To be Implemented/Executed	Responsible Party (ties) to Direct, Coordinates, Lead, provide Oversight and/or	Oct, 2014	

